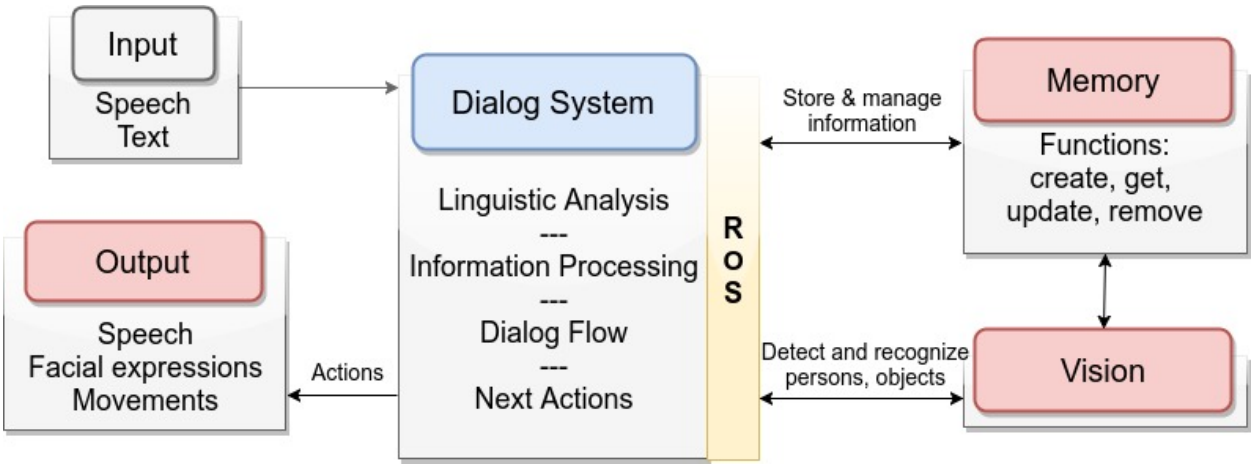
Roboy Dialog Manager

Release 0.0.

Jul 04, 2018

Usage and Installation

This project aims to implement human-like conversation routines for the humanoid anthropomimetic robot Roboy. The overview diagram shows the external systems which Dialog System interacts with, and the tasks for which the system is responsible.



CHAPTER 1

Status

Stable functionality:

- Roboy introduces himself
- Roboy answers questions about himself
- Roboy recognizes once someone says his name
- Roboy asks questions people he meets

In development:

- Roboy stores and recalls information (name, occupation, ect.) about people he meets
- Roboy recognizes the intent behind an asked questions (age, creator, capabilities etc.)

CHAPTER 2

Contents:

2.1 Installation

We use Apache Maven build automation tool.

2.1.1 Using command line

Install Maven on the computer. `sudo apt install maven`

Clone the Dialog Manager repository. `git clone https://github.com/Roboy/DialogSystem`

Navigate to the root module. `cd DialogSystem`

Compile the project - Maven will take care of the rest. `mvn compile`

Execute the project. `mvn exec:java -Dexec.mainClass="roboy.dialog.DialogSystem"`

2.1.2 Using IDE (Eclipse, Intellij IDEA)

Clone the Dialog Manager repository. `git clone https://github.com/Roboy/DialogSystem`

Now, import Dialog System as a Maven project into the IDE of your choice. Build and execute using `roboy.dialog.DialogSystem` as the main class.

2.2 Getting started

2.2.1 How does it work?

The basic NLP architecture is designed as a pipeline.

1. An input device (derived from `de.roboy.io.InputDevice`) is producing text.

2. The text is is passed to a variety of linguistic analyzers (derived from `de.roboy.linguistics.sentenceanalysis.Analyzer`). This currently consists of a Tokenizer and a POS tagger (both in `de.roboy.linguistics.sentenceanalysis.SentenceAnalyzer`) but could in the future be accompanied by named entity recognition, a syntactical and semantical analysis, an interpretation of the sentence type or other tools.
3. The results of all these linguistics analyzers are collected together with the original text and stored in an Interpretation instance. (`de.roboy.linguistics.sentenceanalysis.Interpretation`)
4. The interpretation ispassed on to a state machine (states are derived from `de.roboy.dialog.personality.states.State`) within a personality class (derived from `de.roboy.dialog.personality.Personality`) that decides how to react to the utterance. In the future, the intentions (`de.roboy.logic.Intention`) determined by the state machine will then formulated into proper sentences or other actions (`de.roboy.dialog.action.Action`) by a module called Verbalizer. Currently, these actions are still directly created in the personality class.
5. Finally, the created actions are sent to the corresponding output device (`de.roboy.io.OutputDevice`).

2.2.2 Design choices

There are interfaces for each step in the processing pipeline to enable an easy exchange of elements. The goal would be to easily exchange personalities based on the occasion.

The implementation of the pipeline is in Java. Integrations with tools in other languages, like C++ RealSense stuff, should be wrapped in a module in the pipeline.

2.2.3 How to extend it?

Pick the corresponding interface, depending on which part of the system you want to extend. If you want to add new devices go for the input or output device interfaces. If you want to extend the linguistic analysis implement the Analyzer interface or extend the SentenceAnalyzer class. If you are happy with input, linguistics and output and just want to create more dialog, implement the Personality interface.

Create a new . . .	By implementing . . .
Input Device	de.roboy.io.InputDevice
NLP Analyzer	de.roboy.linguistics.sentenceanalysis.Analyzer
State Machine	de.roboy.dialog.personality.Personality
State	de.roboy.dialog.personality.states.State
Action type	de.roboy.dialog.action.Action
Output device	de.roboy.io.OutputDevice

The interfaces are deliberately simple, containing only 0 - 2 methods that have to be implemented. Once you implemented your new classes include them in the personality used in `de.roboy.dialog.DialogSystem`, if you only implemented single states or directly in `de.roboy.dialog.DialogSystem` for everything else.

2.3 Personality and states

2.3.1 Overview

To enable a natural way of communication, Roboy's Dialog Module implements a flexible architecture using personality classes, which each manage a number of different states. This enables us to dynamically react to clues from the

conversation partner and spontaneously switch between purposes and stages of a dialog, mimicing a natural conversation.

2.3.2 Personality

During one run-through, the Dialog System uses a single Personality instance (`de.roboy.dialog.personality.Personality`). A personality is designed to define how roboy reacts to every given situation, and as such Roboy can always only represent one personality at a time. Different personalities are meant to be used in different situations, like a more formal or loose one depending on the occasion.

The current primary personality is the SmallTalkPersonality (`de.roboy.dialog.personality.SmallTalkPersonality`).

A new personality (`roboy.newDialog.StateBasedPersonality`) is currently being implemented. Similarly to the SmallTalkPersonality, it is built on top of a state machine. The new personality is designed to be more generic one and allows to load the behaviour from a personality file. The file stores a representation of the state machine. Additionally, it is still possible to define the dialog structure directly from code (as it was done in previous implementations).

2.3.3 Legacy State

A state's activity can be divided into two stages. When the state is entered, the initial action from the `act()` method is carried out, which is expected to trigger a response from the person. After Roboy has received and analyzed the response, the `react()` method completes the current state's actions and Roboy moves on to the next state.

The AbstractBooleanState describes a special case where the state's reaction depends on whether the `act()` method resulted in successful interaction. States which implement AbstractBooleanState can respond differently move on into different stages according to their `determineSuccess()` method.

For example, the initial action of `de.roboy.dialog.personality.states.IntroductionState` is to ask the user's name. Then the response is analyzed externally and when the state's determineSuccess() method is called, it checks whether a name was extracted. If this is the case, then the system outputs predefined sentences with the extracted name embedded into them. Otherwise, fallback sentences are used which do not include a name.

2.3.4 New State

Currently, we are improving the state system. Old state implementations will be replaced with newer ones. The functionality of the AbstractBooleanState will be improved to allow arbitrary conditional transitions in every new state. Nested states will be replaced with the fallback concept.

A state's activity can be divided into two stages. When the state is entered, the initial action from the `act()` method is carried out, which is expected to trigger a response from the person. After Roboy has received and analyzed the response, the `react()` method completes the current state's actions and Roboy picks a transition to the next state defined by the `getNextState()` method of the current state.

It is possible to remain in the same state for many cycles. In this case the `getNextState()` method just returns a reference to the current state (`this`) and the `act()` and `react()` methods are carried out again.

A state can have any number of transitions to other states. Every transition has a name (like "next" or "errorState"). When changing states, the following state can be selected based on internal conditions of the current state. For example, a state can expect a "yes/no" answer and have tree outgoing transitions: "gotYes", "gotNo" and "askAgain" (if the reply is not "yes/no").

When designing a new state, only the transition names are defined. The following states are defined in the personality file later. At run time the state machine loads the file and initializes the transitions to point it correct states. The destination state can be retrieved by the transition name using `getTransition(transitionName)`.

A fallback can be attached to a state. In the case this state doesn't know how to react to an utterance, it can return `null` from the `react()` function. The state machine will query the fallback in this case. This concept helps to decouple the states and reduce the dependencies between them. When implementing the `react()` function of a new state, it is sufficient to detect unknown input and return `null`.

2.3.5 Legacy State machine structure

Every state defines at least one successor state, and more complex hierarchies can be realized - for example as a fallback system for cases when a single state cannot respond in a meaningful manner. The fallback system implemented using nested states in the legacy state machine and will be improved in the newer implementation. The following is an example from the documentation of SmallTalkPersonality:

The current legacy state machine looks like this:

Greeting state

V

Introduction state

V

Question Randomizer state

|_**Question Answering state**

|_**Segue state** |_Wild talk state

The Question Randomizer, Question Answering, Segue and Wilk talk states are nested. If one cannot give an appropriate reaction to the given utterance, the utterance is passed on to the next one. The Wild talk state will always answer.

2.4 The memory module

2.4.1 General design

To remember information about itself and its conversation partners, their hobbies, occupations and origin, a persistent Memory module has been implemented using the Neo4j graph database.

2.4.2 Implementation

Roboy's Dialog System interactions with the Memory module are based on ROS messages. The messages are sent using the methods in `de.roboy.ros.RosMainNode`, which implements the four query types based on the specified Memory services:

Method name	Description
CreateMemoryQuery	Creates a node in Memory database
UpdateMemoryQuery	Adds or changes information of an existing node
GetMemoryQuery	Retrieves either one node or an array of IDs
DeleteMemoryQuery	Removes information from or deletes a node
CypherMemoryQuery	For more complex queries (future)

The messages received from Memory are in JSON format. To enable flexible high-level handling of Memory information, two classes were created to incorporate the node structures and logic inside the Dialog System. The `de.roboy.memory.nodes.MemoryNodeModel` contains the labels, properties and relationships in a format which can be directly parsed from and into JSON. For this, Dialog is using the GSON parsing methods which enable direct translation of a JSON String into its respective Java class representation.

Methods such as `getRelation()` or `setProperties()` were implemented to allow intuitive handling of the MemoryNodeModel instances. A separate class, `de.roboy.memory.nodes.Interlocutor`, encapsulates a MemoryNodeModel and is intended to further ease saving information about the current conversation partner of Roboy. Interlocutor goes one step further by also abstracting the actual calls to memory, such that adding the name of the conversant performs an automatic lookup in the memory with subsequent updating of the person-related information. This is then available in all subsequent interactions, such that Roboy can refrain from asking questions twice, or refer to information he rememberes from earlier conversations.

2.5 Configuration

The Dialog Manager can be called with a specific system configuration that determines which external services will be used within the session. The `ROS_HOSTNAME` is set through the `config.properties` file at project root.

2.5.1 Usage

Set profile in the execution invocation like this: `mvn exec:java -Dexec.mainClass="roboy.dialog.DialogSystem" -Dprofile=NOROS`

If running from within an IDE, edit the run configurations to include the profile as VM option:
`-Dprofile=NOROS`

Without a specified profile, `DEFAULT` will be used. Please note that this profile requires setting a valid `ROS_HOSTNAME` address in the `config.properties` file to function properly! If ROS is not set up, use the `NOROS` profile to prevent the Dialog Manager from using ROS-dependent services.

2.5.2 Profiles

Profile	Description
DEFAULT	Used when no other profile is set, assumes that all requirements (ROS, Internet connection, speakers, mic) are fulfilled.
NOROS	To be used when ROS services are not set up, avoids calls to memory, speech synthesis, voice output, etc.
STANDALONE	To be used when running without Internet connection - this profile includes all restrictions of NOROS and also does not call DBPedia.
MEMORY-ONLY	To be used during Memory development, when no other ROS services are running. Only Neo4j-related ROS calls will be made.
DEBUG	With this setting, DM will run like DEFAULT but not shut down when ROS failures are encountered.

2.5.3 Extending

To extend or change the configurations, have a look at the instructions in the `roboy.dialog.Config` class.

2.6 Context

The goal of Context is to collect information about Roboy's environment and state. This information can be used by the DM classes and also to react upon situations that match certain conditions, such as turning the head of Roboy when the Interlocutor moves.

2.6.1 Architecture

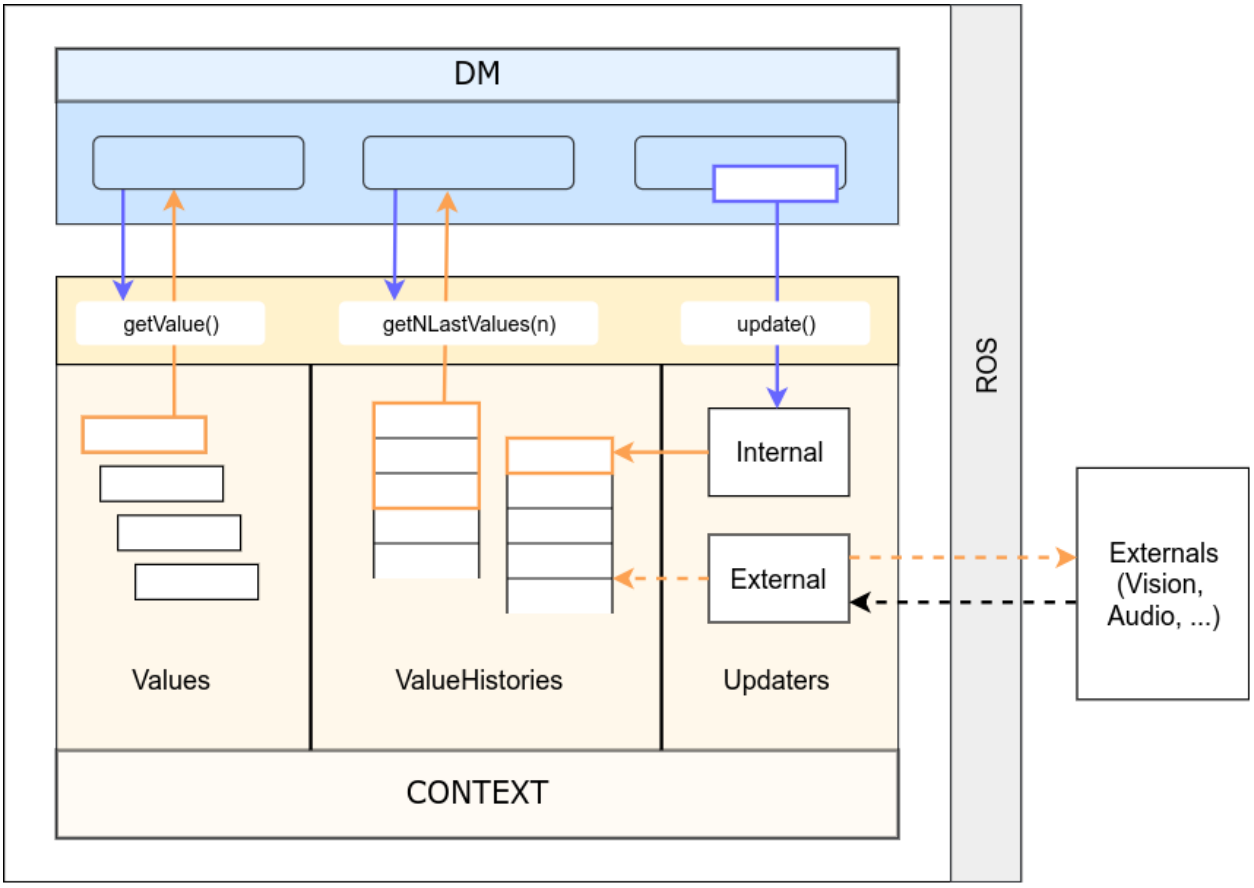
alt Context architecture

The Context supports storing data as a `Value` or `ValueHistory`. A `Value` only stores the latest data object that was pushed to it. A `ValueHistory` stores every value it receives and assigns each a unique key, thus the values can be ordered by their adding time.

2.6.2 How to add Values?

Here we describe how a new Value can be created and added to the Context. Sample implementations can be found inside `roboy.context.contextObjects` packge.

1. Consider what type of data will be stored in the Value. For this example, we chose `String`.
2. In the `contextObjects` directory, create a new class which inherits from the Value class. The final signature should look similar to: `public class SampleValue extends Value<String>` (replacing String with your type).
3. **Add the new Value in the main class `Context.java`:**
   (a) In the standard constructor, initialize the Value object and add it to the builder of the value map: `put(SampleValue.class, sampleValue)`
   (b) Make the value available over the enum `Values` within the Context class by adding a new element with your class name and stored data type. For example: `SAMPLE_VALUE(SampleValue.class, String.class);`


DM
getValue()
getNLastValues(n)
update()
ROS
Internal
External
Externals
(Vision,
Audio, ...)
Values
ValueHistories
Updaters
CONTEXT

2.6.3 How to add ValueHistories?

ValueHistories extend the functionality of Values by storing all data objects sent to them. Over the `getNLastValues(int n)` method, a map with several most recent data objects can be retrieved, including their ordering.

Adding a `ValueHistory` is very much alike to adding a `Value`, just make sure to:

1. extend `ValueHistory<>` instead of `Value<>`,
2. in `Context.java`, add the new object to the Builder of `valueHistories` instead of `values`, and to the enum `ValueHistories` instead of `Values`.

2.6.4 How to add Updaters?

New values can only be added to the Context over an `Updater` instance. Internal updaters can be used by DM classes to actively add new values. External updaters run in separate threads and seek out new values, for example over a ROS connections to the Vision module.

Adding an External Updater

Currently, the only implementation of an external updater is the `IntervalUpdater` abstract class. Usage:

1. Create a class extending `IntervalUpdater` and implement its `update()` method. It should retrieve the values and finally add them over the `target.updateValue(value)` method call.
2. Add the updater to `externalUpdaters` in the `Context.java` constructor, setting its `target` parameter with the `Value` or `ValueHistory` object created in the same constructor.

Adding a new Internal Updater

1. Create a class extending InternalUpdater<*targetClass*, *valueType*>. The class and data type of the target `Value` or `ValueHistory` are the generic parameters for the updater.
2. A constructor is required for the class, simply match the InternalUpdater constructor and call `super(target)` within. An example is in the `DialogTopicsUpdater` class.
3. In the `Context` class constructor, initialize the updater and add it to the `internalUpdaters` map.
4. Add an entry to the `Updaters` enum, similarly as discussed above for `Values`.

2.7 Semantic Parser

Semantic parser is used to translate text representation into formal language representation. The aim is to be able to process user utterances and react upon them.

roboy_parser is based on *SEMPRE <http://nlp.stanford.edu/software/sempre/*. It is currently being modified to fulfill Roboy Dialog system needs.

2.7.1 Installation

In order to use semantic parser, you need to:

- clone `roboy_parser` repository:

```
git clone http://github.com/Roboy/roboy_parser
```

- navigate to created repository:

```
cd roboy_parser
```

- build it:

```
ant freebase
```

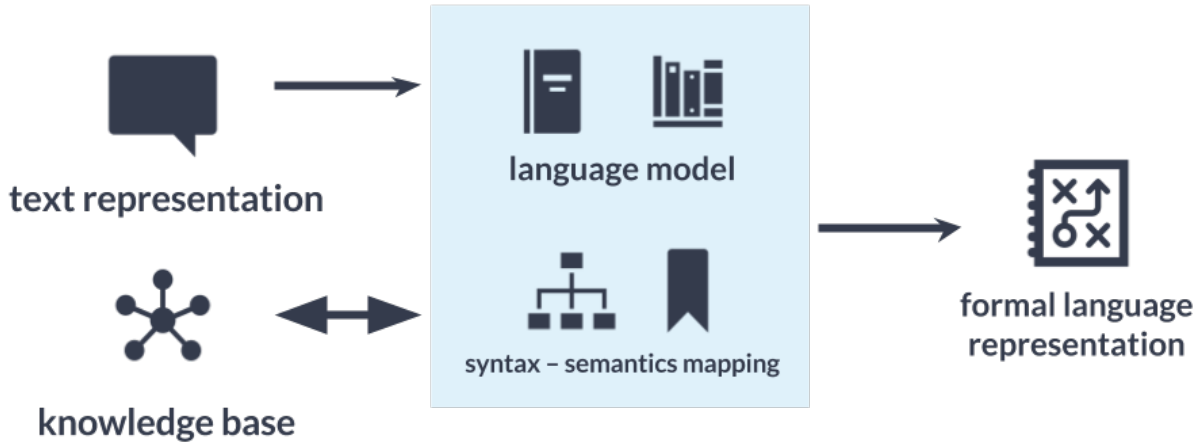
- run it:

```
./quick_start [options]
```

2.7.2 Architecture

Semantic parser is based on the language model and NLP algorithms that then apply rules to the utterance to translate it. Language model consists of: - set of grammar rules, - lexicon, - training dataset.

General architecture can be seen on the diagram below.



alt Semantic parser general architecture

2.7.3 Implementation

roboy_parser is a separate Java project and is communicating using `WebSocket`. Dialog system has a client implemented in `SemanticParserAnalyzer.java` class. It is therefore part of Natural Language Understanding unit.

Functionalities

Roboy parser currently has currently following functionalities:

Table 1: Semantic Parser algorithms used

Functionality	Software used	Summary
POS Tags	OpenNLP	Tagging tokens as part of speech
NER Tags	OpenNLP	Tool used to tag named entities like PERSON, NUMBER, ORGANIZATION
Triple extraction	OpenIE	Tool used to extract triples from sentences in form `(Subject, Predicate,Object)`

2.7.4 Usage

In order to run the parser, you need to run **roboy_parser** first - see instructions on *project Github <http://github.com/Roboy/roboy_parser* and then run Dialog System.

Configurations

To test parser, you can run following configurations using `quick_start.sh` script. For more information refer to *project documentation <http://github.com/Roboy/roboy_parser*

Table 2: Possible parser configurations

Command	Options
./quick_start	Default configuration. Using custom Roboy grammar and lexicons
./quick_start freebase	Example setup to test Freebase functionality

2.8 API

class

Abstract super class for states that fork between two possible subsequent states.

The determineSuccess method needs to be implemented by subclass to determine if the success or failure state should be moved into next.

Subclassed by *roboy.dialog.personality.states.ConverseState*, *roboy.dialog.personality.states.GenerativeCommunicationState*, *roboy.dialog.personality.states.GreetingState*, *roboy.dialog.personality.states.IdleState*, *roboy.dialog.personality.states.InquiryState*, *roboy.dialog.personality.states.IntroductionState*, *roboy.dialog.personality.states.LocationDBpedia*, *roboy.dialog.personality.states.PersonalFollowUpState*, *roboy.dialog.personality.states.PersonalQAState*

Public Functions

State roboy.dialog.personality.states.AbstractBooleanState.getSuccess()

void roboy.dialog.personality.states.AbstractBooleanState.setSuccess(State success)

Sets the state Roboy moves into if the determineSuccess method returns true.

Parameters

- `success`: The following state

State roboy.dialog.personality.states.AbstractBooleanState.getFailure()

void roboy.dialog.personality.states.AbstractBooleanState.setFailure(State failure)
Sets the state Roboy moves into if the determineSuccess method returns false.

Parameters

- `failure`: The following state

void roboy.dialog.personality.states.AbstractBooleanState.setNextState(State state)

void roboy.dialog.personality.states.AbstractBooleanState.setSuccessTexts(List< String

void roboy.dialog.personality.states.AbstractBooleanState.setFailureTexts(List< String

Reaction roboy.dialog.personality.states.AbstractBooleanState.react(Interpretation inp

Protected Functions

abstract boolean roboy.dialog.personality.states.AbstractBooleanState.determineSuccess
Needs to be implemented by subclasses.

If the method returns true the state machine moves to the success state, if it returns false it moves to the failure state.

Return true or false depending on the examined condition of the method

Parameters

- `input`: The interpretation of all inputs

Protected Attributes

State roboy.dialog.personality.states.AbstractBooleanState.success

State roboy.dialog.personality.states.AbstractBooleanState.failure

Private Members

List<String> roboy.dialog.personality.states.AbstractBooleanState.successTexts = Lists.strin

List<String> roboy.dialog.personality.states.AbstractBooleanState.failureTexts = Lists.strin

template <V>
interface *roboy*::*context***AbstractValue**
Stores a single value.

On update, the value is overwritten.

Subclassed by *roboy.context.AbstractValueHistory< K, V >*, *roboy.context.Value< V >*

Public Functions

V roboy.context.AbstractValue< V >.getValue()

void roboy.context.AbstractValue< V >.updateValue(V key)

template <K, V>

interface *roboy*::*context***AbstractValueHistory**

ValueHistory maintains a map containing all (current and past) values.

These values are accessible over the getLastNValues method.

Public Functions

Map<K, V> roboy.context.AbstractValueHistory< K, V >.getLastNValues(int n)

interface *roboy*::*dialog*::*action***Action**

The marker interface for an action.

The interface is empty, since different output devices will require different informations in an action. The most important action is the *SpeechAction* which is used for communication.

Subclassed by *roboy.dialog.action.FaceAction*, *roboy.dialog.action.ShutDownAction*, *roboy.dialog.action.SpeechAction*

interface *roboy*::*linguistics*::*sentenceanalysis***Analyzer**

All linguistic analyses implement the *Analyzer* interface.

An analyzer always takes an existing interpretation of a sentence and returns one including its own analysis results (usually an enriched version of the input interpretation).

Subclassed by *roboy.linguistics.sentenceanalysis.AnswerAnalyzer*, *roboy.linguistics.sentenceanalysis.DictionaryBasedSentenceTy*
roboy.linguistics.sentenceanalysis.EmotionAnalyzer, *roboy.linguistics.sentenceanalysis.IntentAnalyzer*, *roboy.linguistics.sentenceanalysis.OntologyNERAnalyzer*, *roboy.linguistics.sentenceanalysis.OpenNLPParser*, *roboy.linguistics.sentenceanalysis.OpenNLPPOSTagger*, *roboy.linguistics.sentenceanalysis.Preprocessor*, *roboy.linguistics.sentenceanalysis.SemanticParserAnalyzer*, *roboy.linguistics.sentenceanalysis.SentenceAnalyzer*, *roboy.linguistics.sentenceanalysis.SimpleTokenizer*

Public Functions

Interpretation roboy.linguistics.sentenceanalysis.Analyzer.analyze(Interpretation sente

class

Utters the given text and moves to the given state.

Used for telling anecdotes.

Public Functions

roboy.dialog.personality.states.AnecdoteState.AnecdoteState(State nextState, String an

List<Interpretation> roboy.dialog.personality.states.AnecdoteState.act()

Reaction roboy.dialog.personality.states.AnecdoteState.react(Interpretation input)

Private Members

State roboy.dialog.personality.states.AnecdoteState.nextState

String roboy.dialog.personality.states.AnecdoteState.anecdote

class

Checks the predicate argument structures produced by the *OpenNLPParser* analyzer and looks for possible answers to questions in them.

It creates the outputs *Linguistics.OBJ_ANSWER* for situations where the answer to the question is in the object of the sentence (e.g. "Frank" in the sentence "I am Frank" to the question "Who are you?") and *Linguistics.PRED_ANSWER* if it is in the predicate or in the predicate and the object combined (e.g. "swimming" in the answer "I like swimming" to the question "What is your hobby?").

Public Functions

Interpretation roboy.linguistics.sentenceanalysis.AnswerAnalyzer.analyze(Interpretatio

class *roboy*::*linguistics*::*sentenceanalysis***AnswerAnalyzerTest**

Public Functions

void roboy.linguistics.sentenceanalysis.AnswerAnalyzerTest.testName()

void roboy.linguistics.sentenceanalysis.AnswerAnalyzerTest.testOccupation()

void roboy.linguistics.sentenceanalysis.AnswerAnalyzerTest.testOrigin()

void roboy.linguistics.sentenceanalysis.AnswerAnalyzerTest.testHobby()

void roboy.linguistics.sentenceanalysis.AnswerAnalyzerTest.testMovie()

Private Functions

String roboy.linguistics.sentenceanalysis.AnswerAnalyzerTest.analyze(String sentence)

String roboy.linguistics.sentenceanalysis.AnswerAnalyzerTest.analyzePred(String senten

Private Static Attributes

final SimpleTokenizer roboy.linguistics.sentenceanalysis.AnswerAnalyzerTest.tokenizer =

final OpenNLPPOSTagger roboy.linguistics.sentenceanalysis.AnswerAnalyzerTest.pos = new

final OpenNLPParser roboy.linguistics.sentenceanalysis.AnswerAnalyzerTest.parser = new *O*

final AnswerAnalyzer roboy.linguistics.sentenceanalysis.AnswerAnalyzerTest.answer = new *A*

template <H, V>
class *roboy*::*context***AttributeManager**

The collection of values, split into valueHistories (H) and single values (V).

Protected Attributes

ImmutableClassToInstanceMap<AbstractValueHistory> roboy.context.AttributeManager< H ex

ImmutableClassToInstanceMap<AbstractValue> roboy.context.AttributeManager< H extends E

Package Functions

protected<T> T roboy.context.AttributeManager< H extends ExternalContextInterface, V e

protected<K, T> Map<K, T> roboy.context.AttributeManager< H extends ExternalContextInt

protected<T> T roboy.context.AttributeManager< H extends ExternalContextInterface, V e

class

Using Bing to perform speech to text.

Requires internet connection.

Public Functions

roboy.io.BingInput.BingInput(RosMainNode node)

Input roboy.io.BingInput.listen()

Private Members

RosMainNode roboy.io.BingInput.rosMainNode

class

Uses Bing for text to speech.

Requires internet connection.

Public Functions

void roboy.io.BingOutput.act(List< Action > actions)

void roboy.io.BingOutput.say(String text)

class

Should perform the celebrity look-a-like vison input.

Isn't implemented yet.

Public Functions

Input roboy.io.CelebritySimilarityInput.listen()

class

Checks whether it was asked 'Whom do I look like' or something similar and answers with the most similar celebrity if it was detected by vision.

If no trigger sentence was used, the given inner state is executed instead.

Public Functions

roboy.dialog.personality.states.CelebrityState.CelebrityState(State inner)

void roboy.dialog.personality.states.CelebrityState.setTop(State top)

List<Interpretation> roboy.dialog.personality.states.CelebrityState.act()

Reaction roboy.dialog.personality.states.CelebrityState.react(Interpretation input)

Private Members

State roboy.dialog.personality.states.CelebrityState.inner

State roboy.dialog.personality.states.CelebrityState.top

Private Static Attributes

Lists.stringList(“whom do i look like”, “who do i look like”, “which star do i look like”, “which celebrity do i look like”, “how do i look”, “whom do i resemble”, “who do i resemble”, “which star do i resemble”, “which celebrity do i resemble”, “whom do i remind you of”, “who do i remind you of”, “who am i”)]

Lists.stringList(“You look one hundred percent like “, “You totally look like “, “You bear a very striking resemblance to “, “You must be the identical twin of “, “You look a lot like “, “You seem to be the doubleganger of “, “The look, the attitude. Yeah, you are totally a “, “You look like “, “That is easy. You are a “, “You resemble “, “You could easily pass for “, “You are the very picture of “, “You remind me a lot of “, “You take after “, “You were clearly created in the image of “, “You are like a poor version of “, “What is up with your face? You look like if Picasso tried to draw “, “Looks like they finally managed to clone “, “You are like an impersinator of “, “I am unable to distinguish between you and “, “You have quite some of the features of “, “Is that you? “)]

class

Cerevoice text to speech.

Public Functions

roboy.io.CerevoiceOutput.CerevoiceOutput(RosMainNode node)

void roboy.io.CerevoiceOutput.act(List< Action > actions)

void roboy.io.CerevoiceOutput.say(String text)

Private Members

RosMainNode roboy.io.CerevoiceOutput.rosMainNode

class

Public Functions

void roboy.io.CommandLineCommunication.setPersonality(Personality p)

void roboy.io.CommandLineCommunication.communicate()

Private Functions

void roboy.io.CommandLineCommunication.talk(List< Action > actions)

Private Members

Personality roboy.io.CommandLineCommunication.personality

SentenceAnalyzer roboy.io.CommandLineCommunication.analyzer

class
Uses the command line as input device.

Public Functions

Input roboy.io.CommandLineInput.listen()

Protected Functions

void roboy.io.CommandLineInput.finalize()

Private Members

Scanner roboy.io.CommandLineInput.sc = new Scanner(System.in)

class
Uses the command line as output device.

Public Functions

void roboy.io.CommandLineOutput.act(List< Action > actions)

interface *roboy*::*io***Communication**
Subclassed by *roboy.io.CommandLineCommunication*

Public Functions

void roboy.io.Communication.setPersonality(Personality p)

void roboy.io.Communication.communicate()

class *roboy*::*util***Concept**
Protege memory concept.

Public Functions

roboy.util.Concept.Concept()

roboy.util.Concept.Concept(Map< String, Object > attrs)

roboy.util.Concept.Concept(String name)

void roboy.util.Concept.addAttribute(String property, Object value)

void roboy.util.Concept.addAttributes(Map< String, Object > attrs)

Map<String, Object> roboy.util.Concept.getAttributes()

Object roboy.util.Concept.getAttribute(String key)

String roboy.util.Concept.getProperties()

String roboy.util.Concept.getValues()

boolean roboy.util.Concept.hasAttribute(String property)

Object roboy.util.Concept.retrieve()

boolean roboy.util.Concept.updateInMemory()

int roboy.util.Concept.getID()

Private Members

Map<String, Object> roboy.util.Concept.attributes

class *roboy*::*linguistics*Concept

Package Attributes

String roboy.linguistics.Concept.id

class *roboy*::*dialog*Config

Save runtime configurations (profiles) for Roboy.

1) Configuration variables define alternating behaviors. 2) To create a combination of configurations, add a new profile to Configurations and implement its setProfile method.

Public Functions

roboy.dialog.Config.Config(ConfigurationProfile profile)

Constructor switching to the correct profile.

Public Static Functions

static ConfigurationProfile roboy.dialog.Config.getProfileFromEnvironment(String profi

ConfigurationProfile instance which matches the profileString.

Parameters

- `profileString`: String value of the configuration profile name.

Public Static Attributes

boolean roboy.dialog.Config.STANDALONE = false

If true, Roboy avoids using network-based services such as DBpedia as well as ROS.

boolean roboy.dialog.Config.NOROS = false

If true, Roboy avoids using ROS-based services.

boolean roboy.dialog.Config.SHUTDOWN_ON_ROS_FAILURE = true

If true, Roboy will not continue executing if the ROS main node fails to initialize.

boolean roboy.dialog.Config.SHUTDOWN_ON_SERVICE_FAILURE = true
If true, Roboy will not continue executing if any of the ROS services failed to initialize.

String roboy.dialog.Config.ROS_HOSTNAME = null
ROS hostname, will be fetched from the configuration file in the DEFAULT profile.

boolean roboy.dialog.Config.MEMORY = true
If true, memory will be queried.

Ensure that if NOROS=false, then MEMORY=true. When NOROS=true, MEMORY can be either true or false.

int roboy.dialog.Config.PARSER_PORT = -1
Semantic parser socket port.

boolean roboy.dialog.Config.DEMO_GUI = false
Context GUI demo trigger.

Set manually, if wanted.

Private Functions

void roboy.dialog.Config.setDefaultProfile()

void roboy.dialog.Config.setNoROSProfile()

void roboy.dialog.Config.setStandaloneProfile()

void roboy.dialog.Config.setDebugProfile()

void roboy.dialog.Config.setMemoryProfile()

void roboy.dialog.Config.initializeYAMLConfig()

Private Members

YAMLConfiguration roboy.dialog.Config.yamlConfig

Private Static Attributes

String roboy.dialog.Config.yamlConfigFile = "config.properties"
Configuration file to store changing values.

enum *roboy*::*dialog*::*Config***ConfigurationProfile**
List of profile names.

The variables are set in the corresponding set<name>Profile() method. String values make it possible to define the profile in start command with: -Dprofile=<profileString>

Public Functions

roboy.dialog.Config.ConfigurationProfile.ConfigurationProfile(String profile)

Public Members

roboy.dialog.Config.ConfigurationProfile.DEFAULT =("DEFAULT")

roboy.dialog.Config.ConfigurationProfile.NOROS =("NOROS")

roboy.dialog.Config.ConfigurationProfile.STANDALONE =("STANDALONE")

roboy.dialog.Config.ConfigurationProfile.DEBUG =("DEBUG")

roboy.dialog.Config.ConfigurationProfile.MEMORY =("MEMORY")

String roboy.dialog.Config.ConfigurationProfile.profileName

class

Singleton class serving as an interface to access all context objects.

Takes care of correct initialization of attribute histories and updaters.

Queries to values are handled through the inherited *AttributeManager* methods.

For usage examples, check out ContextTest.java

Public Members

final HashMap<Class, InternalUpdater> roboy.context.Context.internalUpdaters = new HashMa

Public Static Functions

static Context roboy.context.Context.getInstance()

Package Functions

public<V> void roboy.context.Context.updateValue(Updaters updater, V value)

Directly update an attribute.

Parameters

- `updater`: The name of the *Value* or *ValueHistory* object.
- `value`: Data to put into the *Value* or *ValueHistory* object.

Private Functions

roboy.context.Context.Context()

Private Members

final ArrayList<ExternalUpdater> roboy.context.Context.externalUpdaters = new ArrayList<>()

Private Static Attributes

Context roboy.context.Context.context

class *roboy*::*context*::*GUI***ContextGUI**

A simple GUI with the goal of showing the attribute values and histories in the *Context*.

Public Static Functions

static void roboy.context.GUI.ContextGUI.run()

Private Functions

roboy.context.GUI.ContextGUI.ContextGUI()

void roboy.context.GUI.ContextGUI.prepareGUI()

void roboy.context.GUI.ContextGUI.startFrame()

void roboy.context.GUI.ContextGUI.updateValues()

void roboy.context.GUI.ContextGUI.updateHistories()

Private Members

JFrame roboy.context.GUI.ContextGUI.mainFrame

TitledBorder roboy.context.GUI.ContextGUI.valueBorder

JPanel roboy.context.GUI.ContextGUI.valuePanel

Map<Context.Values, JLabel> roboy.context.GUI.ContextGUI.valueDisplays

Map<Context.ValueHistories, JScrollPane> roboy.context.GUI.ContextGUI.historyDisplays

TitledBorder roboy.context.GUI.ContextGUI.historyBorder

JPanel roboy.context.GUI.ContextGUI.historyPanel

JPanel roboy.context.GUI.ContextGUI.controlPanel

Private Static Attributes

int roboy.context.GUI.ContextGUI.MAX_HISTORY_VALUES = 10

int roboy.context.GUI.ContextGUI.FULL_WIDTH = 400

int roboy.context.GUI.ContextGUI.FULL_HEIGHT = 300

int roboy.context.GUI.ContextGUI.ATTR_WIDTH = 390

int roboy.context.GUI.ContextGUI.ATTR_HEIGHT = 50

int roboy.context.GUI.ContextGUI.HISTORY_HEIGHT = 100

String roboy.context.GUI.ContextGUI.NO_VALUE = “<not initialized>”

class *roboy*::*context*::*visionContext***ContextTest**

Public Functions

void roboy.context.visionContext.ContextTest.getLastAttributeValue()
Checks that the values of FACE_COORDINATES get automatically updated.

void roboy.context.visionContext.ContextTest.setAndGetDialogTopics()

enum *roboy*::*dialog*::*personality*::DefaultPersonality**CONVERSATIONAL_STATE**

Public Members

roboy.dialog.personality.DefaultPersonality.CONVERSATIONAL_STATE.GREETING

roboy.dialog.personality.DefaultPersonality.CONVERSATIONAL_STATE.INTRODUCTION

roboy.dialog.personality.DefaultPersonality.CONVERSATIONAL_STATE.SMALL_TALK

roboy.dialog.personality.DefaultPersonality.CONVERSATIONAL_STATE.FAREWELL

class

Public Functions

roboy.dialog.personality.states.ConverseState.ConverseState()

List<Interpretation> roboy.dialog.personality.states.ConverseState.act()

Reaction roboy.dialog.personality.states.ConverseState.react(Interpretation input)

Protected Functions

boolean roboy.dialog.personality.states.ConverseState.determineSuccess(Interpretation

Private Members

State roboy.dialog.personality.states.ConverseState.inner

class *roboy*::*context*::*contextObjects***CoordinateSet**
A coordinate set data structure for the interlocutor face.

Public Functions

roboy.context.contextObjects.CoordinateSet.CoordinateSet(double x, double y, double z)

Package Attributes

final double roboy.context.contextObjects.CoordinateSet.x

final double roboy.context.contextObjects.CoordinateSet.y

final double roboy.context.contextObjects.CoordinateSet.z

class

Public Functions

roboy.dialog.personality.CuriousPersonality.CuriousPersonality()

List<Action> roboy.dialog.personality.CuriousPersonality.answer(Interpretation input)
The central method of a personality.

Given an interpretation of all inputs (audio, visual, ...) to Roboy, this method decides which actions to perform in response.

Return A list of actions to perform in response

Parameters

- `input`: The interpretation of the inputs

Public Static Functions

static void roboy.dialog.personality.CuriousPersonality.main(String[] args)

Private Functions

Triple roboy.dialog.personality.CuriousPersonality.remember(String predicate, String a

Private Members

List<Triple> roboy.dialog.personality.CuriousPersonality.memory

class
Restores information from the DBpedia.

Public Functions

boolean roboy.memory.DBpediaMemory.save(Relation object)

List<Relation> roboy.memory.DBpediaMemory.retrieve(Relation object)
Retrive all matching relations from DBpedia.

Public Static Functions

static DBpediaMemory roboy.memory.DBpediaMemory.getInstance()
Loading DBpedia takes resources, so only do it once.

Return

static LinkedHashSet<String> roboy.memory.DBpediaMemory.buildQueries(Relation object)

Private Functions

roboy.memory.DBpediaMemory.DBpediaMemory()

Private Members

Map<String,String> roboy.memory.DBpediaMemory.forms

Private Static Attributes

DBpediaMemory roboy.memory.DBpediaMemory.dbpediaMemory

final Map<String, String> roboy.memory.DBpediaMemory.supportedRelations

class

Public Functions

List<Action> roboy.dialog.personality.DefaultPersonality.answer(Interpretation input)

The central method of a personality.

Given an interpretation of all inputs (audio, visual, ...) to Roboy, this method decides which actions to perform in response.

Return A list of actions to perform in response

Parameters

- `input`: The interpretation of the inputs

Private Functions

String roboy.dialog.personality.DefaultPersonality.stripFromFront(String input, List<

String roboy.dialog.personality.DefaultPersonality.random(List< String > list)

boolean roboy.dialog.personality.DefaultPersonality.checkForTerm(String input, List< S

Private Members

CONVERSATIONAL_STATE roboy.dialog.personality.DefaultPersonality.state = CONVERSATIONAL

Private Static Attributes

Arrays.asList("hello","hi","greetings","good morning", "howdy","good day","hey")]

Arrays.asList("ciao","goodbye","cheerio","bye","see you", "farewell","bye-bye")]

Arrays.asList("enthusiastic","awesome","great","very good", "dope","smashing","happy","cheerful","good","phantastic")]

Arrays.asList("yes","yeah","indeed","i am")]

Arrays.asList("no","never","not sure")]

Arrays.asList("i am","i'm","my name is","call me")]

class *roboy*::*linguistics***DetectedEntity**

Public Functions

roboy.linguistics.DetectedEntity.DetectedEntity(Entity entity, int tokenIndex)

Entity roboy.linguistics.DetectedEntity.getEntity()

int roboy.linguistics.DetectedEntity.getTokenIndex()

Private Members

Entity roboy.linguistics.DetectedEntity.entity

int roboy.linguistics.DetectedEntity.tokenIndex

class *roboy*::*newDialog*.**DialogStateMachine**

State machine to manage dialog states.

Dialog state machines can be written to files and loaded from them later.

Personalities can be implemented using a dialog state machine.

Subclassed by *roboy.newDialog.StateBasedPersonality*

Public Functions

roboy.newDialog.DialogStateMachine.DialogStateMachine()

roboy.newDialog.DialogStateMachine.DialogStateMachine(boolean enableDebug)

State roboy.newDialog.DialogStateMachine.getInitialState()

void roboy.newDialog.DialogStateMachine.setInitialState(State initial)

Set the initial state of this state machine.

The state will be automatically added to the machine. If active state was null, it will be set to the new initial state.

Parameters

- `initial`: initial state

void roboy.newDialog.DialogStateMachine.setInitialState(String identifier)

State roboy.newDialog.DialogStateMachine.getActiveState()

void roboy.newDialog.DialogStateMachine.setActiveState(State s)

void roboy.newDialog.DialogStateMachine.setActiveState(String identifier)

State roboy.newDialog.DialogStateMachine.getStateByIdentifier(String identifier)

void roboy.newDialog.DialogStateMachine.addState(State s)

void roboy.newDialog.DialogStateMachine.loadFromString(String s)

void roboy.newDialog.DialogStateMachine.loadFromFile(File f)

void roboy.newDialog.DialogStateMachine.saveToFile(File f)

String roboy.newDialog.DialogStateMachine.toJsonString()

String roboy.newDialog.DialogStateMachine.toString()

boolean roboy.newDialog.DialogStateMachine.equals(Object obj)

Private Functions

void roboy.newDialog.DialogStateMachine.loadFromJSON(JsonElement json)

JsonObject roboy.newDialog.DialogStateMachine.toJsonObject()

Private Members

HashMap<String, State> roboy.newDialog.DialogStateMachine.identifierToState

State roboy.newDialog.DialogStateMachine.activeState

State roboy.newDialog.DialogStateMachine.initalState

boolean roboy.newDialog.DialogStateMachine.enableDebug

class *roboy*::*newDialog*DialogStateMachineTest

Public Functions

void roboy.newDialog.DialogStateMachineTest.machineEqualsItself()

void roboy.newDialog.DialogStateMachineTest.stringEqualsCode()

void roboy.newDialog.DialogStateMachineTest.notEqualsNoInitialState()

void roboy.newDialog.DialogStateMachineTest.notEqualsDifferentStates()

void roboy.newDialog.DialogStateMachineTest.notEqualsDifferentTransitions()

void roboy.newDialog.DialogStateMachineTest.activeStateIsSetToInitialState()

void roboy.newDialog.DialogStateMachineTest.machineContainsAllStates()

void roboy.newDialog.DialogStateMachineTest.transitionsAreOK()

void roboy.newDialog.DialogStateMachineTest.fallbackIsOK()

Private Static Functions

static DialogStateMachine roboy.newDialog.DialogStateMachineTest.fromCode()

Private Static Attributes

” "initialState": "Greetings",\n” + ” "states": [\n” + ” {\n” + ” "identifier": "Farewell",\n” + ” "implementation": "roboy.newDialog.states.toyStates.ToyFarewellState",\n” + ” "transitions": {}\n” + ” },\n” + ” {\n” + ” "identifier": "Greetings",\n” + ” "implementation": "roboy.newDialog.states.toyStates.ToyGreetingsState",\n” + ” "fallback": "Farewell",\n” + ” "transitions": {\n” + ” "next": "Farewell",\n” + ” "noHello": "Farewell"\n” + ” }\n” + ” }\n” + ”]\n” + “}”]

class *roboy*::*dialog*DialogSystem

The dialog manager’s main class.

Here, the used components are put together and executed using the main method. In the future, the different combinations of components should probably be transfered to configuration files.

The workflow in the dialog manager is the following:

1. Input devices produce an Input object
2. The Input object is transformed into an Interpretation object containing the input sentence in the Linguistics.SENTENCE attribute and all other lists of the Input object in the corresponding fields
3. Linguistic Analyzers are used on the Interpretation object to add additional information
4. The Personality class takes the Interpretation object and decides how to answer to this input
5. The list of actions returned by *Personality.answer* is performed by the Output devices
6. If one of these actions is a ShutDownAction the program terminates
7. Otherwise repeat

Input devices:

- For testing from command line: CommandLineInput
- For speech to text: BingInput (requires internet)
- For combining multiple inputs: MultiInputDevice
- Others for specific tasks

Analyzers:

- Tokenization: SimpleTokenizer
- Part-of-speech-tagging: OpenNLPPOSTagger
- Semantic role labeling: OpenNLPParser
- DBpedia question answering: AnswerAnalyzer
- Other more stupid ones

Personalities:

- SmallTalkPersonality: main one
- Others for testing specific things

Output devices:

- For testing with command line: CommandLineOutput
- For text to speech: BingOutput (requires internet)
- For combining multiple outputs: MultiOutputDevice
- For text to speech + facial expressions: CerevoiceOutput
- For facial expressions: EmotionOutput
- For text to speech (worse quality): FreeTTSOutput

The easiest way to create ones own Roboy communication application is to pick the input and output devices provided here, use the tokenization, POS tagging and possibly semantic role labeling (though still under development) if needed and write an own personality. If one wants to use the DBpedia, Protege, generative model or state machine stuff, one has to dig deeper into the small talk personality and see how it is used there.

Public Static Functions

static void roboy.dialog.DialogSystem.main(String[] args)

class *roboy*::*context*::*contextObjects***DialogTopics** : **public** *roboy*::*context*::ValueHistory<String>

class *roboy*::*context*::*contextObjects***DialogTopicsUpdater** : **public** *roboy*::*context*::*InternalUpdater*<*DialogTopics*, String>
Updater available to all DM for adding new values to the *DialogTopics* attribute.

Public Functions

roboy.context.contextObjects.DialogTopicsUpdater.DialogTopicsUpdater(DialogTopics targ

class
Checks the sentence type by stupidly looking at the first word of the sentence and hoping that there is a known question word.

Puts the answer in the sentenceType variable of the *Interpretation* object.

Public Functions

Interpretation roboy.linguistics.sentenceanalysis.DictionaryBasedSentenceTypeDetector.

Private Functions

SENTENCE_TYPE roboy.linguistics.sentenceanalysis.DictionaryBasedSentenceTypeDetector.d

class *roboy*::*linguistics*::*sentenceanalysis***DictionaryBasedSentenceTypeDetectorTest**

Public Functions

void roboy.linguistics.sentenceanalysis.DictionaryBasedSentenceTypeDetectorTest.testWh

Private Members

DictionaryBasedSentenceTypeDetector roboy.linguistics.sentenceanalysis.DictionaryBased

SimpleTokenizer roboy.linguistics.sentenceanalysis.DictionaryBasedSentenceTypeDetector

class
A phonetic encoder using the method double metaphone that maps words to their phonetic base form so that words that are written differently but sound similar receive the same form.

This is intended to be used to correct terms that Roboy misunderstood, but currently is not is use.

Public Functions

roboy.linguistics.phonetics.DoubleMetaphoneEncoder.DoubleMetaphoneEncoder(DoubleMetaph

String roboy.linguistics.phonetics.DoubleMetaphoneEncoder.encode(String input)

Package Attributes

DoubleMetaphone roboy.linguistics.phonetics.DoubleMetaphoneEncoder.doubleMetaphone

class

Checks for a handfull of keywords and stores more or less fitting emotions in the *Linguistics.EMOTION* feature that is later read out and fed to the facial expression output module.

Public Functions

Interpretation roboy.linguistics.sentenceanalysis.EmotionAnalyzer.analyze(Interpretati

class

Roboy's facial expression output.

Public Functions

roboy.io.EmotionOutput.EmotionOutput(RosMainNode node)

void roboy.io.EmotionOutput.act(List< Action > actions)

void roboy.io.EmotionOutput.act(Action action)

Private Members

RosMainNode roboy.io.EmotionOutput.rosMainNode

class *roboy*::*linguistics***Entity**

Public Functions

roboy.linguistics.Entity.Entity(String term)

String roboy.linguistics.Entity.getForm(String form)

Map<String,String> roboy.linguistics.Entity.getForms()

Private Members

Map<String,String> roboy.linguistics.Entity.forms

interface *roboy*::*context***ExternalContextInterface**

Interface for an enum which lists *Context* values and valueHistories.

Methods enable retrieving values over generic methods with *AttributeManager*.

Subclassed by *roboy.context.Context.ValueHistories*, *roboy.context.Context.Values*

Public Functions

Class roboy.context.ExternalContextInterface.getClassType()

Class roboy.context.ExternalContextInterface.getReturnType()

class *roboy*::*context***ExternalUpdater**
For Values which should be updated upon incoming data or at regular intervals, this class fetches and passes the values.

Subclassed by *roboy.context.IntervalUpdater< T >*

Protected Functions

abstract void roboy.context.ExternalUpdater.update()

class
Action used if the dialogue manager wants Roboy to express a certain facial expression, like being angry, neutral or moving its lips (speak).

Public Functions

roboy.dialog.action.FaceAction.FaceAction(String state)
Constructor.

Duration is set to 1.

Parameters

- `state`: The facial expression. Possible values: angry, neutral, speak

roboy.dialog.action.FaceAction.FaceAction(String state, int duration)
Constructor.

Parameters

- `state`: The facial expression. Possible values: angry, neutral, speak
- `duration`: How long Roboy should display the given facial expression

String roboy.dialog.action.FaceAction.getState()

int roboy.dialog.action.FaceAction.getDuration()

Private Members

String roboy.dialog.action.FaceAction.state

int roboy.dialog.action.FaceAction.duration

class *roboy*::*context*::*contextObjects***FaceCoordinates** : **public** *roboy*::*context*::*Value*<*CoordinateSet*>
xzy-coordinates of a person in the field of vision.

class *roboy*::*context*::*contextObjects***FaceCoordinatesUpdater** : **public** *roboy*::*context*::IntervalUpdater<*FaceCoordinates*>
Asynchronously triggers ROS queries for face coordinates (in the future).

Public Functions

roboy.context.contextObjects.FaceCoordinatesUpdater.FaceCoordinatesUpdater(FaceCoordina

Protected Functions

`void roboy.context.contextObjects.FaceCoordinatesUpdater.update()`

class
Says goodbye.

Public Functions

`roboy.dialog.personality.states.FarewellState.FarewellState()`

`List<Interpretation> roboy.dialog.personality.states.FarewellState.act()`

`Reaction roboy.dialog.personality.states.FarewellState.react(Interpretation input)`

class
Free TTS text to speech.

Public Functions

`roboy.io.FreeTTSOutput.FreeTTSOutput()`

`void roboy.io.FreeTTSOutput.act(List< Action > actions)`

Public Static Functions

`static void roboy.io.FreeTTSOutput.main(String[] args)`

Private Members

`Voice roboy.io.FreeTTSOutput.voice`

class

Public Functions

`List<Interpretation> roboy.dialog.personality.states.GenerativeCommunicationState.act(`

Protected Functions

`boolean roboy.dialog.personality.states.GenerativeCommunicationState.determineSuccess(`

Private Members

`boolean roboy.dialog.personality.states.GenerativeCommunicationState.first` = true

class
Says hello.

Public Functions

List<Interpretation> roboy.dialog.personality.states.GreetingState.act()

Reaction roboy.dialog.personality.states.GreetingState.react(Interpretation input)

Protected Functions

boolean roboy.dialog.personality.states.GreetingState.determineSuccess(Interpretation

class

Public Functions

List<Interpretation> roboy.dialog.personality.states.IdleState.act()

Protected Functions

boolean roboy.dialog.personality.states.IdleState.determineSuccess(Interpretation inpu

class *roboy*::*io***Input**

The result of an input device consists of a sentence, if it is an audio device, and an arbitrary map of lists.

Public Functions

roboy.io.Input.Input(String sentence)

roboy.io.Input.Input(String sentence, Map< String, Object > attributes)

Public Members

String roboy.io.Input.sentence

Map<String,Object> roboy.io.Input.attributes

interface *roboy*::*io***InputDevice**

An input device must listen and return an *Input* object.

Subclassed by *roboy.io.BingInput*, *roboy.io.CelebritySimilarityInput*, *roboy.io.CommandLineInput*, *roboy.io.MultiInputDevice*, *roboy.io.RoboyNameDetectionInput*, *roboy.io.UdpInput*

Public Functions

Input roboy.io.InputDevice.listen()

class

Asks a given question, checks the answer for a list of given terms.

Moves to the success state if the answer consists one of these terms and to the failure state if not.

Public Functions

roboy.dialog.personality.states.InquiryState.InquiryState(String inquiry, List< String
Constructor.

Parameters

- `inquiry`: The question asked
- `successTerms`: The list of terms that is checked for
- `failureText`: Currently, not used

List<Interpretation> roboy.dialog.personality.states.InquiryState.act()

Protected Functions

boolean roboy.dialog.personality.states.InquiryState.determineSuccess(Interpretation i

Private Members

String roboy.dialog.personality.states.InquiryState.inquiry

List<String> roboy.dialog.personality.states.InquiryState.successTerms

String roboy.dialog.personality.states.InquiryState.failureText

class
Calls a machine learning model to determine if the utterance of the other person represents one of the learned intents.

Stores the highest scoring intent in the *Linguistics.INTENT* feature and the score in the *Linguistics.INTENT_DISTANCE* feature.

Public Functions

roboy.linguistics.sentenceanalysis.IntentAnalyzer.IntentAnalyzer(RosMainNode ros)

Interpretation roboy.linguistics.sentenceanalysis.IntentAnalyzer.analyze(Interpretatio

Private Members

RosMainNode roboy.linguistics.sentenceanalysis.IntentAnalyzer.ros

interface *roboy*::*logic***Intention**

class *roboy*::*logic***IntentionClassifier**

Public Functions

roboy.logic.IntentionClassifier.IntentionClassifier(Ros ros_)

String roboy.logic.IntentionClassifier.classify(String utterance)

Private Members

Ros roboy.logic.IntentionClassifier.ros

class *roboy*::*memory*::*nodes***Interlocutor**

Encapsulates a *MemoryNodeModel* and enables dialog states to easily store and retrieve information about its current conversation partner.

Public Functions

roboy.memory.nodes.Interlocutor.Interlocutor()

void roboy.memory.nodes.Interlocutor.addName(String name)

After executing this method, the person field contains a node that is in sync with memory and represents the interlocutor.

Unless something goes wrong during querying, which would affect the following communication severely.

String roboy.memory.nodes.Interlocutor.getName()

boolean roboy.memory.nodes.Interlocutor.hasRelationship(Neo4jRelationships type)

ArrayList<Integer> roboy.memory.nodes.Interlocutor.getRelationships(Neo4jRelationships

void roboy.memory.nodes.Interlocutor.addInformation(String relationship, String name)

Adds a new relation to the person node, updating memory.

Public Members

boolean roboy.memory.nodes.Interlocutor.FAMILIAR = false

Package Attributes

Neo4jMemory roboy.memory.nodes.Interlocutor.memory

Private Members

MemoryNodeModel roboy.memory.nodes.Interlocutor.person

boolean roboy.memory.nodes.Interlocutor.memoryROS

template <T, V>
class *roboy*::*context***InternalUpdater**

An updater which can be called from inside DM to update a *Value* or *ValueHistory*.

Parameters

- <T>: The target *Value* or *ValueHistory*.
- <V>: The data type stored in the target.

Subclassed by *roboy.context.contextObjects.DialogTopicsUpdater*

Public Functions

```
synchronized void roboy.context.InternalUpdater< T extends AbstractValue< V, V >.putVa
```

Protected Functions

```
roboy.context.InternalUpdater< T extends AbstractValue< V, V >.InternalUpdater(T targe
```

Package Attributes

```
AbstractValue<V> roboy.context.InternalUpdater< T extends AbstractValue< V, V >.target
```

class *roboy*::*linguistics*::*sentenceanalysis*`Interpretation`

An interpretation of all inputs to Roboy consists of the sentence type and an arbitrary map of features.

Feature names are listed and documented in the class *roboy.linguistics.Linguistics*.

The interpretation class is also used to pass the output information from the states to the verbalizer class.

Public Functions

```
roboy.linguistics.sentenceanalysis.Interpretation.Interpretation(String sentence)
roboy.linguistics.sentenceanalysis.Interpretation.Interpretation(String sentence, Map<
roboy.linguistics.sentenceanalysis.Interpretation.Interpretation(SENTENCE_TYPE sentenc
roboy.linguistics.sentenceanalysis.Interpretation.Interpretation(SENTENCE_TYPE sentenc
Map<String, Object> roboy.linguistics.sentenceanalysis.Interpretation.getFeatures()
Object roboy.linguistics.sentenceanalysis.Interpretation.getFeature(String featureName
void roboy.linguistics.sentenceanalysis.Interpretation.setFeatures(Map< String, Object
SENTENCE_TYPE roboy.linguistics.sentenceanalysis.Interpretation.getSentenceType()
void roboy.linguistics.sentenceanalysis.Interpretation.setSentenceType(SENTENCE_TYPE s
String roboy.linguistics.sentenceanalysis.Interpretation.toString()
```

Private Members

```
Map<String,Object> roboy.linguistics.sentenceanalysis.Interpretation.features
SENTENCE_TYPE roboy.linguistics.sentenceanalysis.Interpretation.sentenceType
```

template <T>
class

An implementation of the UpdatePolicy which performs regular updates on a target object.

The method update() needs to be implemented in the subclass.

Parameters

- `<T>`: The class of the target object.

Subclassed by *roboy.context.contextObjects.FaceCoordinatesUpdater*

Public Functions

roboy.context.IntervalUpdater< T >.IntervalUpdater(T target, int updateFrequencySecond
Create a new updater service, executing the update() method at regular time intervals.

Parameters

- `target`: The target attribute of the update() method.
- `updateFrequencySeconds`: Delay in seconds between calls to the update() method.

Public Members

final int roboy.context.IntervalUpdater< T >.updateFrequency

Protected Attributes

final T roboy.context.IntervalUpdater< T >.target

final ScheduledExecutorService roboy.context.IntervalUpdater< T >.scheduler = Executors.new

Private Functions

void roboy.context.IntervalUpdater< T >.start()
Starts the ScheduledExecutorService of the updating thread.

class
Roboy introduces himself and asks "Who are you?".

Moves to success state if the answer is at most 2 words.

Public Functions

roboy.dialog.personality.states.IntroductionState.IntroductionState(Interlocutor perso

List<Interpretation> roboy.dialog.personality.states.IntroductionState.act()

Public Members

Neo4jRelationships roboy.dialog.personality.states.IntroductionState.predicate = Neo4jRel

Protected Functions

boolean roboy.dialog.personality.states.IntroductionState.determineSuccess(Interpretat
Performs person detection by consulting memory.

Package Attributes

Interlocutor roboy.dialog.personality.states.IntroductionState.person = new *Interlocutor*()

Neo4jMemory roboy.dialog.personality.states.IntroductionState.memory

Private Static Attributes

"I am Roboy. Who are you?", "My name is Roboy. What is your name?")]

class *roboy*::*util***IO**

Helper class for *IO* related tasks.

Public Static Functions

static String roboy.util.IO.readFile(String file)

static String roboy.util.IO.readFile(File file)

static List<String> roboy.util.IO.readLines(String file)

static List<String> roboy.util.IO.readLines(File file)

class *roboy*::*util***JsonEntryModel**

Package Attributes

List<String> roboy.util.JsonEntryModel.Q

Map<String, List<String> > roboy.util.JsonEntryModel.A

Map<String, List<String> > roboy.util.JsonEntryModel.FUP

class *roboy*::*util***JsonModel**

Package Attributes

JsonEntryModel roboy.util.JsonModel.name

JsonEntryModel roboy.util.JsonModel.FROM

JsonEntryModel roboy.util.JsonModel.HAS_HOBBY

JsonEntryModel roboy.util.JsonModel.LIVE_IN

JsonEntryModel roboy.util.JsonModel.FRIEND_OF

JsonEntryModel roboy.util.JsonModel.STUDY_AT

JsonEntryModel roboy.util.JsonModel.MEMBER_OF

JsonEntryModel roboy.util.JsonModel.WORK_FOR

JsonEntryModel roboy.util.JsonModel.OCCUPIED_AS

class *roboy*::*util***JsonQAValues**

Public Functions

roboy.util.JsonQAValues.JsonQAValues(Map< String, List< String >> questions, Map< Stri

Map<String, List<String> > roboy.util.JsonQAValues.getQuestions()

Map<String, List<String> > roboy.util.JsonQAValues.getSuccessAnswers()

Map<String, List<String> > roboy.util.JsonQAValues.getFailureAnswers()

Map<String, List<String> > roboy.util.JsonQAValues.getFollowUpQuestions()

Map<String, List<String> > roboy.util.JsonQAValues.getFollowUpAnswers()

Private Members

Map<String, List<String> > roboy.util.JsonQAValues.questions

Map<String, List<String> > roboy.util.JsonQAValues.successAnswers

Map<String, List<String> > roboy.util.JsonQAValues.failureAnswers

Map<String, List<String> > roboy.util.JsonQAValues.followUp

Map<String, List<String> > roboy.util.JsonQAValues.answersFollowUp

class *roboy*::*util***JsonUtils**

Public Static Functions

static JsonQAValues roboy.util.JsonUtils.getQuestionsAndAnswersFromJson(String file)
Fetches the complite JSON string, splits and converts the most straightforward way into backward-compatible Map<> entries initializing a backward-compatible *JsonQAValues* class.

static Map<String, List<String> > roboy.util.JsonUtils.getSentencesFromJsonFile(String
Fetches the map of (keyword) -> (lists of corresponding questions) from the specified filename.

static Map<String,List<String[]> > roboy.util.JsonUtils.getSentenceArraysFromJsonFile(
The success responses consist of an array of two strings, which enables reflecting parsed answers back at the conversation partner.

class
A test personality that only tries to tell knock knock jokes.

This should later be include in sensible states and used in the normal small talk personality.

Public Functions

List<Action> roboy.dialog.personality.KnockKnockPersonality.answer(Interpretation input
The personality has four states which it will run through consecutively: WELCOME: An intial greeting, starting with a knock, knock KNOCKKNOCK: Knock, knock after at least one jokes was told already WHOISTHERE: Giving the first, shortened answer PUNCHLINE: Giving the punchline of the joke.

Private Functions

String [] roboy.dialog.personality.KnockKnockPersonality.pickJoke()

Private Members

KnockKnockState roboy.dialog.personality.KnockKnockPersonality.state = KnockKnockState.WEL

String [] roboy.dialog.personality.KnockKnockPersonality.joke

new String[]{"Rafa","Exactly! I have no idea. There are so many of them."}, new String[]{"Yoda lady", "Good job yodeling!"}, new String[]{"Deja","Knock, knock"}, new String[]{"Yah","No thanks, I am more of a Google person."}, new String[]{"Hatch","Gesundheit"}, new String[]{"Cows go","No, stupid. Cows go moo"}, new String[]{"To","No, it should always be to whom"}, new String[]{"Icing","Icing: Dale a tu cuerpo alegria Macarena. Que tu cuerpo es pa darle alegria y cosa buena. Dale a tu cuerpo alegria, Macarena. Hey Macarena!"}, new String[]{"Wanda","Wanda hang out with me?"}, new String[]{"Olive","Olive you and I don't care who knows it!"}, new String[]{"Police","Police hurry. I am freezing out here."}, new String[]{"Canoe","Canoe open the door?"}, new String[]{"Wendy","Wendy bell works again I won't have to knock anymore."}, new String[]{"Ken","Ken you open the door?"}, new String[]{"Alex","Hey, Alex the questions around here."}, new String[]{"Annie","Annie body going to open the door already?"}, new String[]{"Doris","Doris locked. Open up."}, new String[]{"Tank","You're welcome."}, new String[]{"Armageddon","Armageddon a little bored by this."}, new String[]{"Accordion","Accordion to the scientists that built me, I have a horrible sense of humor."}, new String[]{"Value","Value be my Valentine?"}, new String[]{"Lena","Lena little bit closer and I will show you."}, new String[]{"Anita","Anita recharge my batteries."}, new String[]{"Irish","Irish my legs would work."}, new String[]{"Avenue","Avenue seen this coming."}, new String[]{"Says","Says me. You looking for trouble?"}, new String[]{"Kenya","Kenya feel the love tonight?"} }]

enum *roboy*::*dialog*::*personality*::KnockKnockPersonality**KnockKnockState**

Public Members

roboy.dialog.personality.KnockKnockPersonality.KnockKnockState.WELCOME

roboy.dialog.personality.KnockKnockPersonality.KnockKnockState.KNOCKKNOCK

roboy.dialog.personality.KnockKnockPersonality.KnockKnockState.WHOSETHERE

roboy.dialog.personality.KnockKnockPersonality.KnockKnockState.PUNCHLINE

class *roboy*::*memory***Lexicon**

Represents a Protege lexicon.

Public Functions

roboy.memory.Lexicon.Lexicon()

List<LexiconLiteral> roboy.memory.Lexicon.getLiterals(String question, int limit, int

List<LexiconPredicate> roboy.memory.Lexicon.scoreThesePredicates(List< LexiconPredica

List<LexiconLiteral> roboy.memory.Lexicon.addTypeOfOwner(List< LexiconLiteral > resu

List<LexiconLiteral> roboy.memory.Lexicon.scoreLiterals(List< LexiconLiteral > result

List<String> roboy.memory.Lexicon.getPermutations(String question)

Package Functions

String roboy.memory.Lexicon.bestLabelOf(String objlabel, String label1, String permuta

Private Functions

List<LexiconPredicate> roboy.memory.Lexicon.addDomainAndRange(List< LexiconPredicate

Private Members

List<LexiconPredicate> roboy.memory.Lexicon.predicateList

List<LexiconLiteral> roboy.memory.Lexicon.literalList

Boolean roboy.memory.Lexicon.predicateFilled

Boolean roboy.memory.Lexicon.literalFilled

List<String> roboy.memory.Lexicon.permutationList

class *roboy*::*memory***LexiconLiteral** : **public** Comparable<*LexiconLiteral*>

An entity in the lexicon.

Public Functions

roboy.memory.LexiconLiteral.LexiconLiteral()

roboy.memory.LexiconLiteral.LexiconLiteral(String URI, String label, String QuestionMa

roboy.memory.LexiconLiteral.LexiconLiteral(String URI, String label, String QuestionMa

int roboy.memory.LexiconLiteral.compareTo(LexiconLiteral lexlit)

Public Members

List<String> roboy.memory.LexiconLiteral.typeOfOwner

String roboy.memory.LexiconLiteral.URI

String roboy.memory.LexiconLiteral.label

String roboy.memory.LexiconLiteral.QuestionMatch

int roboy.memory.LexiconLiteral.score

Public Static Attributes

public int compare(*LexiconLiteral* lexlit1, *LexiconLiteral* lexlit2) { return lexlit1.compareTo(lexlit2); } }]

class *roboy*::*memory***LexiconPredicate** : **public** Comparable<*LexiconPredicate*>

A relation in the lexicon.

Public Functions

roboy.memory.LexiconPredicate.LexiconPredicate()

roboy.memory.LexiconPredicate.LexiconPredicate(String URI, String Label)

int roboy.memory.LexiconPredicate.compareTo(LexiconPredicate lexpre)

Public Members

List<String> roboy.memory.LexiconPredicate.domains

List<String> roboy.memory.LexiconPredicate.ranges

String roboy.memory.LexiconPredicate.type

String roboy.memory.LexiconPredicate.URI

String roboy.memory.LexiconPredicate.label

String roboy.memory.LexiconPredicate.QuestionMatch

int roboy.memory.LexiconPredicate.score

Public Static Attributes

{ public int compare(*LexiconPredicate* lexpre1, *LexiconPredicate* lexpre2) { return lexpre1.compareTo(lexpre2); } }]

class *roboy*::*linguistics***Linguistics**

Collection of attribute names, enumerations, word lists etc.

related to linguistics.

Most importantly it contains the names of the results of the Analyzer that are stored in an Interpretation object and can be retrieved by the getFeature(String featureName) method. These feature names include: SENTENCE TRIPLE TOKENS POSTAGS KEYWORDS ASSOCIATION PAS NAME CELEBRITY OBJ_ANSWER PRED_ANSWER EMOTION INTENT INTENT_DISTANCE

Public Static Attributes

final List<String> roboy.linguistics.Linguistics.tobe = Arrays.asList("am","are","is","was","were","be

final List<String> roboy.linguistics.Linguistics.beMod = Lists.stringList("am","are","is","was","were",

final String roboy.linguistics.Linguistics.SENTENCE = "sentence"
The utterance of the person Roboy is speaking to.

final String roboy.linguistics.Linguistics.TRIPLE = "triple"
A triple of subject, predicate and object extracted by a very primitive rule system.

final String roboy.linguistics.Linguistics.TOKENS = "tokens"
The tokens (usually words) of the sentence.

final String roboy.linguistics.Linguistics.POSTAGS = "postags"
The part-of-speech tags (noun, verb, adjective etc.) corresponding to the tokens.

final String roboy.linguistics.Linguistics.KEYWORDS = "keywords"
If keywords for the segue state from the resource knowledgebase/triviaWords.csv are detected, they are passed with this name.

final String roboy.linguistics.Linguistics.ASSOCIATION = "association"
Is used to pass the detected keyword from the segue state to the verbalizer state to mention it before telling the anecdote.

final String roboy.linguistics.Linguistics.PAS = "pas"
Predicate-argument structures (who(agens) did what(predicate) to whom(patiens))

final String roboy.linguistics.Linguistics.NAME = "name"
Internally used to retrieve the name of a concept.

final String roboy.linguistics.Linguistics.CELEBRITY = "celebrity"
The name of the celebrity most resembling the person talked to, as detected by the CelebritySimilarityInput.

final String roboy.linguistics.Linguistics.ROBOYDETECTED = "roboydetected"
If Roboy detected his own name.

final String roboy.linguistics.Linguistics.OBJ_ANSWER = "objanswer"
Contains the answer to a question asked by the QuestionAskingState, if the answer is expected to be in the object of the sentence, like if the question is "What is your name?" or "Where are you from?".

final String roboy.linguistics.Linguistics.PRED_ANSWER = "predanswer"
Contains the answer to a question asked by the QuestionAskingState, if the answer is expected to be a predicate or a predicate and an object of the sentence, like if the question is "What is your hobby?" or "What do you do

for a living?".

final String roboy.linguistics.Linguistics.EMOTION = "emotion"
Contains the emotion Roboy intends to express based on the keyword detection in the EmotionAnalyzer.

final String roboy.linguistics.Linguistics.INTENT = "intent"
The result of the machine learning intent classification in the IntentAnalyzer.

final String roboy.linguistics.Linguistics.INTENT_DISTANCE = "intentdistance"
The confidence score of the machine learning intent classification in the IntentAnalyzer.

final String roboy.linguistics.Linguistics.PARSE = "parse"
The result of SemanticParserAnalyzer, formal language representation.

class *roboy*::*util***Lists**
Helper class for list related tasks.

Public Static Functions

static List<Action> roboy.util.Lists.actionList(Action... actions)

static List<Interpretation> roboy.util.Lists.interpretationList(Interpretation... inte

static List<String> roboy.util.Lists.stringList(String... strings)

static List<String[]> roboy.util.Lists.strArray(String...[] strings)

class
Created by roboy on 7/5/17.

Public Functions

List<Interpretation> roboy.dialog.personality.states.LocationDBpedia.act()

boolean roboy.dialog.personality.states.LocationDBpedia.determineSuccess(Interpretatio

Reaction roboy.dialog.personality.states.LocationDBpedia.react(Interpretation input)

class *roboy*::*dialog*::*personality*::*states***LocationDBpediaStateTest**
Created by roboy on 7/5/17.

Public Functions

void roboy.dialog.personality.states.LocationDBpediaStateTest.testCity()

void roboy.dialog.personality.states.LocationDBpediaStateTest.testCountry()

class *roboy*::*util*::**Maps**

Helper class for map related tasks.

Public Static Functions

static Map<String,String> roboy.util.Maps.stringMap(String... elements)

static Map<String,Object> roboy.util.Maps.stringObjectMap(Object... elements)

static Map<String,Reaction> roboy.util.Maps.stringReactionMap(Object... elements)

static Map<Integer,String> roboy.util.Maps.intStringMap(Object... elements)

template <T>
interface *roboy*::*memory*::**Memory**

The *Memory* interface contains of methods to save and retrieve information.

Parameters

- `<T>`: the type of information stored

Public Functions

boolean roboy.memory.Memory< T >.save(T object)

Storing the element in the memory.

Return true, if storing was successful

Parameters

- `object`: the element to be stored

Exceptions

- `InterruptedException`:
- `IOException`:

List<T> roboy.memory.Memory< T >.retrieve(T object)

Retrieve an element from memory.

Return a list of objects that match the query containing all the required information

Parameters

- `object`: a version of the object that lacks information (e.g. it only has the ID)

Exceptions

- `InterruptedException`:
- `IOException`:

class *roboy*::*memory*::*nodes*::**MemoryNodeModel**

This class represents a full node similarly to its representation in *Memory*.

Public Functions

roboy.memory.nodes.MemoryNodeModel.MemoryNodeModel()

roboy.memory.nodes.MemoryNodeModel.MemoryNodeModel(boolean stripQuery)

int roboy.memory.nodes.MemoryNodeModel.getId()

void roboy.memory.nodes.MemoryNodeModel.setId(int id)

ArrayList<String> roboy.memory.nodes.MemoryNodeModel.getLabels()

void roboy.memory.nodes.MemoryNodeModel.setLabel(String label)

HashMap<String, Object> roboy.memory.nodes.MemoryNodeModel.getProperties()

Object roboy.memory.nodes.MemoryNodeModel.getProperty(String key)

void roboy.memory.nodes.MemoryNodeModel.setProperties(HashMap< String, Object > proper

void roboy.memory.nodes.MemoryNodeModel.setProperty(String key, Object property)

HashMap<String, ArrayList<Integer> > roboy.memory.nodes.MemoryNodeModel.getRelationshi

ArrayList<Integer> roboy.memory.nodes.MemoryNodeModel.getRelationship(String key)

void roboy.memory.nodes.MemoryNodeModel.setRelationships(HashMap< String, ArrayList< I

void roboy.memory.nodes.MemoryNodeModel.setRelationship(String key, Integer id)

void roboy.memory.nodes.MemoryNodeModel.setStripQuery(boolean strip)

String roboy.memory.nodes.MemoryNodeModel.toJSON(Gson gson)
This toString method returns the whole object, including empty variables.

MemoryNodeModel roboy.memory.nodes.MemoryNodeModel.fromJSON(String json, Gson gson)
Returns an instance of this class based on the given JSON.

Package Attributes

transient boolean roboy.memory.nodes.MemoryNodeModel.stripQuery = false

Private Members

int roboy.memory.nodes.MemoryNodeModel.id

ArrayList<String> roboy.memory.nodes.MemoryNodeModel.labels

String roboy.memory.nodes.MemoryNodeModel.label

HashMap<String, Object> roboy.memory.nodes.MemoryNodeModel.properties

HashMap<String, ArrayList<Integer> > roboy.memory.nodes.MemoryNodeModel.relationships

class
A phonetic encoder using the method metaphone that maps words to their phonetic base form so that words that are written differently but sound similar receive the same form.

This is intended to be used to correct terms that Roboy misunderstood, but currently is not is use.

Public Functions

roboy.linguistics.phonetics.MetaphoneEncoder.MetaphoneEncoder(Metaphone metaphone)

String roboy.linguistics.phonetics.MetaphoneEncoder.encode(String input)

Private Members

Metaphone roboy.linguistics.phonetics.MetaphoneEncoder.metaphone

class
Meta class to combine multiple input devices.

Public Functions

roboy.io.MultiInputDevice.MultiInputDevice(InputDevice mainInput)

void roboy.io.MultiInputDevice.addInputDevice(InputDevice additionalInput)

Input roboy.io.MultiInputDevice.listen()

Private Members

InputDevice roboy.io.MultiInputDevice.mainInput

ArrayList<InputDevice> roboy.io.MultiInputDevice.additionalInputs

class
Meta class to combine multiple output devices.

Public Functions

roboy.io.MultiOutputDevice.MultiOutputDevice(OutputDevice device)

void roboy.io.MultiOutputDevice.add(OutputDevice additionalDevice)

void roboy.io.MultiOutputDevice.act(List< Action > actions)

Private Members

ArrayList<OutputDevice> roboy.io.MultiOutputDevice.devices

class
Implements the high-level-querying tasks to the *Memory* services using RosMainNode.

Public Functions

boolean roboy.memory.Neo4jMemory.save(MemoryNodeModel node)
Updating information in the memory for an EXISTING node with known ID.

Return true for success, false for fail

Parameters

- `node`: Node with a set ID, and other properties to be set or updated.

MemoryNodeModel roboy.memory.Neo4jMemory.getById(int id)
This query retrieves a a single node by its ID.

Return Node representation of the result.

Parameters

- `id`: the ID of requested

ArrayList<Integer> roboy.memory.Neo4jMemory.getByQuery(MemoryNodeModel query)
This is a classical database query which finds all matching nodes.

Return Array of IDs (all nodes which correspond to the pattern).

Parameters

- `query`: the ID of requested

int roboy.memory.Neo4jMemory.create(MemoryNodeModel query)

boolean roboy.memory.Neo4jMemory.remove(MemoryNodeModel query)
IF ONLY THE ID IS SET, THE NODE IN MEMORY WILL BE DELETED ENTIRELY.

Otherwise, the properties present in the query will be deleted.

Parameters

- `query`: StrippedQuery avoids accidentally deleting other fields than intended.

List<MemoryNodeModel> roboy.memory.Neo4jMemory.retrieve(MemoryNodeModel query)
//TODO Deprecated due to interface incompatibility, use getById or getByMatch

Return Array with a single node

Parameters

- `query`: a GetByIDQuery instance

String roboy.memory.Neo4jMemory.determineNodeType(String relationship)

Public Static Functions

static Neo4jMemory roboy.memory.Neo4jMemory.getInstance(RosMainNode node)

static Neo4jMemory roboy.memory.Neo4jMemory.getInstance()

Private Functions

roboy.memory.Neo4jMemory.Neo4jMemory(RosMainNode node)

Private Members

Gson roboy.memory.Neo4jMemory.gson = new Gson()

Private Static Attributes

Neo4jMemory roboy.memory.Neo4jMemory.memory

RosMainNode roboy.memory.Neo4jMemory.rosMainNode

enum *roboy*::*memory***Neo4jRelationships**
Contains the relations available in Neo4j database.

Respective questions should be added to the questions.json file and used in the QuestionRandomizerState.

Public Functions

roboy.memory.Neo4jRelationships.Neo4jRelationships(String type)

Public Members

roboy.memory.Neo4jRelationships.FROM =("FROM")

roboy.memory.Neo4jRelationships.HAS_HOBBY =("HAS_HOBBY")

roboy.memory.Neo4jRelationships.LIVE_IN =("LIVE_IN")

roboy.memory.Neo4jRelationships.STUDY_AT =("STUDY_AT")

roboy.memory.Neo4jRelationships.OCCUPIED_AS =("OCCUPIED_AS")

roboy.memory.Neo4jRelationships.WORK_FOR =("WORK_FOR")

roboy.memory.Neo4jRelationships.FRIEND_OF =("FRIEND_OF")

roboy.memory.Neo4jRelationships.MEMBER_OF =("MEMBER_OF")

roboy.memory.Neo4jRelationships.OTHER =("OTHER")

roboy.memory.Neo4jRelationships.IS =("IS")

String roboy.memory.Neo4jRelationships.type

class *roboy*::*newDialog***NewDialogSystem**
Temporary class to test new state based personality.

Will be be extended and might replace the old DialogSystem in the future.

Public Static Functions

static void roboy.newDialog.NewDialogSystem.main(String[] args)

Private Static Functions

static String roboy.newDialog.NewDialogSystem.getPersonalityFilePathFromConfig()

class
Checks for keywords from a list (knowledgebase/triviaWords.csv) and stores them in *Linguistics.KEYWORDS* attribute of the interpretation.

Public Functions

roboy.linguistics.sentenceanalysis.OntologyNERAnalyzer.OntologyNERAnalyzer()

Interpretation roboy.linguistics.sentenceanalysis.OntologyNERAnalyzer.analyze(Interpre

Private Members

Map<String,Entity> roboy.linguistics.sentenceanalysis.OntologyNERAnalyzer.entities

class

Performs a sentence analysis using the Open NLP constituency parser, then interprets the output for predicate argument structures (who did what to whom?) and stores them in the *Linguistics.PAS* attribute of the interpretation.

Public Functions

roboy.linguistics.sentenceanalysis.OpenNLPParser.OpenNLPParser()

Interpretation roboy.linguistics.sentenceanalysis.OpenNLPParser.analyze(Interpretation

StringBuilder roboy.linguistics.sentenceanalysis.OpenNLPParser.parseToString(Parse par

Public Static Functions

static void roboy.linguistics.sentenceanalysis.OpenNLPParser.main(String[] args)

Private Functions

Interpretation roboy.linguistics.sentenceanalysis.OpenNLPParser.extractPAS(Interpretat

Map<SEMANTIC_ROLE,Object> roboy.linguistics.sentenceanalysis.OpenNLPParser.top(Parse p

Map<SEMANTIC_ROLE,Object> roboy.linguistics.sentenceanalysis.OpenNLPParser.sbar(Parse

Map<SEMANTIC_ROLE,Object> roboy.linguistics.sentenceanalysis.OpenNLPParser.vp(Parse pa

Private Members

Parser roboy.linguistics.sentenceanalysis.OpenNLPParser.parser

class *roboy*::*linguistics*::*sentenceanalysis***OpenNLPParserTest**

Public Functions

void roboy.linguistics.sentenceanalysis.OpenNLPParserTest.testWhatIs()

void roboy.linguistics.sentenceanalysis.OpenNLPParserTest.testWhenWas()

void roboy.linguistics.sentenceanalysis.OpenNLPParserTest.testWhereWas()

void roboy.linguistics.sentenceanalysis.OpenNLPParserTest.testWhereDid()

void roboy.linguistics.sentenceanalysis.OpenNLPParserTest.testWhenDid()

void roboy.linguistics.sentenceanalysis.OpenNLPParserTest.testHowAdjective()

Private Static Attributes

final OpenNLPParser roboy.linguistics.sentenceanalysis.OpenNLPParserTest.parser = new *Op*

class
Perform part-of-speech tagging (detecting nouns, verbs etc.) using the Open NLP POS tagger and stores the results in the *Linguistics.POSTAGS* attribute of the interpretation.

Public Functions

roboy.linguistics.sentenceanalysis.OpenNLPPPOSTagger.OpenNLPPPOSTagger()

Interpretation roboy.linguistics.sentenceanalysis.OpenNLPPPOSTagger.analyze(Interpreta

Private Functions

String [] roboy.linguistics.sentenceanalysis.OpenNLPPPOSTagger.posTag(String[] tokens)

Private Members

POSTaggerME roboy.linguistics.sentenceanalysis.OpenNLPPPOSTagger.tagger

interface *roboy*::*io***OutputDevice**
An output device gets a list of actions and should perform those that it can handle.

Subclassed by *roboy.io.BingOutput*, *roboy.io.CerevoiceOutput*, *roboy.io.CommandLineOutput*, *roboy.io.EmotionOutput*, *roboy.io.FreeTTSOutput*, *roboy.io.MultiOutputDevice*, *roboy.io.UdpOutput*

Public Functions

void roboy.io.OutputDevice.act(List< Action > actions)

class *roboy*::*logic***PASInterpreter**
Turns predicate-argument-structures in the kind of relations required for querying DBpedia.

Maps the predicates to the predicate keys of DBpedia and picks the elements of the relation from different arguments of the PAS depending on the relation type.

Public Static Functions

static Relation roboy.logic.PASInterpreter.pas2DBpediaRelation(Map< String, Object > pa
Transforms a predicate argument structure into a DBpedia relation, that can be used to query DBpedia for the answer to the missing elements of the PAS.

Return the DBpedia relation

Parameters

- `pas`: the predicate argument structure

Private Static Attributes

final Map<String, String> roboy.logic.PASInterpreter.dbpediaRelations

class *roboy*::*logic***PASInterpreterTest**

Public Functions

void roboy.logic.PASInterpreterTest.testWhenWas()

void roboy.logic.PASInterpreterTest.testWhatIs()

void roboy.logic.PASInterpreterTest.testWhereWas()

void roboy.logic.PASInterpreterTest.testWhereDid()

void roboy.logic.PASInterpreterTest.testWhenDid()

void roboy.logic.PASInterpreterTest.testHowAdjective()

void roboy.logic.PASInterpreterTest.testWhatIsNewExamples()

void roboy.logic.PASInterpreterTest.testWhereDidNewExamples()

void roboy.logic.PASInterpreterTest.testWhoIsNewExamples()

void roboy.logic.PASInterpreterTest.testWhoLivesNewExamples()

Private Static Attributes

final OpenNLPParser roboy.logic.PASInterpreterTest.parser = new *OpenNLPParser*()

class

CSV file memory.

Can only be used for retrieving and not for storing.

Public Functions

List<Triple> roboy.memory.PersistentKnowledge.retrieve(Triple triple)

boolean roboy.memory.PersistentKnowledge.save(Triple triple)

Public Static Functions

static PersistentKnowledge roboy.memory.PersistentKnowledge.getInstance()

Private Functions

roboy.memory.PersistentKnowledge.PersistentKnowledge()

Private Static Attributes

PersistentKnowledge roboy.memory.PersistentKnowledge.persistentKnowledge

List<Triple> roboy.memory.PersistentKnowledge.memory

class

Public Functions

roboy.dialog.personality.states.PersonalFollowUpState.PersonalFollowUpState(List< Stri

List<Interpretation> roboy.dialog.personality.states.PersonalFollowUpState.act()
Ask the question.

Using Neo4jRelationships predicate

Public Members

Neo4jRelationships roboy.dialog.personality.states.PersonalFollowUpState.predicate

Protected Functions

boolean roboy.dialog.personality.states.PersonalFollowUpState.determineSuccess(Interpr
Retrieve the answer and add it to the memory, if needed.

As locations, hobbies, workplaces etc are individual nodes in memory, those will be retrieved or created if necessary.

Private Members

List<String> roboy.dialog.personality.states.PersonalFollowUpState.questions

List<String> roboy.dialog.personality.states.PersonalFollowUpState.successTexts

Interlocutor roboy.dialog.personality.states.PersonalFollowUpState.person

interface *roboy*::*dialog*::*personality***Personality**
Personality interface.

A personality is designed to define how Roboy reacts in every given situation. Roboy can always only represent one personality at a time. Different personalities are meant to be used in different situations, like a more formal or loose one depending on the occasion where he is at. In the future, also different languages could be realized by the use of different personalities.

The currently used personality is the *SmallTalkPersonality* which makes use of a state machine to act and react differently in different situations.

Subclassed by *roboy.dialog.personality.CuriousPersonality*, *roboy.dialog.personality.DefaultPersonality*, *roboy.dialog.personality.KnockKnockPersonality*, *roboy.dialog.personality.SmallTalkPersonality*, *roboy.newDialog.StateBasedPersonality*

Public Functions

List<Action> roboy.dialog.personality.Personality.answer(Interpretation input)
The central method of a personality.

Given an interpretation of all inputs (audio, visual, ...) to Roboy, this method decides which actions to perform in response.

Return A list of actions to perform in response

Parameters

- `input`: The interpretation of the inputs

class

Public Functions

roboy.dialog.personality.states.PersonalQAState.PersonalQAState(List< String > questio

List<Interpretation> roboy.dialog.personality.states.PersonalQAState.act()
Ask the question.

Public Members

Neo4jRelationships roboy.dialog.personality.states.PersonalQAState.predicate

Protected Functions

boolean roboy.dialog.personality.states.PersonalQAState.determineSuccess(Interpretatio
Retrieve the answer and add it to the memory, if needed.

As locations, hobbies, workplaces etc are individual nodes in memory, those will be retrieved or created if necessary.

Private Members

List<String> roboy.dialog.personality.states.PersonalQAState.questions

List<String> roboy.dialog.personality.states.PersonalQAState.successTexts

Interlocutor roboy.dialog.personality.states.PersonalQAState.person

interface *roboy*::*linguistics*::*phonetics***PhoneticEncoder**
An interface for phonetic encoders that map words to their phonetic base form so that words that are written differently but sound similar receive the same form.

This is intended to be used to correct terms that Roboy misunderstood, but currently is not is use.

Subclassed by *roboy.linguistics.phonetics.DoubleMetaphoneEncoder*, *roboy.linguistics.phonetics.MetaphoneEncoder*, *roboy.linguistics.phonetics.SoundexEncoder*

Public Functions

String roboy.linguistics.phonetics.PhoneticEncoder.encode(String input)

class *roboy*::*linguistics*::*phonetics***Phonetics**

Public Functions

List<String> roboy.linguistics.phonetics.Phonetics.similarWords(String word)

Public Static Functions

static void roboy.linguistics.phonetics.Phonetics.main(String[] args)

Private Members

Soundex roboy.linguistics.phonetics.Phonetics.soundex = new Soundex()

Map<String,List<String> > roboy.linguistics.phonetics.Phonetics.codecToWords

class

Corrects abbreviated forms like "I'm" to complete forms like "I am" which are expected by later sentence analyses.

Public Functions

Interpretation roboy.linguistics.sentenceanalysis.Preprocessor.analyze(Interpretation

class

State in which Roboy is answering questions based on DBpedia or the knowledge base from the resources folder.

Public Functions

roboy.dialog.personality.states.QuestionAnsweringState.QuestionAnsweringState(State in

void roboy.dialog.personality.states.QuestionAnsweringState.setTop(State top)

List<Interpretation> roboy.dialog.personality.states.QuestionAnsweringState.act()

Reaction roboy.dialog.personality.states.QuestionAnsweringState.react(Interpretation i

Checks the sentence type and detected triples in the input for determining what is asked about.

Then checks its knowledge base to come up with an answer.

Private Functions

Reaction roboy.dialog.personality.states.QuestionAnsweringState.innerReaction(Interpre

List<Triple> roboy.dialog.personality.states.QuestionAnsweringState.remember(String pr

Private Members

boolean roboy.dialog.personality.states.QuestionAnsweringState.first = true

List<Triple> roboy.dialog.personality.states.QuestionAnsweringState.memory

State roboy.dialog.personality.states.QuestionAnsweringState.inner

State roboy.dialog.personality.states.QuestionAnsweringState.top

List<Memory<Relation> > roboy.dialog.personality.states.QuestionAnsweringState.memorie

class *roboy*::*dialog*::*personality*::*states***QuestionAnsweringStateTest**

Public Functions

void roboy.dialog.personality.states.QuestionAnsweringStateTest.test()

void roboy.dialog.personality.states.QuestionAnsweringStateTest.testNotAnswerable()

void roboy.dialog.personality.states.QuestionAnsweringStateTest.testWhenWas()

void roboy.dialog.personality.states.QuestionAnsweringStateTest.testWhereWas()

void roboy.dialog.personality.states.QuestionAnsweringStateTest.testWhereDid()

void roboy.dialog.personality.states.QuestionAnsweringStateTest.testWhenDid()

void roboy.dialog.personality.states.QuestionAnsweringStateTest.testHowAdjective()

Private Static Attributes

final OpenNLPParser roboy.dialog.personality.states.QuestionAnsweringStateTest.parser =

final QuestionAnsweringState roboy.dialog.personality.states.QuestionAnsweringStateTes

class

Is asking the other person questions about things that we can store in the Protege memory.

Public Functions

roboy.dialog.personality.states.QuestionAskingState.QuestionAskingState(Map< String, L

List<Interpretation> roboy.dialog.personality.states.QuestionAskingState.act()

Asks first about the name of the other person and if called another time randomly about another possible other information.

Reaction roboy.dialog.personality.states.QuestionAskingState.react(Interpretation inpu

Protected Functions

State roboy.dialog.personality.states.QuestionAskingState.determineNextState(Interpret

Private Functions

Interpretation roboy.dialog.personality.states.QuestionAskingState.checkRoboyMind()

Interpretation roboy.dialog.personality.states.QuestionAskingState.checkDBpedia()

List<Interpretation> roboy.dialog.personality.states.QuestionAskingState.checkOwnMemory

String roboy.dialog.personality.states.QuestionAskingState.analyzeObject(String senten

String roboy.dialog.personality.states.QuestionAskingState.analyzePredicate(String sen

Private Members

Concept roboy.dialog.personality.states.QuestionAskingState.objectOfFocus

String roboy.dialog.personality.states.QuestionAskingState.currentIntent

int roboy.dialog.personality.states.QuestionAskingState.questionsCount

Map<String, List<String> > roboy.dialog.personality.states.QuestionAskingState.questio

Random roboy.dialog.personality.states.QuestionAskingState.generator

Map<String, State> roboy.dialog.personality.states.QuestionAskingState.children

SmallTalkPersonality roboy.dialog.personality.states.QuestionAskingState.personality

Private Static Attributes

final int roboy.dialog.personality.states.QuestionAskingState.TOASK = 2

final SimpleTokenizer roboy.dialog.personality.states.QuestionAskingState.tokenizer = ne

final OpenNLPPOSTagger roboy.dialog.personality.states.QuestionAskingState.pos = new *Op*

final OpenNLPParser roboy.dialog.personality.states.QuestionAskingState.parser = new *Oper*

final AnswerAnalyzer roboy.dialog.personality.states.QuestionAskingState.answer = new *Ans*

class

Manages the questions that can be asked from a person.

Coupled with Neo4j information about the person to prevent duplicates.

Public Functions

roboy.dialog.personality.states.QuestionRandomizerState.QuestionRandomizerState(State

List<Interpretation> roboy.dialog.personality.states.QuestionRandomizerState.act()

Reaction roboy.dialog.personality.states.QuestionRandomizerState.react(Interpretation

void roboy.dialog.personality.states.QuestionRandomizerState.setTop(State top)

Package Attributes

boolean roboy.dialog.personality.states.QuestionRandomizerState.askFollowUp = true

String roboy.dialog.personality.states.QuestionRandomizerState.QAfile = "sentences/QAList.jso

Map<String, List<String> > roboy.dialog.personality.states.QuestionRandomizerState.que

Map<String, List<String> > roboy.dialog.personality.states.QuestionRandomizerState.suc

Map<String, List<String> > roboy.dialog.personality.states.QuestionRandomizerState.fai

Map<String, List<String> > roboy.dialog.personality.states.QuestionRandomizerState.fol

Map<String, List<String> > roboy.dialog.personality.states.QuestionRandomizerState.ans

Private Functions

PersonalQAState roboy.dialog.personality.states.QuestionRandomizerState.initializeQues

PersonalFollowUpState roboy.dialog.personality.states.QuestionRandomizerState.initiali

void roboy.dialog.personality.states.QuestionRandomizerState.checkForAskedQuestions()

Private Members

PersonalQAState [] roboy.dialog.personality.states.QuestionRandomizerState.questionSta

PersonalQAState roboy.dialog.personality.states.QuestionRandomizerState.locationQuesti

PersonalFollowUpState [] roboy.dialog.personality.states.QuestionRandomizerState.follo

HashMap<Neo4jRelationships, Boolean> roboy.dialog.personality.states.QuestionRandomize

State roboy.dialog.personality.states.QuestionRandomizerState.inner

State roboy.dialog.personality.states.QuestionRandomizerState.chosenState

Interlocutor roboy.dialog.personality.states.QuestionRandomizerState.person

JsonQAValues roboy.dialog.personality.states.QuestionRandomizerState.questionsAndAnswe

class *roboy*::*dialog*::*personality*::*states***Reaction**

The reaction to what the other person said and did, consists of a list of interpretations, which is an abstraction of an utterance (the verbalizer later formulates the utterance), and a state into which the state machine moves.

Public Functions

roboy.dialog.personality.states.Reaction.Reaction(State state, List< Interpretation

roboy.dialog.personality.states.Reaction.Reaction(State state)

List<Interpretation> roboy.dialog.personality.states.Reaction.getReactions()

State roboy.dialog.personality.states.Reaction.getState()

void roboy.dialog.personality.states.Reaction.setState(State state)

Private Members

List<Interpretation> roboy.dialog.personality.states.Reaction.reactions

State roboy.dialog.personality.states.Reaction.state

class *roboy*::*util*::**Relation**
DBpedia relation.

Public Functions

roboy.util.Relation.Relation(Concept subject, String predicate, Concept object)

String roboy.util.Relation.getSubject()

String roboy.util.Relation.getObject()

Public Members

Concept roboy.util.Relation.subject

Concept roboy.util.Relation.object

String roboy.util.Relation.predicate

class *roboy*::*memory*::*nodes*::**Roboy**
Encapsulates a *MemoryNodeModel* and enables dialog states to easily store and retrieve information about *Roboy*.

Public Functions

roboy.memory.nodes.Roboy.Roboy(String name)
Initializer for the *Roboy* node.

String roboy.memory.nodes.Roboy.getName()
Method to obtain the name of the *Roboy* node.

Return String name - text containing the name as in the *Memory*

ArrayList<Integer> roboy.memory.nodes.Roboy.getRelationships(Neo4jRelationships type)
Method to obtain the specific type relationships of the *Roboy* node.

Return ArrayList<Integer> ids - list containing integer IDs of the nodes related to the *Roboy* by specific relationship type as in the *Memory*

void roboy.memory.nodes.Roboy.addInformation(String relationship, String name)
Adds a new relation to the *Roboy* node, updating memory.

Package Attributes

Neo4jMemory roboy.memory.nodes.Roboy.memory

Private Functions

void roboy.memory.nodes.Roboy.InitializeRoboy(String name)
This method initializes the roboy property as a node that is in sync with memory and represents the *Roboy* itself.

If something goes wrong during querying, *Roboy* stays empty and soulless, and has to fallback

Private Members

MemoryNodeModel roboy.memory.nodes.Roboy.roboy

boolean roboy.memory.nodes.Roboy.memoryROS

class
Protege memory.

Public Functions

boolean roboy.memory.RoboyMind.save(Concept object)

List<Concept> roboy.memory.RoboyMind.retrieve(Concept object)

boolean roboy.memory.RoboyMind.update(Concept object)

Map<String,List<Concept> > roboy.memory.RoboyMind.match(Concept object)

Public Members

int roboy.memory.RoboyMind.object_id = 0

Public Static Functions

static RoboyMind roboy.memory.RoboyMind.getInstance()

Private Functions

roboy.memory.RoboyMind.RoboyMind()

ServiceResponse roboy.memory.RoboyMind.CreateInstance(String class_name, int object_id

boolean roboy.memory.RoboyMind.AssertProperty(String object, String property, String v

List<Concept> roboy.memory.RoboyMind.FindInstances(String property, String value)

JsonObject roboy.memory.RoboyMind.ListAttributes(String object)

ServiceResponse roboy.memory.RoboyMind.SaveObject(String class_name, String properties

Concept roboy.memory.RoboyMind.GetObject(String properties, String values)

ServiceResponse roboy.memory.RoboyMind.ShowInstance(String class_name)

Private Static Attributes

RoboyMind roboy.memory.RoboyMind.roboyMemory

class
Class detecting Roboy name.

Initiates native sphinx function of live speech analysis and checks the stream

Author Petr Romanov

Version 1.0

Date 21.04.2017

Public Functions

roboy.io.RoboyNameDetectionInput.RoboyNameDetectionInput()
constructor which initialises recognition

void roboy.io.RoboyNameDetectionInput.stopListening()
function for correct stopping recognition

Input roboy.io.RoboyNameDetectionInput.listen()
tracks what was said

Return A signal that Roboy is one of the words in just said phrase

Protected Attributes

LiveSpeechRecognizer roboy.io.RoboyNameDetectionInput.recog_copy
'link' to the object of Recognizer for correct stopping before deletion of the RoboyNameDetectorInput object

class *roboy*::*ros***Ros**
Communication with ROS.

Public Static Functions

static edu.wpi.rail.jrosbridge.Ros roboy.ros.Ros.getInstance()

static void roboy.ros.Ros.close()

Private Functions

roboy.ros.Ros.Ros()

Private Static Attributes

edu.wpi.rail.jrosbridge.Ros roboy.ros.Ros.ros

final String roboy.ros.Ros.ROS_URL = System.getenv("ROS_IP")

enum *roboy*::*ros***RosClients**
Stores the different client addresses and corresponding ROS message types.

Public Functions

roboy.ros.RosClients.RosClients(String address, String type)

Public Members

roboy.ros.RosClients.SPEECHSYNTHESIS =("/roboy/cognition/speech/synthesis/talk", Talk._TYPE)

roboy.ros.RosClients.GENERATIVE =("/roboy/cognition/generative_nlp/answer", GenerateAnswer._TYPE)

roboy.ros.RosClients.FACEDETECTION =("/speech_synthesis/talk", DetectFace._TYPE)

roboy.ros.RosClients.OBJECTRECOGNITION =("/speech_synthesis/talk", RecognizeObject._TYPE)

roboy.ros.RosClients.STT =("/roboy/cognition/speech/recognition", RecognizeSpeech._TYPE)

roboy.ros.RosClients.EMOTION =("/roboy/control/face/emotion", ShowEmotion._TYPE)

roboy.ros.RosClients.CREATEMEMORY =("/roboy/cognition/memory/create", DataQuery._TYPE)

roboy.ros.RosClients.UPDATEMEMORY =("/roboy/cognition/memory/update", DataQuery._TYPE)

roboy.ros.RosClients.GETMEMORY =("/roboy/cognition/memory/get", DataQuery._TYPE)

roboy.ros.RosClients.DELETEMEMORY =("/roboy/cognition/memory/remove", DataQuery._TYPE)

roboy.ros.RosClients.CYPHERMEMORY =("/roboy/cognition/memory/cypher", DataQuery._TYPE)

roboy.ros.RosClients.INTENT =("/roboy/cognition/detect_intent", DetectIntent._TYPE)

String roboy.ros.RosClients.address

String roboy.ros.RosClients.type

class *roboy*::*ros***RosMainNode** : **public** AbstractNodeMain

Public Functions

roboy.ros.RosMainNode.RosMainNode()

GraphName roboy.ros.RosMainNode.getDefaultNodeName()

void roboy.ros.RosMainNode.onStart(final ConnectedNode connectedNode)

boolean roboy.ros.RosMainNode.SynthesizeSpeech(String text)

String roboy.ros.RosMainNode.RecognizeSpeech()

String roboy.ros.RosMainNode.GenerateAnswer(String question)

boolean roboy.ros.RosMainNode.ShowEmotion(String emotion)

String roboy.ros.RosMainNode.CreateMemoryQuery(String query)

String roboy.ros.RosMainNode.UpdateMemoryQuery(String query)

String roboy.ros.RosMainNode.GetMemoryQuery(String query)

String roboy.ros.RosMainNode.DeleteMemoryQuery(String query)

String roboy.ros.RosMainNode.CypherMemoryQuery(String query)

Object roboy.ros.RosMainNode.DetectIntent(String sentence)

Public Members

boolean roboy.ros.RosMainNode.STARTUP_SUCCESS = true

Protected Attributes

Object roboy.ros.RosMainNode.resp

Package Attributes

"status : "FAIL", " + "message : "Memory client not initialized."" + "}"]

Private Functions

void roboy.ros.RosMainNode.waitForLatchUnlock(CountDownLatch latch, String latchName)
Helper method to block the calling thread until the latch is zeroed by some other task.

Parameters

- `latch`: Latch to wait for.
- `latchName`: Name to be used in log messages for the given latch.

Private Members

CountDownLatch roboy.ros.RosMainNode.rosConnectionLatch

RosManager roboy.ros.RosMainNode.clients = new *RosManager*()

class *roboy*::*ros***RosManager**
Stores all the *Ros* Service Clients and manages access to them.

If SHUTDOWN_ON_ROS_FAILURE is set, throws a runtime exception if any of the clients failed to initialize.

Package Functions

boolean roboy.ros.RosManager.initialize(ConnectedNode node)
Initializes all ServiceClients for *Ros*.

boolean roboy.ros.RosManager.notInitialized(RosClients c)
Should always be called before getServiceClient, such that if a client failed to initialize, a fallback response can be created instead.

Important if SHUTDOWN_ON_ROS_FAILURE is false.

ServiceClient roboy.ros.RosManager.getServiceClient(RosClients c)
Returns the ServiceClient matching the *RosClients* entry.

the return might need casting before further use.

Private Members

HashMap<RosClients, ServiceClient> roboy.ros.RosManager.clientMap

class

Is checking for words with which it has associated anecdotes.

Tells the anecdote if a word matches, executes its inner state instead, if not.

Public Functions

roboy.dialog.personality.states.SegueState.SegueState(State inner)

void roboy.dialog.personality.states.SegueState.setTop(State top)

List<Interpretation> roboy.dialog.personality.states.SegueState.act()

Reaction roboy.dialog.personality.states.SegueState.react(Interpretation input)

Private Functions

Reaction roboy.dialog.personality.states.SegueState.segway(Interpretation input, React

Private Members

State roboy.dialog.personality.states.SegueState.inner

State roboy.dialog.personality.states.SegueState.top

Map<String,String> roboy.dialog.personality.states.SegueState.redditTIL

Private Static Attributes

final Map<SENTENCE_TYPE, Reaction> roboy.dialog.personality.states.SegueState.sentence

enum *roboy*::*linguistics*::*Linguistics***SEMANTIC_ROLE**

Public Members

roboy.linguistics.Linguistics.SEMANTIC_ROLE.PREDICATE

roboy.linguistics.Linguistics.SEMANTIC_ROLE.AGENT

roboy.linguistics.Linguistics.SEMANTIC_ROLE.PATIENT

roboy.linguistics.Linguistics.SEMANTIC_ROLE.TIME

roboy.linguistics.Linguistics.SEMANTIC_ROLE.LOCATION

roboy.linguistics.Linguistics.SEMANTIC_ROLE.MANNER

roboy.linguistics.Linguistics.SEMANTIC_ROLE.INSTRUMENT

roboy.linguistics.Linguistics.SEMANTIC_ROLE.ORIGIN

roboy.linguistics.Linguistics.SEMANTIC_ROLE.DESTINATION

roboy.linguistics.Linguistics.SEMANTIC_ROLE.RECIPIENT

roboy.linguistics.Linguistics.SEMANTIC_ROLE.BENEFICIARY

roboy.linguistics.Linguistics.SEMANTIC_ROLE.PURPOSE

roboy.linguistics.Linguistics.SEMANTIC_ROLE.CAUSE

class
Semantic parser class.

Connects DM to Roboy parser and adds its result to interpretation class.

Public Functions

roboy.linguistics.sentenceanalysis.SemanticParserAnalyzer.SemanticParserAnalyzer(int p
A constructor.

Creates ParserAnalyzer class and connects the parser to DM using a socket.

Interpretation roboy.linguistics.sentenceanalysis.SemanticParserAnalyzer.analyze(Interp
An analyzer function.

Sends input sentence to the parser and saves its response in output interpretation.

Return Input interpretation with semantic parser result.

Parameters

- `interpretation`: Input interpretation with currently processed sentence and results from previous analysis.

Private Members

Socket roboy.linguistics.sentenceanalysis.SemanticParserAnalyzer.clientSocket
Client socket for the parser.

PrintWriter roboy.linguistics.sentenceanalysis.SemanticParserAnalyzer.out
Output stream for the parser.

BufferedReader roboy.linguistics.sentenceanalysis.SemanticParserAnalyzer.in
Input stream from the parser.

boolean roboy.linguistics.sentenceanalysis.SemanticParserAnalyzer.debug = true
Boolean variable for debugging purpose.

enum *roboy*::*linguistics*::*Linguistics***SENTENCE_TYPE**

Public Members

roboy.linguistics.Linguistics.SENTENCE_TYPE.GREETING

roboy.linguistics.Linguistics.SENTENCE_TYPE.FAREWELL

roboy.linguistics.Linguistics.SENTENCE_TYPE.SEGUE

roboy.linguistics.Linguistics.SENTENCE_TYPE.ANECDOTE

roboy.linguistics.Linguistics.SENTENCE_TYPE.WHO

roboy.linguistics.Linguistics.SENTENCE_TYPE.HOW_IS

roboy.linguistics.Linguistics.SENTENCE_TYPE.HOW_DO

roboy.linguistics.Linguistics.SENTENCE_TYPE.WHY

roboy.linguistics.Linguistics.SENTENCE_TYPE.WHEN

roboy.linguistics.Linguistics.SENTENCE_TYPE.WHERE

roboy.linguistics.Linguistics.SENTENCE_TYPE.WHAT

roboy.linguistics.Linguistics.SENTENCE_TYPE.IS_IT

roboy.linguistics.Linguistics.SENTENCE_TYPE.DOES_IT

roboy.linguistics.Linguistics.SENTENCE_TYPE.STATEMENT

roboy.linguistics.Linguistics.SENTENCE_TYPE.NONE

class

Tries to find triples with rather stupid heuristics and stores the results in the *Linguistics.TRIPLE* attribute of the interpretation.

Public Functions

roboy.linguistics.sentenceanalysis.SentenceAnalyzer.SentenceAnalyzer()

Interpretation roboy.linguistics.sentenceanalysis.SentenceAnalyzer.analyze(Interpretat

Private Functions

Interpretation roboy.linguistics.sentenceanalysis.SentenceAnalyzer.extractPAS(String s

Triple roboy.linguistics.sentenceanalysis.SentenceAnalyzer.analyzeStatement(String[] t

Triple roboy.linguistics.sentenceanalysis.SentenceAnalyzer.analyzeIsIt(String[] tokens

Triple roboy.linguistics.sentenceanalysis.SentenceAnalyzer.analyzeDoesIt(String[] toke

Triple roboy.linguistics.sentenceanalysis.SentenceAnalyzer.analyzeWho(String[] tokens,

Triple roboy.linguistics.sentenceanalysis.SentenceAnalyzer.analyzeWhat(String[] tokens

Triple roboy.linguistics.sentenceanalysis.SentenceAnalyzer.analyzeHowIs(String[] token

Triple roboy.linguistics.sentenceanalysis.SentenceAnalyzer.analyzeHowDo(String[] token

Private Members

Map<String,String> roboy.linguistics.sentenceanalysis.SentenceAnalyzer.meanings

class

Action used to shut down Roboy.

Sending a *ShutDownAction* leads the dialog manager to leave the communication loop in the DialogManager class and quit the program after uttering the given last words.

Public Functions

roboy.dialog.action.ShutDownAction.ShutDownAction(List< Action > lastwords)
Constructor.

Parameters

- `lastwords`: The last actions that Roboy should perform before shutting down

List<Action> roboy.dialog.action.ShutDownAction.getLastWords()

Private Members

List<Action> roboy.dialog.action.ShutDownAction.lastwords

class
Tokenizes the text by splitting at whitespace and stores the resulting tokens in the *Linguistics.TOKENS* attribute of the interpretation.

Public Functions

Interpretation roboy.linguistics.sentenceanalysis.SimpleTokenizer.analyze(Interpretati

Private Functions

String [] roboy.linguistics.sentenceanalysis.SimpleTokenizer.tokenize(String sentence)

class
Currently, Roboys main personality.

It tries to engage with people in a general small talk, remembers what was said and answers questions. The small talk personality is based on a state machine, where each input is interpreted in the context of the state Roboy is currently in to determine respective answers.

The current state machine looks like this:

Greeting state | V Introduction state | V Question Randomizer state |_Question Answering state |_Segue state |_Wild talk state

The Question Randomizer, Question Answering, Segue and Wilk talk states are stacked. If one cannot give an appropriate reaction to the given utterance, the utterance is passed on to the next one. The Wild talk state will always answer.

If a farewell is uttered the personality re-initializes to the Greeting state.

What the states do: Greeting: Utters a greating Introduction: Introduces himself and asks for the others name. Reacts differently depending on whether the other person is known. Question Randomizer: Asks the other one questions about himself and stores the answers in Roboy's memory. Question Answering: Answers questions if they are asked and Roboy knows the answer. Segue: Tells anecdotes from Today-I-Learneds from Reddit if corresponding keywords are mentioned. Wild talk: Talks according to a neural network model trained on chat logs.

Public Functions

roboy.dialog.personality.SmallTalkPersonality.SmallTalkPersonality(Verbalizer verbaliz

List<Action> roboy.dialog.personality.SmallTalkPersonality.answer(Interpretation input

Reacts to inputs based on the corresponding state Roboy is in.

Each state returns a reaction to what was said and then proactively takes an action of its own. Both are combined to return the list of output actions.

String roboy.dialog.personality.SmallTalkPersonality.getName()

void roboy.dialog.personality.SmallTalkPersonality.setName(String name)

Private Functions

void roboy.dialog.personality.SmallTalkPersonality.initialize()

Private Members

String roboy.dialog.personality.SmallTalkPersonality.name

State roboy.dialog.personality.SmallTalkPersonality.state

Verbalizer roboy.dialog.personality.SmallTalkPersonality.verbalizer

RosMainNode roboy.dialog.personality.SmallTalkPersonality.rosMainNode

Interlocutor roboy.dialog.personality.SmallTalkPersonality.person

Private Static Attributes

Arrays.asList("enthusiastic", "awesome", "great", "very good", "dope", "smashing", "happy", "cheerful", "good", "phantastic")]

class

A phonetic encoder using the method soundex that maps words to their phonetic base form so that words that are written differently but sound similar receive the same form.

This is intended to be used to correct terms that Roboy misunderstood, but currently is not is use.

Public Functions

roboy.linguistics.phonetics.SoundexEncoder.SoundexEncoder(Soundex soundex)

String roboy.linguistics.phonetics.SoundexEncoder.encode(String input)

Private Members

Soundex roboy.linguistics.phonetics.SoundexEncoder.soundex

class

Action used for talking.

Public Functions

roboy.dialog.action.SpeechAction.SpeechAction(String text)
Constructor.

Parameters

- `text`: The text Roboy will utter

String roboy.dialog.action.SpeechAction.getText()

Private Members

String roboy.dialog.action.SpeechAction.text

interface *roboy*::*dialog*::*personality*::*states***State**
The central interface of the state machine.

A state always acts when its enters and reacts when its left. Both, the reaction of the last and the action of the next state, are combined to give the answer of Roboy.

Subclassed by *roboy.dialog.personality.states.AbstractBooleanState*, *roboy.dialog.personality.states.AnecdoteState*, *roboy.dialog.personality.states.CelebrityState*, *roboy.dialog.personality.states.FarewellState*, *roboy.dialog.personality.states.QuestionAnsweringState*, *roboy.dialog.personality.states.QuestionAskingState*, *roboy.dialog.personality.states.QuestionRandomizerState*, *roboy.dialog.personality.states.SegueState*, *roboy.dialog.personality.states.WildTalkState*

Public Functions

List<Interpretation> roboy.dialog.personality.states.State.act()

Reaction roboy.dialog.personality.states.State.react(Interpretation input)

class *roboy*::*newDialog*::*states***State**
Central class of the dialog state system.

Every dialog state should extend this class. A state always acts when it is entered and reacts when its left. Both, the reaction of the last and the action of the next state, are combined to give the answer of Roboy.

A state can have any number of transitions to other states. Every transition has a name (like "next" or "errorState"). When designing a new state, only the transition names are known. At run time the transitions will point to other states. You can get the attached state by the transition name using getTransition(transitionName).

A fallback can be attached to a state. In the case this state doesn't know how to react to an utterance, it can return null from the *react()* function. The state machine will query the fallback in this case. More details on the fallback concept can be found in the description of the *StateBasedPersonality* and in comments below.

Subclassed by *roboy.newDialog.states.toyStates.ToyFarewellState*, *roboy.newDialog.states.toyStates.ToyGreetingsState*, *roboy.newDialog.states.toyStates.ToyIntroState*, *roboy.newDialog.states.toyStates.ToyRandomAnswerState*

Public Functions

roboy.newDialog.states.State.State(String stateIdentifier)

String roboy.newDialog.states.State.getIdentifier()

void roboy.newDialog.states.State.setIdentifier(String stateIdentifier)

final State roboy.newDialog.states.State.getFallback()
If this state can't react to the input, the Personality state machine will ask the fallback state to react to the input.

This state still remains active.

Return fallback state

final void roboy.newDialog.states.State.setFallback(State fallback)
Set the fallback state.

The Personality state machine will ask the fallback state if this one has no answer.

Parameters

- `fallback`: fallback state

final void roboy.newDialog.states.State.setTransition(String name, State goToState)
Define a possible transition from this state to another.

Something like: "next" -> {GreetingState} "rudeInput" -> {EvilState} The next active state will be selected in *getNextState()* based on internal conditions.

Parameters

- `name`: name of the transition
- `goToState`: state to transit to

final State roboy.newDialog.states.State.getTransition(String name)

final HashMap<String, State> roboy.newDialog.states.State.getAllTransitions()

abstract List<Interpretation> roboy.newDialog.states.State.act()
A state always acts after the reaction.

Both, the reaction of the last and the action of the next state, are combined to give the answer of Roboy.

Return interpretations

abstract List<Interpretation> roboy.newDialog.states.State.react(Interpretation input)
Defines how to react to an input.

This is usually the answer to the incoming question or some other statement. If this state can't react, it can return 'null' to trigger the fallback state for the answer.

Note: In the new architecture, *react()* does not define the next state anymore! Reaction and state transitions are now decoupled. *State* transitions are defined in *getNextState()*

Return reaction to the input OR null (will trigger the fallback state)

Parameters

- `input`: input from the person we talk to

abstract State roboy.newDialog.states.State.getNextState()
After this state has reacted, the personality state machine will ask this state to which state to go next.

If this state is not ready, it will return itself. Otherwise, depending on internal conditions, this state will select one of the states defined in transitions to be the next one.

Return next actie state after this one has reacted

final boolean roboy.newDialog.states.State.allRequiredTransitionsAreInitialized()
Checks if all required transitions were initialized correctly.

Required transitions are defined in *getRequiredTransitionNames()*.

Return true if this state was initialized correctly

JsonObject roboy.newDialog.states.State.toJsonObject()

String roboy.newDialog.states.State.toString()

boolean roboy.newDialog.states.State.equals(Object obj)

Protected Functions

Set<String> roboy.newDialog.states.State.getRequiredTransitionNames()
Defines the names of all transition that HAVE to be defined for this state.

This function is used by *allRequiredTransitionsAreInitialized()* to make sure this state was initialized correctly. Default implementation requires no transitions to be defined.

Override this function in sub classes.

Return a set of transition names that have to be defined

Set<String> roboy.newDialog.states.State.newSet(String... tNames)
Utility function to create and initialize string sets in just one code line.

Return set initialized with inputs

Parameters

- `tNames`: names of the required transitions

Private Functions

boolean roboy.newDialog.states.State.equalsHelper_compareTransitions(State other)
check if every transition of this is present in the other and points to the same ID

Return true if all transitions of this state are present in the other state

Parameters

- `other`: other state to compare transitions

Private Members

String roboy.newDialog.states.State.stateIdentifier

State roboy.newDialog.states.State.fallback

HashMap<String, State> roboy.newDialog.states.State.transitions

class
Implementation of Personality based on a *DialogStateMachine*.

In contrast to previous Personality implementations, this one is more generic as it loads the dialog from a file. Additionally, it is still possible to define the dialog structure directly from code (as it was done in previous implementations).

Instead of using nested states that will pass an utterance to each other if a state cannot give an appropriate reaction, we use a fallback concept. If a state doesn't know how to react, it simply doesn't react at all. If a fallback (with is another state) is attached to it, the personality will pass the utterance to the fallback automatically. This concept helps to decouple the states and reduce the dependencies between them.

Public Functions

roboy.newDialog.StateBasedPersonality.StateBasedPersonality(Verbalizer verb)

List<Action> roboy.newDialog.StateBasedPersonality.startConversation()
Always called once by the (new) DialogSystem at the beginning of every new conversation.

Return list of actions based on act() of the initial/active state

List<Action> roboy.newDialog.StateBasedPersonality.answer(Interpretation input)
The central method of a personality.

Given an interpretation of all inputs (audio, visual, ...) to Roboy, this method decides which actions to perform in response.

Return A list of actions to perform in response

Parameters

- `input`: The interpretation of the inputs

Private Functions

void roboy.newDialog.StateBasedPersonality.reset()

List<Action> roboy.newDialog.StateBasedPersonality.stateAct(State state)
Call the act function of the state and verbalize all interpretations into actions.

Return list of actions

Parameters

- `state`: state to call ACT on

List<Action> roboy.newDialog.StateBasedPersonality.stateReact(State state, Interpretat
Call the react function of the state.

If the state can't react, recursively ask fallbacks. Verbalize the resulting reaction interpretation into actions.

Return list of actions

Parameters

- `state`: state to call REact on
- `input`: input from the person Roboy speaks to

List<Action> roboy.newDialog.StateBasedPersonality.verbalizeInterpretations(List< Int
Verbalizes all interpretations into actions using the verbalizer.

Return list of actions

Parameters

- `interpretations`: list of interpretations.

Private Members

final Verbalizer roboy.newDialog.StateBasedPersonality.verbalizer

class *roboy*::*newDialog*::*examples***StateMachineExamples**
This class provides examples how to load state machines from files or create them from code directly.

Public Static Functions

static void roboy.newDialog.examples.StateMachineExamples.main(String[] args)

Private Static Functions

static DialogStateMachine roboy.newDialog.examples.StateMachineExamples.fromCode()

static DialogStateMachine roboy.newDialog.examples.StateMachineExamples.fromFile()

static DialogStateMachine roboy.newDialog.examples.StateMachineExamples.fromString()

Private Static Attributes

final String roboy.newDialog.examples.StateMachineExamples.toyPersonality

class *roboy*::*talk***StatementBuilder**

Public Static Functions

static String roboy.talk.StatementBuilder.random(List< String > list)
Returns a random element from the given list of Strings.

Return

Parameters

- list:

class *roboy*::*logic***StatementInterpreter**

Public Static Functions

static boolean roboy.logic.StatementInterpreter.isFromList(String input, List< String >
Checks if the given String contains one of the Strings from the given list.

Return

Parameters

- input:
- list:

class *roboy*::*linguistics***Term**

Public Functions

String roboy.linguistics.Term.toString()

Public Members

List<String> roboy.linguistics.Term.pos

float roboy.linguistics.Term.prob

String roboy.linguistics.Term.concept

class *roboy*::*linguistics*::*word2vec*::*examples***ToyDataGetter**

Utility class to load toy data from the internet if necessary.

May be refactored into something bigger and more useful later.

Public Functions

roboy.linguistics.word2vec.examples.ToyDataGetter.ToyDataGetter(boolean verbose)

String roboy.linguistics.word2vec.examples.ToyDataGetter.getToyDataFilePath()

void roboy.linguistics.word2vec.examples.ToyDataGetter.ensureToyDataIsPresent()

Checks if toy data is present on the hard drive.

It will be downloaded if necessary.

Private Functions

void roboy.linguistics.word2vec.examples.ToyDataGetter.downloadData(String fromURL, St

boolean roboy.linguistics.word2vec.examples.ToyDataGetter.fileExists(String filePath)

Private Members

final boolean roboy.linguistics.word2vec.examples.ToyDataGetter.verbose

final String roboy.linguistics.word2vec.examples.ToyDataGetter.toyDataDirectory = "./resou

final String roboy.linguistics.word2vec.examples.ToyDataGetter.toyDataFilePath = "./resourc

final String roboy.linguistics.word2vec.examples.ToyDataGetter.toyDataInetURL = "https://raw

class

ToyFarewellState always acts with "Bye bye".

The Interlocutor answer is ignored and there is no reaction. This ends the conversation.

Fallback is not required. This state has no outgoing transitions.

Public Functions

roboy.newDialog.states.toyStates.ToyFarewellState.ToyFarewellState(String stateIdentif

List<Interpretation> roboy.newDialog.states.toyStates.ToyFarewellState.act()

List<Interpretation> roboy.newDialog.states.toyStates.ToyFarewellState.react(Interpret

State roboy.newDialog.states.toyStates.ToyFarewellState.getNextState()

class

ToyGreetingsState can be used as the initial state.

Roboy will greet the Interlocutor with "Hello".

If the response is a greeting, the "next" transition is taken. Otherwise the fallback will be triggered and the "noHello" transition is taken.

Fallback is required. Outgoing transitions that have to be defined:

- next: following state if there was a greeting
- noHello: following state if there was NO greeting

Public Functions

roboy.newDialog.states.toyStates.ToyGreetingsState.ToyGreetingsState(String stateIdent

List<Interpretation> roboy.newDialog.states.toyStates.ToyGreetingsState.act()

List<Interpretation> roboy.newDialog.states.toyStates.ToyGreetingsState.react(Interpre

State roboy.newDialog.states.toyStates.ToyGreetingsState.getNextState()

Protected Functions

Set<String> roboy.newDialog.states.toyStates.ToyGreetingsState.getRequiredTransitionNa

Private Members

boolean roboy.newDialog.states.toyStates.ToyGreetingsState.inputOK = true

class

ToyIntroState demonstrates a simple introduction.

Roboy will tell the Interlocutor his name and ask for the Interlocutor's name. The reply is ignored.

Fallback is not required. Outgoing transitions that have to be defined:

- next: following state

Public Functions

roboy.newDialog.states.toyStates.ToyIntroState.ToyIntroState(String stateIdentifier)

List<Interpretation> roboy.newDialog.states.toyStates.ToyIntroState.act()

List<Interpretation> roboy.newDialog.states.toyStates.ToyIntroState.react(Interpretati

State roboy.newDialog.states.toyStates.ToyIntroState.getNextState()

Protected Functions

Set<String> roboy.newDialog.states.toyStates.ToyIntroState.getRequiredTransitionNames(

class

ToyRandomAnswerState is meant to be used as a fallback state.

It only implements the react() function returning a hardcoded random answer. This state should never become active (meaning that no transition should point to it.)

Fallback is not required (this state should be the fallback). This state has no outgoing transitions.

Public Functions

roboy.newDialog.states.toyStates.ToyRandomAnswerState.ToyRandomAnswerState(String stat

List<Interpretation> roboy.newDialog.states.toyStates.ToyRandomAnswerState.act()

List<Interpretation> roboy.newDialog.states.toyStates.ToyRandomAnswerState.react(Interp

State roboy.newDialog.states.toyStates.ToyRandomAnswerState.getNextState()

class *roboy*::*newDialog*::*states*::*factories***ToyStateFactory**

Temporary factory to create *State* objects based on class name.

May be replaced with something more generic later.

Public Static Functions

static State roboy.newDialog.states.factories.ToyStateFactory.getByClassName(String cl

class *roboy*::*linguistics***Triple**

Represents a simple who(agens) does what(predicate) to whom(patiens) relation.

Public Functions

roboy.linguistics.Triple.Triple(String predicate, String agens, String patiens)

String roboy.linguistics.Triple.toString()

Public Members

String roboy.linguistics.Triple.agens

String roboy.linguistics.Triple.predicate

String roboy.linguistics.Triple.patiens

class

Created by roboy on 7/27/17.

Public Functions

roboy.io.UdpInput.UdpInput(DatagramSocket ds)

Input roboy.io.UdpInput.listen()

Private Members

DatagramSocket roboy.io.UdpInput.serverSocket

class
Created by roboy on 7/27/17.

Public Functions

roboy.io.UdpOutput.UdpOutput(DatagramSocket ds, String address, int port)

void roboy.io.UdpOutput.act(List< Action > actions)

Private Members

DatagramSocket roboy.io.UdpOutput.serverSocket

InetAddress roboy.io.UdpOutput.udpEndpointAddress

int roboy.io.UdpOutput.updEndpointPort

enum *roboy*::*context*::Context**Updaters**
All available updaters by their class and their target's value type.

Public Functions

roboy.context.Context.Updaters.Updaters(Class attribute, Class valueType)

Public Members

roboy.context.Context.Updaters.DIALOG_TOPICS_UPDATER =(DialogTopicsUpdater.class, String.class)

final Class roboy.context.Context.Updaters.classType

final Class roboy.context.Context.Updaters.targetValueType

class *roboy*::*memory***Util** : **public** Exception
Helper class.

Public Static Functions

static String roboy.memory.Util.getPartURI(String URI)

static List<String> roboy.memory.Util.getQuestionType(String question)

static int roboy.memory.Util.calculateLevenshteinDistance(String s, String t)

static int roboy.memory.Util.min(int a, int b, int c)

template <V>
class *roboy*::*context*::**Value** : **public** *roboy*::*context*::*AbstractValue*<V>

Stores a single value of type V.

Subclassed by *roboy.context.contextObjects.FaceCoordinates*

Public Functions

V roboy.context.Value< V >.getValue()

void roboy.context.Value< V >.updateValue(V value)

Private Members

volatile V roboy.context.Value< V >.value = null

enum *roboy*::*context*::Context**ValueHistories**

All available valueHistories.

Public Functions

roboy.context.Context.ValueHistories.ValueHistories(Class<?extends AbstractValueHisto

Class roboy.context.Context.ValueHistories.getClassType()

Class roboy.context.Context.ValueHistories.getReturnType()

public<T> T roboy.context.Context.ValueHistories.getLastValue()

public<K, T> Map<K, T> roboy.context.Context.ValueHistories.getNLastValues(int n)

Public Members

roboy.context.Context.ValueHistories.DIALOG_TOPICS =(DialogTopics.class, String.class)

final Class roboy.context.Context.ValueHistories.classType

final Class roboy.context.Context.ValueHistories.returnType

template <V>
class

HashMap implementation of a value history with unique Integer keys.

Subclassed by *roboy.context.contextObjects.DialogTopics*

Public Functions

roboy.context.ValueHistory< V >.ValueHistory()

V roboy.context.ValueHistory< V >.getValue() **Return**

The last element added to this list.

HashMap<Integer, V> roboy.context.ValueHistory< V >.getLastNValues(int n)
Get a copy of the last n entries added to the list.

Less values may be returned if there are not enough values in this list. In case of no values, an empty array is returned.

Return A hashmap of n last values added to the list.

Parameters

- `n`: The number of instances to retrieve.

synchronized void roboy.context.ValueHistory< V >.updateValue(V value)
Puts a value into the list in the last place.

Parameters

- `value`: The value to be added.

Private Functions

synchronized int roboy.context.ValueHistory< V >.generateKey()
Generates a key that is unique through incrementing an internal counter.

Return A key which is unique in this list instance.

synchronized V roboy.context.ValueHistory< V >.getValue(int key)
In a ValueList, only *getValue()* and *updateValue()* directly access the HashMap data.

Setting these methods to be synchronous avoids concurrency issues.

Return The value, or `null` if not found.

Parameters

- `key`: The key of the value.

Private Members

volatile int roboy.context.ValueHistory< V >.counter
This counter tracks the number of values, indices still start from 0.

Reading is allowed without synchronization, modifications only through *generateKey()*.

HashMap<Integer, V> roboy.context.ValueHistory< V >.data

enum *roboy*::*context*::Context**Values**
All available values.

Public Functions

roboy.context.Context.Values.Values(Class<?extends AbstractValue > attribute, Class

Class roboy.context.Context.Values.getClassType()

Class roboy.context.Context.Values.getReturnType()

public<T> T roboy.context.Context.Values.getLastValue()

Public Members

roboy.context.Context.Values.FACE_COORDINATES =(FaceCoordinates.class, CoordinateSet.class)

final Class roboy.context.Context.Values.classType

final Class roboy.context.Context.Values.returnType

class *roboy*::*talk***Verbalizer**

Turns interpretations to actual utterances.

This should in the future lead to diversifying the ways Roboy is expressing information.

Public Functions

Action roboy.talk.Verbalizer.verbalize(Interpretation interpretation)

Currently contains utterance diversification for greetings, farewells, segue and introductions to anecdotes.

In all other cases the state machine provides a literal sentence that is just passed through. In the future, this should be extended to diversify everything Roboy says.

Return the actual action that is performed

Parameters

- `interpretation`: the abstraction of what Roboy intends to say

Public Static Attributes

Arrays.asList("hello","hi","greetings","good morning","howdy","good day","hey")]

Arrays.asList("ciao","goodbye","cheerio","bye","see you", "farewell","bye-bye")]

Private Functions

SpeechAction roboy.talk.Verbalizer.greet(Interpretation interpretation)

ShutDownAction roboy.talk.Verbalizer.farewell(Interpretation interpretation)

SpeechAction roboy.talk.Verbalizer.segue(Interpretation interpretation)

SpeechAction roboy.talk.Verbalizer.anecdote(Interpretation interpretation)

Interpretation roboy.talk.Verbalizer.verbalizeDates(Interpretation interpretation)

String roboy.talk.Verbalizer.dateToText(String date)

SpeechAction roboy.talk.Verbalizer.literalSentence(Interpretation interpretation)

Private Static Attributes

Arrays.asList("talking about ","since you mentioned ","on the topic of ")]

Arrays.asList("here is an interesting bit of trivia. ", "how about this? ")]

Arrays.asList("did you know ","did you know that ","i read that ", "i heard that ", "have you heard this: ")]

final Map<String,String> roboy.talk.Verbalizer.dayNumberMap

1,”one”, 2,”two”, 3,”three”, 4,”four”, 5,”five”, 6,”six”, 7,”seven”, 8,”eight”, 9,”nine”, 10,”ten”, 11,”eleven”, 12,”twelve”, 13,”thirteen”, 14,”fourteen”, 15,”fifteen”, 16,”sixteen”, 17,”seventeen”, 18,”eighteen”, 19,”nineteen”)]

“1”,”January”, “2”,”February”, “3”,”March”, “4”,”April”, “5”,”May”, “6”,”June”, “7”,”July”, “8”,”August”, “9”,”September”, “01”,”January”, “02”,”February”, “03”,”March”, “04”,”April”, “05”,”May”, “06”,”June”, “07”,”July”, “08”,”August”, “09”,”September”, “10”,”October”, “11”,”November”, “12”,”December”)]

1,”ten”, 2,”twenty”, 3,”thirty”, 4,”forty”, 5,”fifty”, 6,”sixty”, 7,”seventy”, 8,”eighty”, 9,”ninety”)]

class *roboy*::*talk***VerbalizerTest**

Public Functions

void roboy.talk.VerbalizerTest.testDates()

class *roboy*::*io***Vision**

Vision helper class.

Public Functions

String roboy.io.Vision.recognizeFace()

boolean roboy.io.Vision.findFaces()

Public Static Functions

static Vision roboy.io.Vision.getInstance()

Private Functions

roboy.io.Vision.Vision()

Private Static Attributes

Vision roboy.io.Vision.roboyVision

class *roboy*::*io*::*Vision***VisionCallback** : **public** TopicCallback

Public Functions

void roboy.io.Vision.VisionCallback.handleMessage(Message message)

Public Members

String roboy.io.Vision.VisionCallback.latest = null

boolean roboy.io.Vision.VisionCallback.faceDetected = false

class
The generative model talking wildly.

Public Functions

roboy.dialog.personality.states.WildTalkState.WildTalkState(RosMainNode node)

List<Interpretation> roboy.dialog.personality.states.WildTalkState.act()

Reaction roboy.dialog.personality.states.WildTalkState.react(Interpretation input)

void roboy.dialog.personality.states.WildTalkState.setNextState(State next)

Private Members

State roboy.dialog.personality.states.WildTalkState.next = this

RosMainNode roboy.dialog.personality.states.WildTalkState.rosMainNode

class *roboy*::*linguistics*::*word2vec*::*examples***Word2vecTrainingExample**
Neural net that processes text into word-vectors.

Adapted from org.deeplearning4j.examples.nlp.word2vec.Word2VecRawTextExample

Public Static Functions

static void roboy.linguistics.word2vec.examples.Word2vecTrainingExample.main(String[]

class *roboy*::*linguistics*::*word2vec*::*examples***Word2vecUptrainingExample**
Neural net that processes text into word-vectors.

This example shows how to save/load and train the model.

Adapted from org.deeplearning4j.examples.nlp.word2vec.Word2VecUptrainingExample

Public Static Functions

static void roboy.linguistics.word2vec.examples.Word2vecUptrainingExample.main(String[

class

Public Functions

boolean roboy.memory.WorkingMemory.save(Triple object)

String roboy.memory.WorkingMemory.toString()

List<Triple> roboy.memory.WorkingMemory.retrieve(Triple object)

Public Static Functions

static WorkingMemory roboy.memory.WorkingMemory.getInstance()

Private Functions

roboy.memory.WorkingMemory.WorkingMemory()

void roboy.memory.WorkingMemory.addToMap(Map< String, List< Triple >> list, String s

Private Members

Map<String,List<Triple> > roboy.memory.WorkingMemory.agensTripleMap = new HashMap<>()

Map<String,List<Triple> > roboy.memory.WorkingMemory.patiensTripleMap = new HashMap<>()

Map<String,List<Triple> > roboy.memory.WorkingMemory.predicateTripleMap = new HashMap<>()

Private Static Attributes

WorkingMemory roboy.memory.WorkingMemory.memory

namespace com::google**gson**

namespace edu::cmu::sphinx**api**

namespace java**awt**

namespace java**io**

namespace java**net**

namespace java**util**

namespace javax**swing**

namespace org::apache::jena**query**

namespace org::apache::jena::rdf**model**

namespace org::apache::jena**sparql**

namespace org::junit**Assert**

namespace org::ros**node**

namespace **roboy**

namespace *roboy***context**

namespace *roboy*::*context***contextObjects**

namespace *roboy*::*context***GUI**

namespace *roboy*::*context***visionContext**

namespace *roboy***dialog**

namespace *roboy*::*dialog***action**

namespace *roboy*::*dialog*::*Config***ConfigurationProfile**

namespace *roboy*::*dialog***personality**

namespace *roboy*::*dialog*::*personality***states**

namespace *roboy***io**

namespace *roboy***linguistics**

namespace *roboy*::*linguistics***phonetics**

namespace *roboy*::*linguistics***sentenceanalysis**

namespace *roboy*::*linguistics***word2vec**

namespace *roboy*::*linguistics*::*word2vec***examples**

namespace *roboy***logic**

namespace *roboy***memory**

namespace *roboy*::*memory***Neo4jRelationships**

namespace *roboy*::*memory***nodes**

namespace *roboy***newDialog**

namespace *roboy*::*newDialog***examples**

namespace *roboy*::*newDialog***states**

namespace *roboy*::*newDialog*::*states***factories**

namespace *roboy*::*newDialog*::*states***toyStates**

namespace *roboy***ros**

namespace *roboy***talk**

namespace *roboy***util**

namespace roboy_communication_cognition

namespace roboy_communication_control

file **AbstractValue.java**

file **AbstractValueHistory.java**

file **AttributeManager.java**

file **Context.java**

file **CoordinateSet.java**

file **DialogTopics.java**

file **DialogTopicsUpdater.java**

file **FaceCoordinates.java**

file **FaceCoordinatesUpdater.java**

file **ExternalContextInterface.java**

file **ExternalUpdater.java**

file **ContextGUI.java**

file **InternalUpdater.java**

file **IntervalUpdater.java**

file **Value.java**

file **ValueHistory.java**

file **Action.java**

file **FaceAction.java**

file **ShutDownAction.java**

file **SpeechAction.java**

file **Config.java**

file **DialogSystem.java**

file **CuriousPersonality.java**

file **DefaultPersonality.java**

file **KnockKnockPersonality.java**

file **Personality.java**

file **SmallTalkPersonality.java**

file **AbstractBooleanState.java**

file **AnecdoteState.java**

file **CelebrityState.java**

file **ConverseState.java**

file **FarewellState.java**

file **GenerativeCommunicationState.java**

file **GreetingState.java**

file **IdleState.java**

file **InquiryState.java**

file **IntroductionState.java**

file **LocationDBpedia.java**

file **PersonalFollowUpState.java**

file **PersonalQAState.java**

file **QuestionAnsweringState.java**

file **QuestionAskingState.java**

file **QuestionRandomizerState.java**

file **Reaction.java**

file **SegueState.java**

file **State.java**

file **State.java**

file **WildTalkState.java**

file **BingInput.java**

file **BingOutput.java**

file **CelebritySimilarityInput.java**

file **CerevoiceOutput.java**

file **CommandLineCommunication.java**

file **CommandLineInput.java**

file **CommandLineOutput.java**

file **Communication.java**

file **EmotionOutput.java**

file **FreeTTSOutput.java**

file **Input.java**

file **InputDevice.java**

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file **VerbalizerTest.java**

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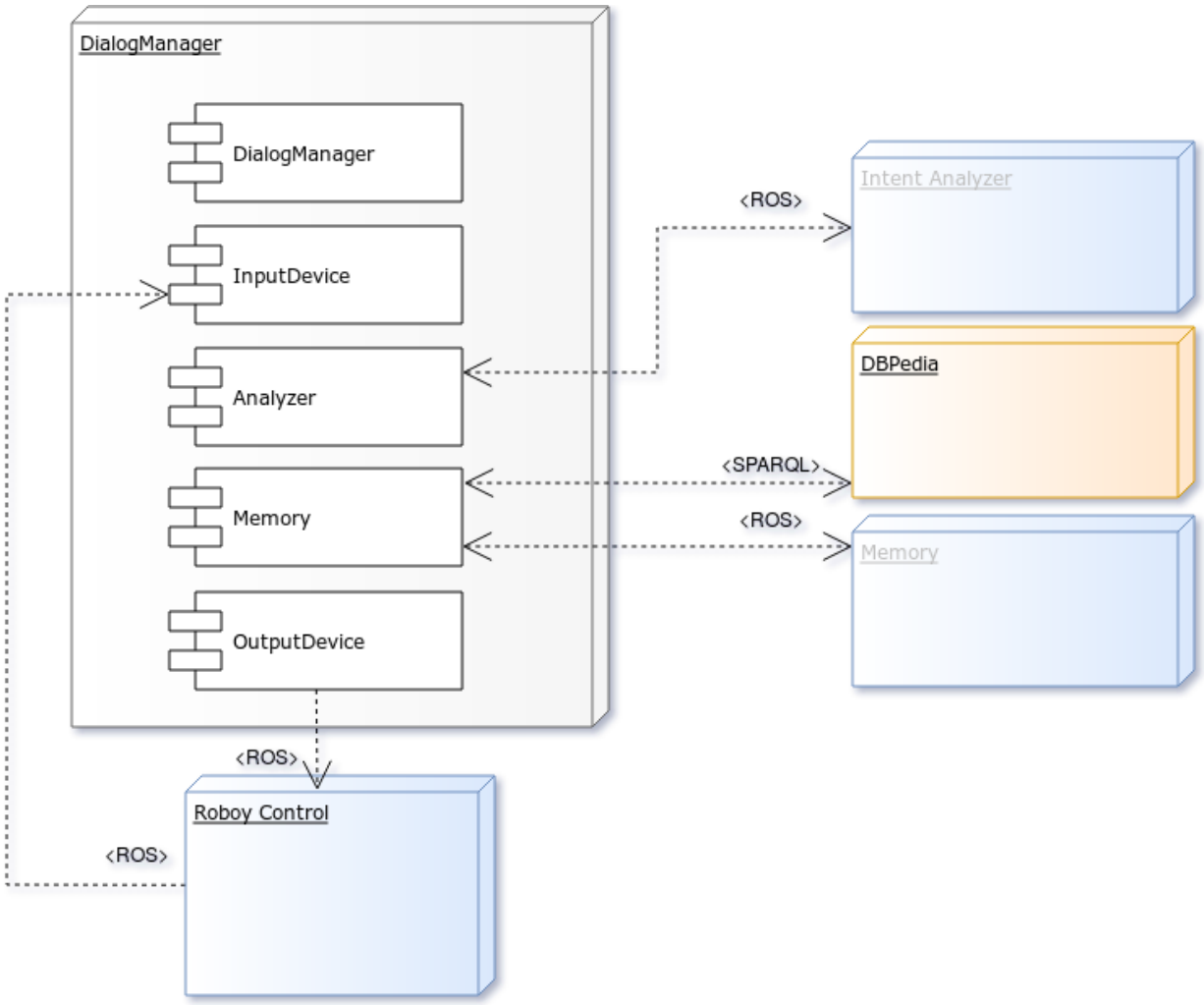
2.9 Deployment diagram

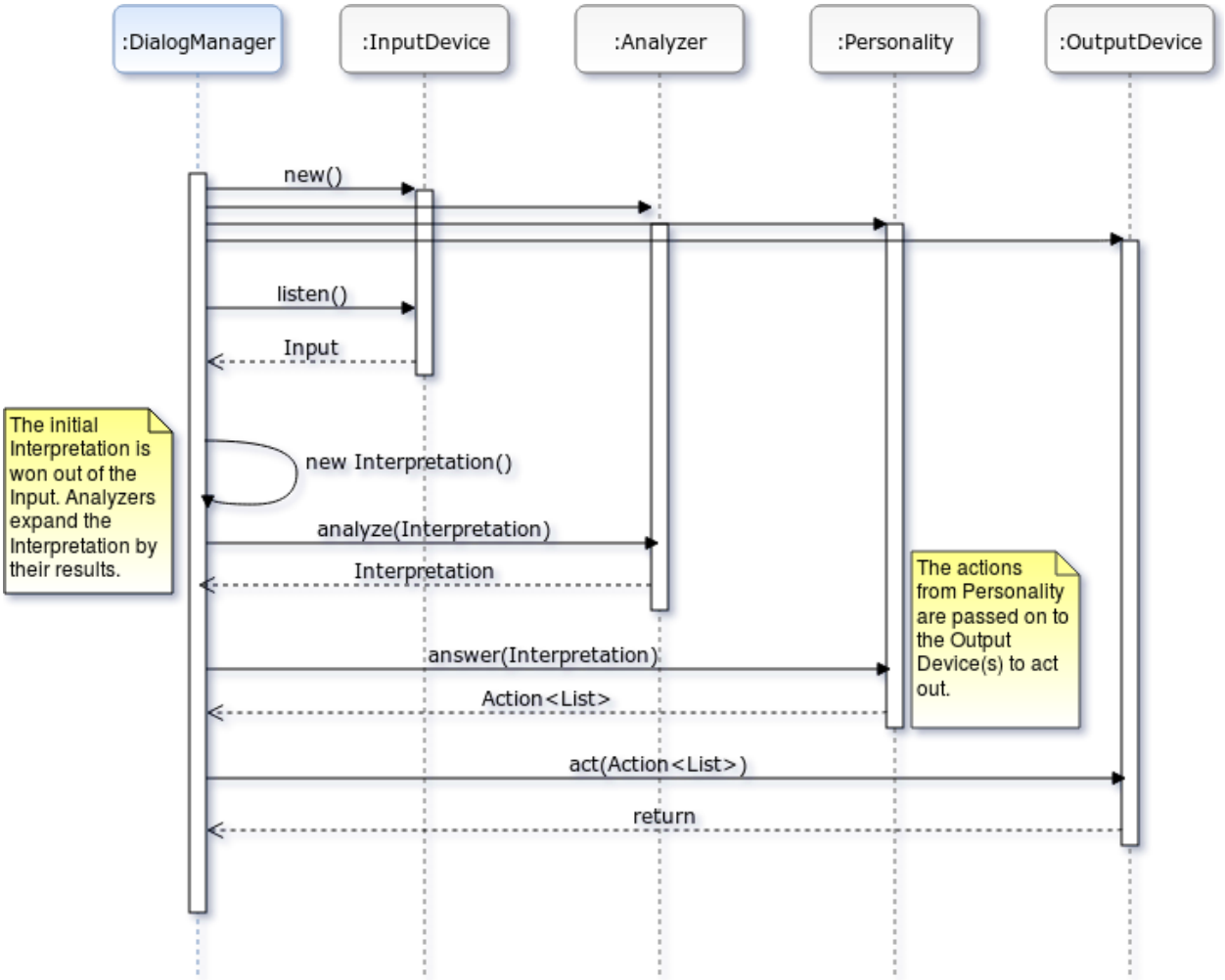
This diagram depicts the external modules and their communication channels/protocols with the Dialog Manager. Modules which are in development (intents, Memory) are included in gray. For simplicity, the Dialog Manager module only contains these components which are most relevant for external connections.

2.10 Sequence diagram

This is a simple high-abstraction sequence of the Dialog Manager's workflow, starting at the initialization and going from registering input over interpretation and action generation to sending output actions.

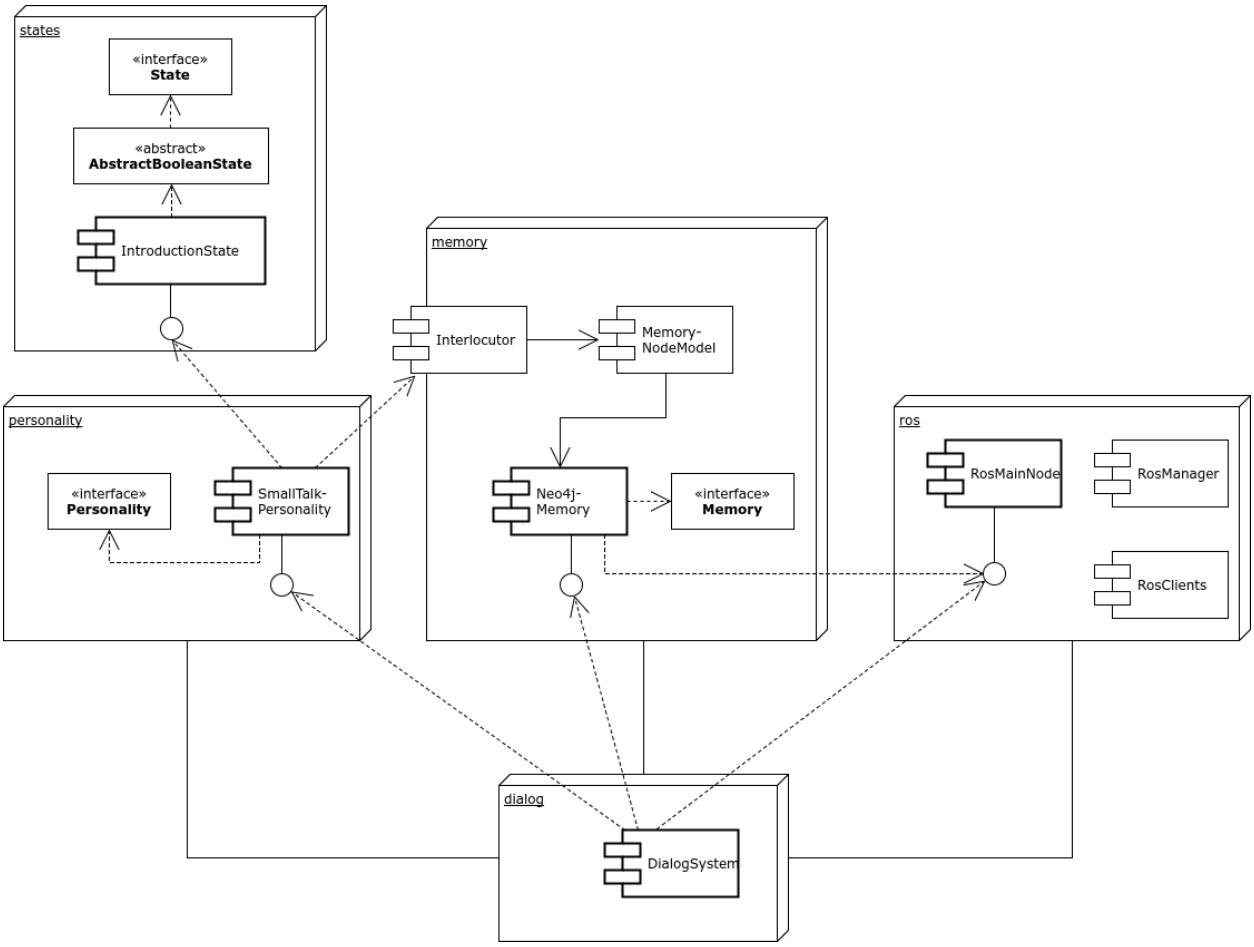
alt Sequence diagram


DialogManager
DialogManager
InputDevice
Analyzer
Memory
OutputDevice
<ROS>
Roboy Control
<ROS>
<ROS>
Intent Analyzer
<SPARQL>
DBPedia
<ROS>
Memory


:DialogManager
:InputDevice
:Analyzer
:Personality
:OutputDevice
new()
listen()
Input
The initial Interpretation is won out of the Input. Analyzers expand the Interpretation by their results.
new Interpretation()
analyze(Interpretation)
Interpretation
The actions from Personality are passed on to the Output Device(s) to act out.
answer(Interpretation)
Action<List>
act(Action<List>)
return

2.11 Building block diagram

This diagram depicts the internal modules of the Dialog System and their dependency hierarchies.



alt Building block diagram

2.12 About arc42

This information should stay in every repository as per their license: http://www.arc42.de/template/licence.html

arc42, the Template for documentation of software and system architecture.

By Dr. Gernot Starke, Dr. Peter Hruschka and contributors.

Template Revision: 6.5 EN (based on asciidoc), Juni 2014

© We acknowledge that this document uses material from the arc 42 architecture template, http://www.arc42.de. Created by Dr. Peter Hruschka & Dr. Gernot Starke. For additional contributors see http://arc42.de/sonstiges/contributors.html

Note

This version of the template contains some help and explanations. It is used for familiarization with arc42 and the understanding of the concepts. For documentation of your own system you use better the *plain* version.

2.12.1 Literature and references

Starke-2014 Gernot Starke: Effektive Softwarearchitekturen - Ein praktischer Leitfaden. Carl Hanser Verlag, 6, Auflage 2014.

Starke-Hruschka-2011 Gernot Starke und Peter Hruschka: Softwarearchitektur kompakt. Springer Akademischer Verlag, 2. Auflage 2011.

Zörner-2013 Softwarearchitekturen dokumentieren und kommunizieren, Carl Hanser Verlag, 2012

2.12.2 Examples

- HTML Sanity Checker
- DocChess (german)
- Gradle (german)
- MaMa CRM (german)
- Financial Data Migration (german)

2.12.3 Acknowledgements and collaborations

arc42 originally envisioned by Dr. Peter Hruschka and Dr. Gernot Starke.

Sources We maintain arc42 in *asciidoc* format at the moment, hosted in GitHub under the aim42-Organisation.

Issues We maintain a list of open topics and bugs.

We are looking forward to your corrections and clarifications! Please fork the repository mentioned over this lines and send us a *pull request*!

2.12.4 Collaborators

We are very thankful and acknowledge the support and help provided by all active and former collaborators, uncountable (anonymous) advisors, bug finders and users of this method.

Currently active

- Gernot Starke
- Stefan Zörner
- Markus Schärtel
- Ralf D. Müller
- Peter Hruschka
- Jürgen Krey

Former collaborators

(in alphabetical order)

- Anne Aloysius
- Matthias Bohlen
- Karl Eilebrecht
- Manfred Ferken
- Phillip Ghadir
- Carsten Klein
- Prof. Arne Koschel
- Axel Scheithauer

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