

UNIVERSITY AVEIRO



Mini-project - MP1

Intelligent Systems

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Chapter 1

Technologies and Tools

For this project, it was made an extensive search of different technologies and tools to use in the development of the conversational agent.

After reading and experimenting with some of the recommended works such as **Eliza Chatbot**[6][11], **Creating a Chat Bot**[9] and **ChatterBot**[8] we gathered some of the bases and concepts for the project, and decided that the best technologies to use in this work would be **Python**[12] as it is a relatively easy language, all elements of the group have a great comprehension of it and the use of **Prolog**[2] an acronym for 'Programmation en Logique' very in line for the objectives of the project, in other words, designed to do natural language processing, that is familiar for all members of the group (as is being learned in classes).

Owlready2[10], a python package that allows the creation, modification, and use of OWL ontologies in order to make an AI, using Python. It was chosen to take into account the experience of some group members.

For the connection between Python and Prolog we decided to use **PySwip**[13], which enables us to query SWI-Prolog in Python programs, using an (incomplete) SWI-Prolog foreign language interface, a utility class and a Pythonic interface.

For a list of words to use in the conversational agent we will chose words from the **WordNet**[14] lexical Database. It has a good amount of verbs, nouns, adverbs and adjectives for the project, which are grouped into sets and stored in different files.

For the Chatbot emotions we learned how to use **Senticnet**[3] through the API[4], that can be used to detect the various emotions on a word or a group of words, this helps will help when choosing how the Chatbot will respond and how the Chatbot will understand emotion considering the phrase that was given to him.

Chapter 2

ChatBot Concept

2.1 Main Conversation Theme

The main topic of conversation between the user and the conversational agent will be in English and related to The **Marvel Cinematic Universe**[1] (MCU) in which movies, characters, directors, and storylines will be themes as well as the opinion of the user about the movies or characters.

The agent will accumulate different information about the MCU, such as the opinion of the interlocutor about a movie or character.

The conversational agent will also “sense” negative and positive emotions from the interlocutor through specific words and sentences provided by him that then the agent will interpret.

2.2 Main Idea - Tamagotchi

The Chatbot will be developed around the idea of a virtual pet theme such as a Tamagotchi, "a keychain-sized virtual pet simulation game"[5], to test "your ability to take care of a small alien pet"[7], in a 2 small egg-shaped computer (Figure 2.1), that can fit into in a pocket.



Figure 2.1: Tradutional Tamagotchi

No matter the Tamagotchi, it was a needy little creature and required almost constant attention to keep it in good health, *needed to be fed, played with, nurtured, and disciplined*, just like a real pet.

ChatBot Concept

Functions and Interactions of the ChatBot influenced by the Tamagotchi will be:

- Feeding - The Chatbot can get hungry and you can feed him new or old foods:
 - With a new food, he learns its name and has a chance of liking or disliking the food which changes his mood.
 - With old foods giving him a food he dislikes, he gets angry or grumpy if you give him a food he likes or loves he gets happy.
 - Or the user can just starve his pet making him very angry.
- Sleeping - If the Chatbot gets bored because you are not talking to him or doing anything with him he may go to sleep:
 - If he is sleeping and the user wakes him up early, there is a chance that he will get angry, and then he won't talk to you for a while.
 - If he wakes up on his own, he wakes up not angry.
- Playing - The ChatBot may get bored, the user can play a game (Checkers):
 - If you (user) play and the bot wins, he gets extremely happy.
 - If you play and you win, the Chatbot gets happy or a bit annoyed.
 - If you don't play, he gets bored or grumpy.

2.2.1 Examples of Conversation

- What 's your name?
 - Bot remembers this noun as user name
- What's your favorite movie?
 - [movie] -> Bot **will remember that**
- What's your favorite character?
 - [character] -> Bot **will remember that**
- Do you know who [character] is?
 - No.
 - * [character] is a character [description] that appears in movies [movies he appears].
 - Yes.

ChatBot Concept

- * I love/hate that character.
 - * Do you like that character?
 - Yes/No -> **Bot will remember that**
- Have you seen [movie]?
 - No.
 - * [movie] was released in 1999 and is about [sinopsis].
 - Yes.
 - * Do you like that movie?
 - Yes/no -> **Bot will remember that**
- Tell me about [movie]
- Tell me about [character]
- What movies has [director name] directed?
- Can you tell me more about [character]?
 - User inserts description -> Saved in DB
- In what movies has [character] appeared in?
 - User inserts movies -> Saved in DB

Chapter 3

Design / Structure

The Chatbot is divided into various interconnecting modules that provide the user with various activities to do with the bot. These modules use various tools including Prolog and OWL, and are connected together thanks to tools like PySwip and Owlready2.

A core aspect of the ChatBot is its mood, which will vary the type of questions and responses it does to the user, various activities may influence the mood. (Figure 3.1)

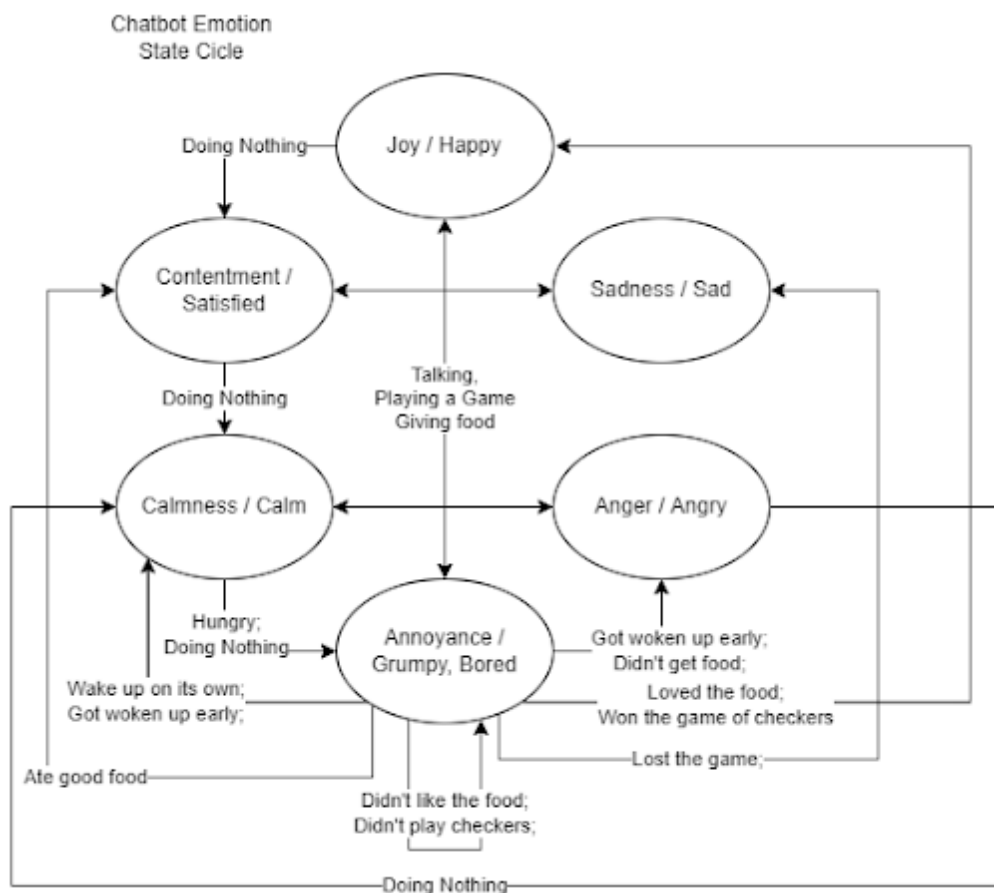


Figure 3.1: ChatBot Emotion States Diagram

The main activity revolves around talking to the ChatBot about the Marvel Cinematic Universe, the bot starts with some knowledge of some Marvel movies and characters, and by speaking with the user it either complements or inserts new knowledge into a new Prolog database. In order to recognize text written by the user, it uses an extensive Prolog grammar developed by using the Wordnet Lexical Database, and to respond to the user it uses various response grammars. Which grammar is used depends on the bot's mood. User responses to the bot are analyzed using Senticnet and will affect the bot's mood. (Figure 3.2)

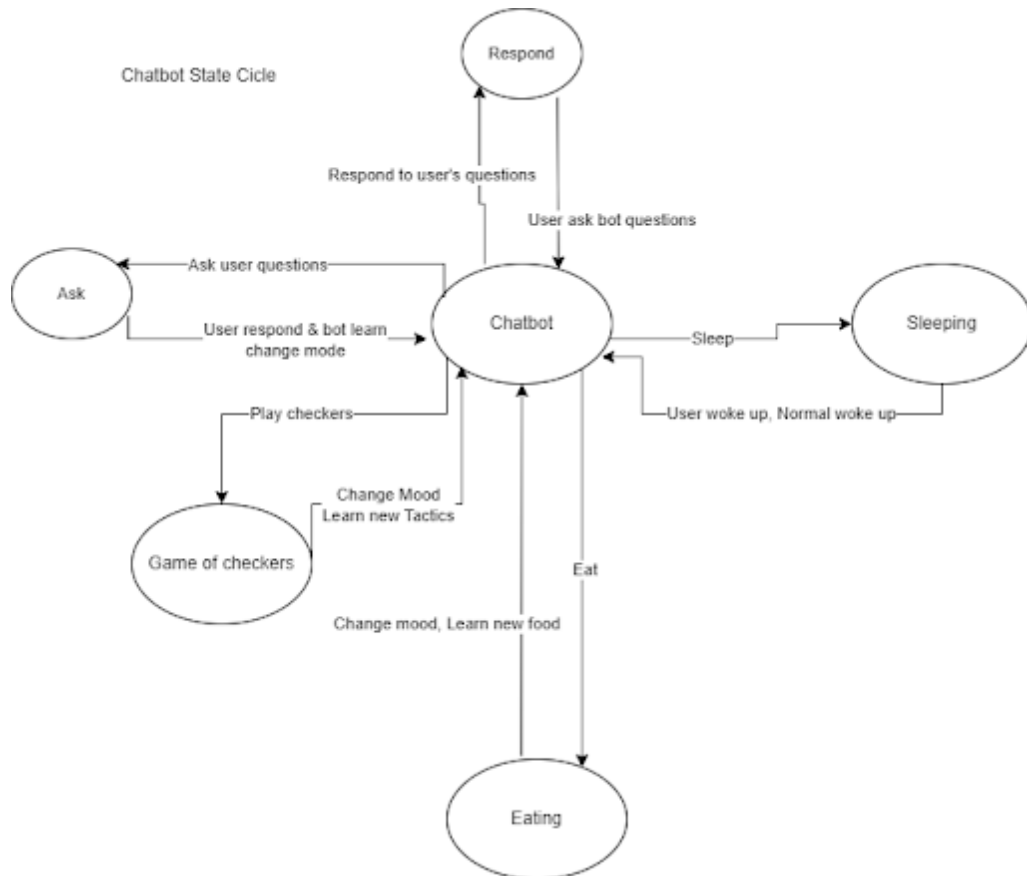


Figure 3.2: ChatBot States Diagram

Other activities include eating, sleeping, and playing checkers (this last one uses both Prolog and an OWL ontology).

Chapter 4

Work Planning

Work Planning for the development of the Conversational agent in the following weeks:

- **1/05 - 10/05**
 - Documentation Development
 - Initial Grammar
 - Checkers Game Initial Code
- **10/05 - 24/05**
 - Complete Grammar
 - Basic Operation for ChatBot
 - Sleeping and Feeding Operation
- **24/05 - 7/06**
 - ChatBot Learning New Knowledges
 - More Training For Checkers
- **7/06 - 17/06**
 - To be Defined

Chapter 5

Initial Code - Demo

Initial code was developed with some of the basic operations mentioned previously, namely Feeding and Playing with the ChatBot. The code developed can be found in the repository and the main to execute is *virtualPet.py*.

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