Introduction to Artificial Intelligence (C951)

Performance Assessment Task 1  
**“CHATBOT”**

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# A. Description: Functionality of the chatbot and how the chatbot meets the needs of the career advisor.

A chatbot is a software application used to conduct an online chat conversation via text or text-to-speech, in lieu of providing direct contact with a live human agent (1). This is especially helpful when a specific routine task gets overwhelmed with solicitudes. In this case, the chatbot named “Dinobot” will help alleviate the career advisor of a university who has seen an increase in the enrolment of Computer Science students and it’s no longer able to manage the student traffic.

“Dinobot” will help the students providing them career advice either by describing a specific career path selected by the student (from 5 different choices) or allowing the student to answer some simple questions that help orient students that don’t know which career may be a better fit for them. Students may also start over to re-do the assessment..

# B. Other Works: Summary of other works describing bot implementation that were published in the past 5 years and they represent key elements this bot

The work of Archana Parab et al., published in March 2017 (2) clearly describes current efforts in the development of an intelligent Career Counselling, and how this type of chatbot may help students with their career selection. Career-advisement may seem an area on the psychological field, therefore waiting for an IA to address this kind of needs may seem out of reach, but this work makes clear that they give tremendous support and a good ‘First advice’ to students. This work influenced the development of “Dinobot”, giving a solid outline for its development.

In 2020, a conference paper by Godson D’Silva (3) addresses the use of psychometric tests in order to identify the careers better suited for each student. Based on this paper, a walkthrough option was added “Dinobot”, to address students most in need of advice, and not just information.

Finally, on a conference paper of the year 2018, named “Faster is Not Always Better: Understanding the Effect of Dynamic Response Delays in Human-Chatbot Interaction” (4) the author states the importance of delaying conversation on interactions with chatbots, and therefore “Dinobot” was implemented with this feature, with different delay times according to the information associated.

# C. Job Types: 5 or more computing job types that are recommended based on the interaction with the bot and the provided chatbot code files support the jobs identified.

“Dinobot” suggests five different paths in the field of computer science: Hardware engineer, Software developer, Web developer, Security Analyst, and Data scientist. This chatbot is capable of providing an introduction to each field along with a hyperlink to a specialized website that “provide an in-depth overview of the computer science field and that stays up-to-date with its constant fluctuations” (5), therefore, making sure that the student receives the most recent information about the selected field.

The chatbot code may be found in the attached AIML file. Students who may want to access the careers information may do it through direct solicitude to “Dinobot” selecting specifically \ the career they want to know more about, or by a “walkthrough” that will help the student state which of this path may be a better fit for them

# D. Training: How the training cases were selected, and how the programming language was used to enhance bot’s functionality. Includes examples of the chatbot’s functionality at the end of the training process that support explanations of how the training cases were selected.

Before the development of the final “Dinobot” version, previous versions were created and tested by 2 different users, after a few tests, the need of creating a guided conversation instead of answering user’s questions was evident due to the vast variety and complexity of different scenarios that different users may bring to the chatbot.

After different iterations, the final version of “Dinobot” was finished, it contained hardcoded questions and answers through the AIML file. This construction facilitated two different types of interactions with the bot, either with a more informative or resolutive approach, depending on what the student selects. The creation of the informative approach was simple and fast, whereas the walkthrough came with different challenges through the development.

To create the walkthrough, similarities, and differences between the five available career suggestions were identified, and then “Dinobot” was trained to go through a binary decision tree. The binary tree was traversed by asking questions of two possible answers on which the student needed to select the one that better represented him. Each answer narrows the possible outcomes until the bot can select a career path that addresses the student selections.

Examples of functionality: “Dinobot” recommendations based on the student’s preferences

Daniel enjoys programming and the development environment, he prefers computer science in a more theoretical sense of the word, also, he loves to analyze given data, finding patrons and prefers to do that instead of directly diving into code. “Dinobot” will recommend Daniel to investigate careers in Data science.

Carlos likes the computer sciences but he doesn’t like programming that much, he prefers something more concrete, he likes to touch things, in fact, if he were building a house, he would prefer to work with the bricks instead of its design. “Dinobot” will recommend Carlos to investigate careers in Hardware Engineering.

# E. Optimization: How the bot was optimized with examples of optimization methods used at the end of the optimization process.

Process optimization implies to make the best or most effective use of some process (6). In the case of “Dinobot”, it involved the implementation of simple buttons for the user to answer the bot’s questions. This feature may seem simple, but it allows a more fluid with the user and completely eliminates the need for handling all the different possible answers that the user may provide (including typo errors). Therefore, the user experience and engagement are improved and provides a sense of control over the interaction to the user.

It’s important also to mention that the use of Hyperlink also contributed to the optimization of the process. These hyperlinks make sure that the users get up-to-date information and eliminate the possibility of a student receiving more information than what he is looking for, which would make the interaction with “Dinobot” both boring and slow.

# F. Installation Manual: A complete installation manual.

1. Decompress the file “dinobot” and leave the un-compressed files in a known location
2. Navigate to <https://home.pandorabots.com/home.html>
3. Log-in or create a free account
4. Once logged, on the upper-left corner of your dashboard, click on the “Plus” icon next to “MY BOTS”
5. A popup view will appear, fill the values as follows:
   * Name: dinobot (lowercase, no spaces)
   * Language: English
   * Content: Blank Bot
6. Click on the purple button “Create Bot”
7. On the left menu, select “dinobot” > Edit > Code Editor
8. To the right, there will appear a “File” drop-down menu, select “Upload”
9. Upload the previously uncompressed files from “dinobot”. The filenames are: udc.aiml and dinobot.properties.
10. Select the orange icon on the bottom right-hand side of the screen and begin interacting with the bot.

# G. Effectiveness of the bot: Explanation on the effectiveness of the bot and examples of how it will be monitored and maintained to improve the final user experience.

The simplicity of the questions of the bot is fundamental to its effectiveness directing users to possible career paths. The bot was tested with graduated students and it effectively addressed their selected career. Also “Dinobot” has the ability to provide resources outside of its environment, therefore addressing students with more specific questions along with the ones with a broader need.

Over time, the student’s acceptance will be monitored through campus surveys and the human counselor’s appointments statistics, this will help determine the effectiveness of “Dinobot” in a real-world environment and also will help to see ways of improving interactions from the student perspective.

Also, it is important to mention that one of the major categories of improvement for this bot will be adding more career options. Like this, the bot will be able to address all the different paths available in the computer science field and make specific recommendations to students.

# H. Challenges during development: Challenges faced during the bot development process and how the challenges were resolved.

When creating a chatbot, the challenges encountered may be vast, going from language limitations to the different kinds of interactions that the users may want. During the creation of “Dinobot,” the major challenge was the different iterations performed to conclude that it was impossible to manage all the different answers that the students may provide. It was evident that the approach needed to switch from open answers to alternatives. Another major challenge when building this bot was the creation of adequate questions to direct the students to a specified field, without being too specific on what each field does to avoid biased answers. To overcome this challenge, it was imperative to find similarities and differences between the different paths, and the use of testing and direct questions to the testers was fundamental.

# I. The bot development environment: Strengths and weaknesses of the bot development environment and how they supported or impeded chatbot construction.

Strengths of the development environment:

The use of “Pandorabots” to create this chatbot made it fairly easy. the navigation and the use of the AIML itself were simple and very declarative on their functions. Also, there is vast documentation on the same site that was helpful when wanting to implement any feature, and the portal counts with a free course to learn the basis of AIML, which make all the process really smooth.

Weaknesses of the development environment:

Even though it was vast, the documentation lacked information about more modern features (such as “media-rich tools”), and they needed to be discovered on another place in the site, making the search sometimes cumbersome.

# J. Panopto Recording: An interactive session with the chatbot, with a verbal summary of the capabilities of the bot and shows it providing meaningful career advice.

* https://wgu.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=3e427481-d646-4d1c-8843-abbe017748c2

# K. Sources: In-text citations for sources that are properly quoted, paraphrased, or summarized and a reference list that accurately identifies the author, date, title, and source location as available.

1. **Wikipedia.** Chatbot. [Online] https://en.wikipedia.org/wiki/Chatbot.

2. *An Intelligent Career Counselling Bot, A System for counselling.* **Parab, Archana, et al.** 03 Mar 2017, s.l. : International Research Journal of Engineering and Technology (IRJET), Vol. 04.

3. *Career Counselling Chatbot Using Cognitive Science and Artificial Intelligence.* **D’Silva, Godson, et al.** Palghar, India : Advanced Computing Technologies and Applications, 2020.

4. *Faster is Not Always Better: Understanding the Effect of Dynamic Response Delays in Human-Chatbot Interaction.* **Gnewuch, Ulrich, et al.** s.l. : Association for Information Systems, 2018.

5. **ComputerScience.org. *About | ComputerScience.org.* [Online] [Cited: May 17, 2020.] https://www.computerscience.org/about/.**

**6. Wikipedia. Wikipedia. *Process Optimization.* [Online] [Cited: May 17, 2020.] https://en.wikipedia.org/wiki/Process\_optimization.**