Chatbot Documentation

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*A. Explain the functionalities of the chatbot and how they will address the needs of the career advisor as described in the scenario.*

The chatbot functions as a virtual career advisor. It chats with existing computer science majors from the university. The chatbot has the ability to remember student’s preferences based on their answers to the questionnaire. Once finished with the questionnaire, the bot is able to suggest a career. The bot is programmed with 5 of the top jobs in computing fields. After a job is recommended, a link to WGU’s website appears. This link contains information about the job, job specific responsibilities, salary details, and necessary skills.

*B. Summarize other outside works or articles describing bot implementation that represent each of the key elements of the bot you created. These other works must have been published in the past 5 years.*

The 2020 article, *An Overview of Chatbot Technology* explains to design and develop a chatbot. It provides a general chatbot architecture which I followed to construct my chatbot. The article states that “a chatbot should be built in a way that acts as a tool, a toy, and a friend at the same time” (Adamopoulou, E., & Moussiades, L., 2020). I programmed my chatbot to be all three things mentioned in the article. It is a tool for career advisors to use while being silly like a toy. The chatbot is also friendly and remembers the users’ name.

The 2019 Harvard Business Review article, *Does Your Company Really Need a Chatbot?* states “Start with small pilot projects where you can demonstrate success” (Bernoff, J., & Kannan, P.V., 2019). It explains how you should get some general functionalities grounded before implementing complex processes. It is easier to build upon existing code than creating something complex from the ground up. For my bot I started with general responses that would get the conversation flowing. Once I had a good base for my chatbot, I added more specifics to improve the quality of the chat. After everything worked how I wanted, I added the links and cleaned up the code.

A 2020 research paper, *AI-based chatbots in customer service and their effects on user compliance* discuss how to apply social response theory to chatbots. Chatbots need to have the same social norms as humans. Stated in the article, “when presented with a technology possessing cues that are normally associated with human behavior (e.g., language, turn-taking, interactivity), individuals respond by exhibiting social behavior and making anthropomorphic attributions” (Adam, M., Wessel, M. & Benlian, A., 2020). Which means the users will engage more with a chatbot if it presents friendly, human-like behavior. I programed my bot to ask and remember the user’s name to improve on that friendship. I also coded the bot with multiple different greetings to improve its social response.

*C. Identify 5 or more computing job types that your created bot can recommend based on the interaction with the bot. Provide the generated chatbot code files to support the identified job types.*

The chatbot will recommend one of the five jobs programmed. Each of the 5 jobs are industry leading fields and are as follows: Web Developer, Software Developer, Database Administrator, Information Security Analyst, and IT Specialist. Every job provided can be achieved with a degree in Computer Science. Information for each job is provided in the chat dialogue. The chatbot code files will be attached to this submission.

*D. Explain how the chatbot training cases were selected and how the AIML or other programming languages were used to enhance the functionality of the bot. Provide examples of the chatbot functionality (that represent the selected case and languages) at the end of the training process in support of your explanation.*

The training cases for this chatbot were selected by a number of factors. First, we created a UML diagram that shows the required flow of the conversation. From there we trained the chatbot on numerous expected responses based on the question asked. We knew we had to train for 4 major sections. The first section was trained around greetings. Then we trained the bot to inform the user about the survey. Next, we trained the chatbot to ask questions and remember responses. Finally, the chatbot was trained to recommend a job.

All of the code for this bot was written in AIML using the pandorabots environment. AIML made is fairly simple to train our chatbot. This language allowed us to create a sophisticated career advising chatbot. AIML has some basic machine learning and AI capabilities built it. It allows for our chatbot to remember names, and responses. It also allows for our chatbot to have a natural flowing conversation.

Once training was completed, we tested the chatbot’s functionality. We got a user to interact with the chatbot in a black box scenario. The user did not know the programmed responses or the inputs required. In order for the chatbot to be functional it had to be able to work in a real-world environment. The user started the chat by saying “hello” to the bot. The bot responded with “Hi, what is your name?” the user replayed with “My name is Jeff”. The bot responded “Hi, there Jeff. Nice to meet you! I am CareerBot, your virtual career advisor. Then the chatbot asked Jeff 5 questions and recommended a job to him. He was satisfied with his career recommendation and was happy to learn more about the job.

*E. Explain how AI optimization methods were used to optimize the chatbot by providing examples that represent the optimization methods used at the end of the optimization process.*

In order to optimize the chatbot we applied AI characteristics, incorporated hardcoding knowledge, and implemented countless tests. The pandorabots environment allows for AI integration. The more the chatbot is used the more it will learn. By using AI learning the chatbot is constantly improving. Another way we optimized the chatbot was by hardcoding its knowledge. With every question there are numerous responses that the user can use. An optimized chatbot must be able to logically respond to anything the user says. We started by coding the basic responses that would be expected. Then moved on to advanced knowledge optimization, including spelling and grammar errors. With every change to the chatbot the code was tested. This insured that our optimizations worked as intended in every cycle.

*F. Create an installation manual for the chatbot.*

1. Download the word document attached named Career Chatbot.
2. On your PC go your browser and navigate to <https://home.pandorabots.com/home.html>
3. Sign in or create new account.
4. On the left-hand side next to “My Bots” select the “+” icon.
5. Create a bot named CareerChatbot.
6. Click on CareerChatbot -> Edit -> Code Editor.
7. Select the folder named “AIML” and then open the “udc” file.
8. Clear all the code from the current “udc” file and copy and paste the code from the word document attacked here.
9. Save the updated “udc” file.
10. Click on the chat bubble in the bottom right corner of the website to start the chatbot.

*G. Explain how you measured the effectiveness of the bot and how the bot will be monitored and maintained to improve the final user experience.*

The effectiveness of our bot was measured by comparing the company’s goals and the bot’s performance. After the students used the chatbot they would be prompted with a survey. The same survey is given to students who used human career advisors. Our bot would only be considered effective once it provided the same results and feedback as a human career advisor. After that goal is achieved, we will begin to monitor and maintain the chatbot.

The goal of the chatbot is to provide the best career advice to all students, while maintaining little negative feedback. The chatbot algorithm will monitor and log every interaction that receives negative feedback. This will allow our programmers to analyze these key conversations and make necessary adjustments. Maintaining the chatbot based on user feedback is a scalable solution. The more the chatbot is used the better it becomes. The chatbot also logs questions that it does not have a response to. This information will insure the chatbot continually learning. These two techniques to monitor and maintain improve the chatbot with every iteration.

*H. Describe the challenges faced during the development process and summarize their resolution.*

There were many challenges with developing this chatbot. In the beginning we tried to make the chatbot very complex. We were coding it to have many greetings and responses top every scenario we could think of. We quickly realized that this approach would be impossible to implement. We took a step back and created a flow outline. This consisted of the goals of the chatbot and the conversation flow. Then we used the outline to only code what was necessary. The next major challenge was encountered in the questionnaire. We had to find a series of questions that relate to certain jobs in the computer science market. We conquered this challenge by researching numerous computer science jobs. Once we were knowledgeable on the subject, we could create accurate questions for the chatbot to ask.

*I. Assess the strengths and weaknesses of the bot development environment and explain how they supported or impeded the construction of the chatbot.*

AIML was very user friendly and simply enough to start coding quick. One of the best strengths for a chatbot environment is its adoptability. After a few AIML tutorials I was ready to create a chatbot. I used the pandorbots environment to run my AIML code. The concepts of this language were easy for me to understand. Even the high-level concepts were pretty basic. I think that is one of the major drawbacks from the environment. Many redundant statements had to be coded. For instance, when coding the greeting, every variation had to be hard coded, such as hello, hi, hey, howdy, etc. This made the code unnecessarily lengthy. If the language focused on creating APIs or downloadable greeting packs and such, I feel the environment would be more successful.

**References**

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