A. **Explain the functionalities of the chatbot and how they will meet the needs described in the scenario.**

This chat bot is designed to help reduce the amount of students sent to the career advisors on campus by directing them to a chat bot. The chat bot helps students by providing 2 forms that provide career assistance:

1)Display a list of 5 typical jobs along with their descriptions

2) Allow students to take a quiz.

Option (2) will ask some basic questions and after will suggest one of the 5 suggested careers, based on the students answers. Students may select any of the provided career options to receive a brief description along with a link that provides information on said career. Functionality wise, the bot will point users towards a career path that might fit their interests. If a user happens to get stuck they can simply type 'help' and the bot will generate a link to schedule an appointment with an advisor.

B. **Identify five computing job types that your chatbot can recommend based on student interaction with the chatbot.**

The chatbot will suggest 5 Computer Science based career paths: Cyber Security, UX Design, Web Development, Software/Firmware Engineer, DB Admin. There are 2 ways that the chatbot will provide students with suggestions:

(1) As a list where the user can click on any career and the associated description will be provided along with any additional information.
(2) The user will be asked a series of 3-4 questions that aim to determine the students interests by answering 'yes' or 'no'.

C. **Provide the generated chatbot code files to support the** five **identified job types from part B.**

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D. Explain how the chatbot training cases were selected and how you used artificial intelligence markup language (AIML) to enhance the functionality of the chatbot. Provide examples of the chatbot's functionality that represent the selected cases at the end of the training process in support of your explanation.

Chatbot training began during the initial testing deployment. Users tested and black-box version of the chatbot with the conversions being recorded. From the results, several keyworks are selected and hardcoded in using AIML. It quickly became apparent that the chat bot would need to steer away from answering user questions and instead focus on steering the conversation.(**Naro, M., 2016**)(**Oliver Vincent**) This is obviously because user questions can easily exceed the scope of the chatbots capabilities. And most answers will vary on a case-by-case basis.

Because of this we focused on training the bot to start offering career advice immediately or steer the user towards the 'help' option.(**Mathison C., 2018**) We trained the bot to proceed through a binary decision tree and identify the differences/similarities between the 5 suggested careers. This binary tree is traversed by navigating a series of yes or no questions, with each answer removing potential outcomes until the chatbot can determine the students interest. A few special cases were included for students that may not fit certain suggestions. For these special cases we suggested that the student speak directly with an career advisor. I have included 2 examples below of how the chatbot might recommend a career based on a users preferences:

(1) Josh is a programming student that prefers to work in a development setting. He also enjoys designing, testing, and troubleshooting software. Once the chatbot learned of these attributes it will recommend and Josh look at careers in Software Engineering.

(2) Josh is a programming student that enjoys the design aspect of writing code but struggles with the engineering portion. He has plenty of experience working with various API's and WebApps. However, Josh has a large portfolio of experience and would prefer to work with more than just WebApps. The chatbot can ask a series of questions to determine the answers to these questions. Once the chatbot learns the answers it will suggest that Josh look into careers in User Experience Design(UX).

E. Create an installation manual for the chatbot that includes the web link to access the live chatbot in the Pandorabot platform.

The following instructions will guide you through the process of running the chatbot on Pandorabot.com.

(1) From your web browser, navigate to www.pandorabots.com
(2) Navigate to the dashboard on the left hand side, and click **My Bots**. Click the **plus** sign on the right side to finish creating the new chat bot.
(3) Assign a name to the new chatbot.
(4) Select the new chatbot from the left and click **Edit**. Select **Code Editor**.
(5) In the Code Editor, click the **File** dropdown. Select **Upload**.

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(6) Upload the compressed files. (cybersecurityanalyst.aiml, databaseadministrator.aiml, softwaredeveloper.aiml, begin.aiml, , udc.aiml, uxdesign.aiml, webdeveloper.aiml, and help.aiml)
(7) Select the orange icon in the lower right corner to practice talking to the chatbot.

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

One of the chatbots strengths is how easy it was to begin building. Navigating the development environment and learning AIML was fast and easily understood. The large amount of documentation and external resources available further supported this. However, it isn't long after you begin programming that you realize the limits of this programming environment. It simply felt as though there was too much key functionality missing from the GUI, and the functionality that was there did not go deep enough. I'd say that on the whole this was a great learning experience, however it lacked some of the functionality you would expect from a modern development environment.

G. Explain how the chatbot will be monitored and maintained to improve the final user experience.

The admin can maintain the chatbot by simply monitoring the logs for persistent recurring questions. As time goes on the both should adapt to providing direct responses to these questions instead of suggesting an appointment be scheduled with an advisor. This should help to continuously update the chat by reducing the number of scheduled meetings. One other critical component of chatbot maintenance is monitoring the suggestions used. One thing that could be done is including a user survey that will help to determine if users feel the suggestions were relevant to their interests.

Improvements to the bot are realized as design and testing are applied to the first implementation of the chatbot. One of these realizations was the decision to steer away from having the bot answer questions and attempt to steer the conversation instead.(**Naro, M., 2016**)(**Oliver Vincent**) To optimize the user experience we need to make it easy for users to respond to the bot. We can do this by creating a button based UI for the user to interact with. This would allow users to stay engaged with the bot, but also feel like they are in control of the conversation. I also improved the chatbots ability to reason through user answers based on the asked questions.

Over time the chatbot has improved significantly at directing users to appropriate career paths. The bot can effectively guide someone to a career path or direct them to schedule and appointment with an advisor. In the niche case that a user is not able to reach a recommendation the user will always be recommended a face to face meeting.

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Sources

Did A Chatbot Really Pass The Turing Test?, discusses the complex nature of open-ended conversation. This prevented me from trying to force a conversation where the students asks questions. I came to find it was more practical to focus on steering the conversation towards an end goal of helping users identify jobs in CS.

Naro, M. (n.d.). Did a chatbot really pass the turing test? Retrieved February 24, 2021, from https://www.popsci.com/blog-network/boxplot/did-chatbot-really-pass-turing-test/

Chatterbots for Learning, gives a great summary of how most of the more recent research handles interactions with bots. The examples in the "Tests" section assisted in the adjustment of my chatbot to steer the conversation towards a conclusion.

Oliver Vincent, Silva CD, Silva RG. Chatterbots for Learning. July 2016. https://search.ebscohost.com/login.aspx?direct=true&db=eue&AN=119264921&site =eds-live&scope=site+. Accessed February 22, 2021.

Robots Have Many Uses identifies what makes bots like this successful for educational purposes. Its mains point is that bots are strong when you ask follow up questions to personalize the chat experience. This was the main factor that helped to come up with using a quiz for users.

Mathison C. Robots Have Many Uses. Popular Science. June 2018. https://search.ebscohost.com/login.aspx?direct=true&db=ofm&AN=130143340&site =eds-live&scope=site+. Accessed February 22, 2021.

CHATBOTS EXPLAINED, emphasizes the importance of utilizing chatbots to educate users. The report lead me to include an external link along with a short description of the career path. I reflected on how I typically interact with my smart home on a daily basis and saw the value it provides me through interacting with it.

Maki Knowles. CHATBOTS EXPLAINED. Business Insider. https://www.businessinsider.com/chatbots-explained-why-businesses-should-be-paying-attention-to-the-chatbot-revolution-2016-7?IR=T.

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