1. **How would you define a Chatbot?**

In as few words as possible, while utilizing ibm.com's definition, we have come too define a chat bot as a set of instructions(code) that uses AI and NLP to understand a users questions and send automated responses. This would simulate a human conversation and provide the user with information quicker and with reduced waiting time.

2. **What do you think is the function of a Chatbot? And what are its required functionalities? What areas or fields of knowledge are used?**

The function of a chatbot would be to create a faster experience for the user. For example if the user has a problem with a particular task, the chatbot could provide quick answers that would help the user. This would reduce waiting time and not allow the user to disconnect from our product because they do not know how to proceed.

Required functionalities would include dealing with complex dialogues, easy handling, and ongoing optimization. The first resource consulted for this was onlim.com. The language used is pretty technical, but we believed that it was a sophisticated interpretation that would be beneficial once we had a better understanding. This will also become more useful in our professional careers as it is important to have the correct terminology when doing career based projects.

We wanted to cross reference the functionalities above with another source and found one (botscrew.com) that is more beginner level and less tech language. Our groups personal favorites are the "chatbot's look and tone of voice" or "Languages", both of these examples would set our chatbot apart from the other groups. Some other basic functionalities would be the channels used, technologies, and the accessibility.

The fields of knowledge that are required for this would include some form of computer programming experience. But as far as Im concerned anyone with google and YouTube could most probably do this. As we are searching for this information, we are finding many tutorials. For example, in our master class it was even necessary to write any new code as everything was already implemented within the libraries. The only real requirement is that we needed to be able to properly code to be able use the tools within the libraries.

3. **How do you think you could design a Chatbot? Design it at a high level.**

A primary component would be something that will interpret the user information. We will need to search the sentence(string) for verbs, nouns, adjectives to determine what the user is trying to say. We will use the NLP resources from the master class in order to achieve this. It appeared that many libraries and tools were available for a project such as this. These libraries have come to normally be seen to be implemented in python.

We would need the chatbot to make a decision based upon the users input. For example if this was to reccomend a movie, we would need to filter a database based upon the deconstruction of the aforementioned sentence. In turn the chatbots decision would be applying the filters and thusly displaying a good movie match for the user.

For this decision to be made the chatbot would need to be connected to a database. Using the movie recommendation again, the chatbot would need a database filled with movies and information relating to them.

A concern of ours would be the mistakes that chatbot would make, such as redirecting the user to a not useful location or a misinterpretation. This would lead to user dissatisfaction and disengagement which is not ideal when designing something to assist them.

4. **What limitations do you think a Chatbot might have?**

As discussed before the many many languages of the world could limit what users can receive this help. Some words are considered slang or the ever changing verbiage of the newer generation could lead to bad interpretations. The chatbot will only know the website (or product) as well as we know it, or even better, what we instruct the chatbot to know about the product. If we do not explicitly program the chatbot correctly with all the available information we will be extremely limited to what it can accomplish.

The chatbot will only be as good as the testing for it was. If the chatbot is not tested thoroughly it could lead the user discovering the error. This again builds off the idea that the chatbot only knows what we tell it to know.

5. **How could we verify the correctness of a Chatbot?**

We have learned testing methods in different courses throughout university so we begin with the basic blackbox testing. Although the time and man-power required for this could be quite large. The first source consulted here would be payoda.com. They provide a very good explanation into what we will be required to do.

The highlights from the aforementioned website would include: conversation flow, confusion handling, speed and accuracy, format validation, error handling for unknown inputs. These are essential to avoid failures or other actions that would cause the user some form of discomfort.

80%/20% Split
Considered to be the most basic approach and most common. The 20% is because the user only provides 80% of the information to the chatbot.

K-Fold Cross Validation
This is done by dividing the training set (GT) into K number of parts (folds). The by utilizing one fold at a time and the rest of the data as the training data. Most common is the 5-fold. This means that the training data is split into five folds, then the bot is trained with four of the folds and the fifth is used to test

Monte Carlo Cross Validation
Similar to k-fold except the data sets are determined randomly. The first 80% is the training the rest of the data is designated as testing data. The website medium.com shows a good implementation of cross validation

Some Other Good Verification Things according to blog.unguess.io
This website again covers the flow of the conversation and also

6. **What is a recommendation system?**

A recommendation system is a type of Artificial Intelligence that gives the user a series of personalized suggestion based on their request. When talking about a Chatbot, it could provide any type of answer as we may have seen when playing around with Chat GPT. An interesting aspect is that this Chatbot or AI tool could store the user's previous conversations and data so that in further conversations has a bit of background about the user.

Some examples could be when a user is speaking with a Chatbot about clothing, this Chatbot could recommend us certain clothing pieces based on our past google searches and online purchases. To provide the most accurate response, the system might additionally consider additional elements including the user's size, height, budget…

To sum up, a recommendation system in a Chatbot can help improve the user experience by providing a very humanized response.

7. **List Chatbot examples and explain one in detail.**

- **Mitsuku**
- **Replika**
- **Woebot**
- **Kuki**
- **YouChat**
- **Chat GPT**

Steve Worswick created the Mitsuku chatbot, which has won numerous honors including the Loebner Award, a chatbot version of the Turing test. With her engaging nature, Mitsuku is a conversational agent that can talk about a variety of subjects, including sports, politics, and music. She employs machine learning (ML) and natural language processing (NLP) strategies to comprehend user input and deliver responses that are human-like.

Mitsuku can comprehend and produce language in a variety of circumstances because she was trained on a huge corpus of text data. Additionally, she is able to recall previous interactions with users, enabling her to reply in a more engaging and personalized manner. Mitsuku can be found on a variety of platforms, scuh as Facebook Messenger, Kik, and Telegram.

8. **What role should ethics play? Have you found any previous concrete cases? Controversies?**

With the increasing importance of Chatbots, it is crucial that they comply with ethical standards which may include the following:

- Transparency: Chatbots should clearly specify their abilities and limitations. For example, they should state that they are unable to have feelings and consequently take decisions with moral biases.
- Privacy: They should protect user's privacy by not collecting unnecessary information, and should only use such information for allowed purposes.
- Fairness: They should be designed to be fair and unbiased, meaning that they should not discriminate against any particular group of people and that they should treat every user equally.
- Safety: They should not be programmed for illegal or harmful purposes. E.g stealing bank information, stealing identities etc

To illustrate a bad usage of chatbots, we found the following case:

In 2020, an Italian journalist named Candida Morvillo interacted with a chatbot called Replika, which has been downloaded more than seven million times. Morvillo asked Replika for advice on harming someone who hates artificial intelligence. Shockingly, the chatbot suggested murder. Another journalist, Luca Sambucci, also tried Replika and within minutes, the chatbot encouraged him to commit suicide. Despite being created to alleviate loneliness, Replika can promote nihilistic behavior if pushed in the wrong direction.

9. References (I recommend that you follow the APA format, in case you do not know it try to find resources regarding the format).

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