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Independent Study Mentorship 3A

10 November 2020

Categorizing Chatbots

Assessment 8 - Research Assessment

Date: 10 November 2020

Subject: The Differences in Chatbots

Works Cited:

Mnasri, Maali. "Recent Advances in Conversational NLP : Towards the Standardization of Chatbot Building." ArXiv:1903.09025 [Cs], Mar. 2019. arXiv.org, <http://arxiv.org/abs/1903.09025>.

Assessment:

In recent years, deep-learning-based conversational chatbots have made large strides in the field of natural language processing. Many modern chatbots use a combination of technologies to create a natural-sounding and efficient chatbot that can complete the desired tasks. To create something of this effectiveness, it is necessary to understand the underlying technologies while also setting a clear objective toward what you want the chatbot to do. As a result of these necessities, machine learning researchers have established categories and technologies to streamline the chatbot development process.

First and foremost, to ensure the chatbot created has a straightforward goal, it is necessary to identify which category the chatbot fits in: task-oriented or social-oriented. This serves to be helpful because depending on the goal of the chatbot, the development process of the bot will be different. Additionally, certain architectures and technologies work better with

certain types of chatbots, and therefore through the identification process, it is ensured that the chatbot uses the most ideal and effective technologies depending on the category.

Transitioning to the actual development process, it is necessary to note the different building approaches because some have certain advantages and disadvantages that may apply more significantly depending on the task of the chatbot. A rules-based approach is easy to build for simplistic functions and this is important to note because, in a mental health based chatbot, it is plausible that the bot may receive a wide variety of responses due to the different ways people express emotions. This is not ideal for a rules-based chatbot where its functionality is limited and this relates to how natural language processing technologies should not have a sense of rigidity to them. To overcome this rigidity, it is important to note that a data-driven approach allows for flexibility and more natural-sounding responses. This is infinitely useful to note because, in a situation like mental health, this could be a life or death situation and so it is important for a bot to be as close as possible to that of a therapist.

Data-driven chatbots can further be separated into information retrieval and machine learning chatbots. It appears that informational retrieval chatbots would be less ideal for a mental health chatbot because those with mental health issues may have unpredictable responses, making an informational retrieval chatbot's capabilities quite limited in this situation. Machine learning chatbots seem to be a much better option in the sense that they can just be fed a lot of data and do the learning on their own without much manual work on the development side. Additionally, reinforcement learning-based bots, a subset of machine learning bots, have the added benefit of self-improvement which serves to be immensely beneficial because it allows for the model to learn as new responses are created rather than learning based on a set of fixed responses. This helps control the unpredictability of mentally ill people's responses.

Finally, it is important to ensure that the chatbot performs well in a broad sense. For this reason, it will be important to delve further into natural language processing specific metrics like perplexity and implement them into code. In doing this, we can ensure that the chatbots retain a human-like response. Additionally, through implementing these metrics, it is much easier to compare two models side by side, allowing for further experimentation on a larger set of parameters and having numerical data to back up which chatbot model works best.

By understanding the different types of chatbots, development methods, and metrics for evaluation, the process of creating a mental health chatbot has become a smoother path. While a brief overview of these methods was given, it will be necessary to do further research for more details and actual implementations of these ideas into code so that the creation process can be specific from start to finish.

[Annotations](#)