CS1980 – Capstone Team Project
Department of Computer Science
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School of Computing and Information, University of Pittsburgh

Midterm Project Proposal

Title

Virtual Kathy: A conversational agent for the CS Department

Mentor

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Team Members

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1. Who would be our customers?

Students of the School of Computing and Information (SCI), applicants who are interested in undergraduate/graduate programs at SCI, and people who have questions to SCI are expected to be our customers.

2. What is the general status of the project? Are you on track to complete it?

In terms of the status, the team is almost half complete with the project, though we still need to make improvements to the previous works. Based on our initial meeting with Alex, our project sponsor, he divided the project into six parts, which is also mentioned in our proposal paper: starting with creating training questions, then coming up with the matching answers, setting up the chatbot, supporting "context", routing non-answerable questions to humans, and finally testing the chatbot. So far, we are close to finish setting up the chatbot. Although our pace is slower than what we initially planned, I believe the group is on track to finishing the project, after the busy midterm period. Currently, we are still waiting to set up our next meeting with Alex to discuss our next step, however, it's a challenge because of Alex's busy schedule. Once, we get to meet with Alex, we shall be able to pick up the pace and proceed further.

3. Are there any features/user stories that you have needed to add/remove since the Proposal?

In our initial meeting with Alex, Alex talked about the purpose of our Virtual Kathy chatbot, which is to create a chatbot for the CS department website that actually serves students. Alex said that he would be fine if we implement the chatbot on platforms like Facebook or Twitter for ease, but considering how the chatbot would eventually be deployed on the CS website, we decided to go for the website approach. The group is working on both the front-end and back-end of the website to set up the chatbot. There are also features that we might remove such as a feedback system due to the limitation of time.

4. Have you made any changes to your process since the proposal?

No, our team strictly followed the plan and timeline presented in the project proposal to implement our project.

5. What parts of the software development process are working well? Which ones are working poorly?

So far, most of our projects are progressing smoothly, including data preprocessing, back-end deep learning model establishment, model training, and front-end web development. The intents and patterns used for deep learning is still limited, but we will enrich it later to achieve the desired model training effect.

6. What are major risks to the project?

The major risk of the project is to merge the front end and the back end, since different group members are working on each part. We also have high expectations for the end-product so it's also risky that our end-product doesn't work out as well as planned. Another risk is that because none of the group members have any previous experiences with creating chatbots, which means we are all learning while developing the chatbot, so it's hard to assure that our end-product would be as satisfactory.

7. Do you need to make any further "course adjustments"?

No, currently our project is progressing well, so there is no plan to make any adjustments.

8. What questions are still outstanding about the project?

The most outstanding question and challenges for us so far is to implement the chatbot such that it understands and supports the "context". An example of the context is when the bot answers a series of questions asked by the user, it can come up with follow up questions. For example, if a user asks about research opportunities, the bot should interpret the user's context and provide some follow-up questions such as "Are you interested in learning about Alex's new research?" This is also our next big step in completing the project, after creating the basic model of questions/answer exchange between our chatbot and the users.

It's relatively easy for us to implement the chatbot so that it provides matching answers to users based on the user' questions/intents, but it is a major challenge for us to integrate contexts into our chatbot. The concept of supporting context was stressed by Alex, so it remains as a problem we still need to learn how to solve.

9. What kinds of trade-offs are you making? How are you determining priority?

Due to time constraints, currently we have not established adequate intents and patterns (i.e., training questions and matching answers), thus Virtual Kathy can only effectively answer a limited number of questions (for example, greetings, say “thank you” and “goodbye”). However, once we complete setting up the conversational agent, the intents will be expanded, and the performance of the chatbot will be greatly improved by then, completing complex and diverse functions including contextual conversation.

10. What are the major issues that you have been experiencing?

As mentioned in question 10 above, the main problem we have encountered so far is how to make the chatbot achieve contextual conversation. In addition, since the smallest processing unit of natural language processing is words, when the user's input is a single word and spelling errors occur, the model performs poorly in predicting the answer to the question. For example, when the user input “godbye” rather than “goodbye”, the chatbot cannot respond correctly. Our team is still looking for any useful information that can solve these two problems, if necessary, we will seek help from Alex.

11. What has been easier than you thought?

Since our mentor provided us with several similar projects completed by past students as our reference, this gave us great help, including but not limited to using Python to build and train deep learning models, and how to use NLKT for natural language processing, etc., and abundant online resources have greatly reduced our pressure in the process of completing the project. In addition, our team member, George Liu, has rich experience in web development, so the current progress of the project is much smoother than we expected.

12. What is our future plan?

On the basis of completing the required tasks, if time permits, to improve the current functionalities of Virtual Kathy, in the future, the scope of the chatbot can be increased by inserting data for all the departments, training the bot with varied data, testing it on live website, and based on that feedback inserting more training data to the bot. Some of the new features which can be added to the bot are (1) speech recognition feature through which students can ask their queries verbally and get the answers from the bot, (2) integration with multiple channels such as phone call, SMS, and various social media platforms like Skype, Facebook and Twitter.