TEDU Assistant

CMPE 491 Final Project I
Analysis Report

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Introduction

This is an analysis report produced for the TEDU Assistant application.

TEDU Assistant is a voice-controlled, natural-language query system (i.e.: voice assistant, chatbot) which will answer common questions for university students, academic and administrative staff where answers are available but difficult to find or inconvenient. It will provide easy access to data published on university websites. [1]

Proposed System

Overview

A lot of useful information is available on university websites but is not convenient to access due to confusing information architecture. We will implement a system which will make this information available through a natural interface, where users ask for the specific information they need instead of needing to find the relevant page.

As part of the project, NLP (natural language processing) will be used to construct queries from the user's questions and commands.

Requirements

Functional requirements

Interface requirements

1. The system must accept questions through voice or text input.
2. The system must be able to answer questions that are not in an exact format.
3. The system must support English. It must be extensible to allow the addition of other languages in the future.
4. The system must ask follow-up questions if needed. For example, if the answer of a question depends on the student's year or department, the system must be able to ask these questions and answer the original question accordingly.
5. The system must respond honestly if it doesn't understand a question. It may ask the user to repeat the question or phrase it differently.
6. During the user's first interaction, it should show examples of questions the system can answer.
7. The system must prompt the user for a rating out of 5 stars for each answer. These replies must be collected so that the function of the assistant can be evaluated.
8. After answering a question, the assistant should provide shortcuts to additional questions the user may be interested in. These additional questions are based on the question that was asked.

Available information

The system must be able to provide the following information:

9. Room numbers of members, centers and departments (as long as this information is available on the university website). This includes not only

academic staff but also office members (such as Corporate Communications),
10. Dates on the academic calendar.
11. Who to consult on given topics (e.g. internship).
12. Department information:
    a. List academic staff of a faculty or department.
    b. Direct users to pages when asked:
13. Opened courses.
14. Final exam dates.

Non-functional requirements

15. The system must not provide any information to a user that isn't already publicly available.
16. Data collected for the sake of improving the system must be anonymized.
17. The system must be accessible through phones, tablets and desktop computers.
18. The system will have a Web-based client. This client must be accessible by all users, in accordance with WCAG 2.0 [1].
19. The system must be compliant with GDPR [2] and KVKK [3][4] regulations.
20. Responses must be delivered as quickly as possible, within a few seconds at most.
21. Voice recognition suffers with less common dialects and accents. As TEDU is an international university, care must be taken to make the system accessible to users who do not speak its language natively.

Pseudo-requirements

22. The system must not rely on information that is not available on the university website or provided by the user. For example, office hours are not available. (Note: We expect to use web scraping to obtain information).
23. The system can only provide accurate info as long as the university system is up-to-date and accurate (see requirement 22).
24. The system requires a device which supports the *Media Capture and Streams API* [5].
25. The TEDU Assistant system may encounter internet connection opportunities that may not be equal everywhere, this may cause a delay in the login process.

System models

Use Case Model

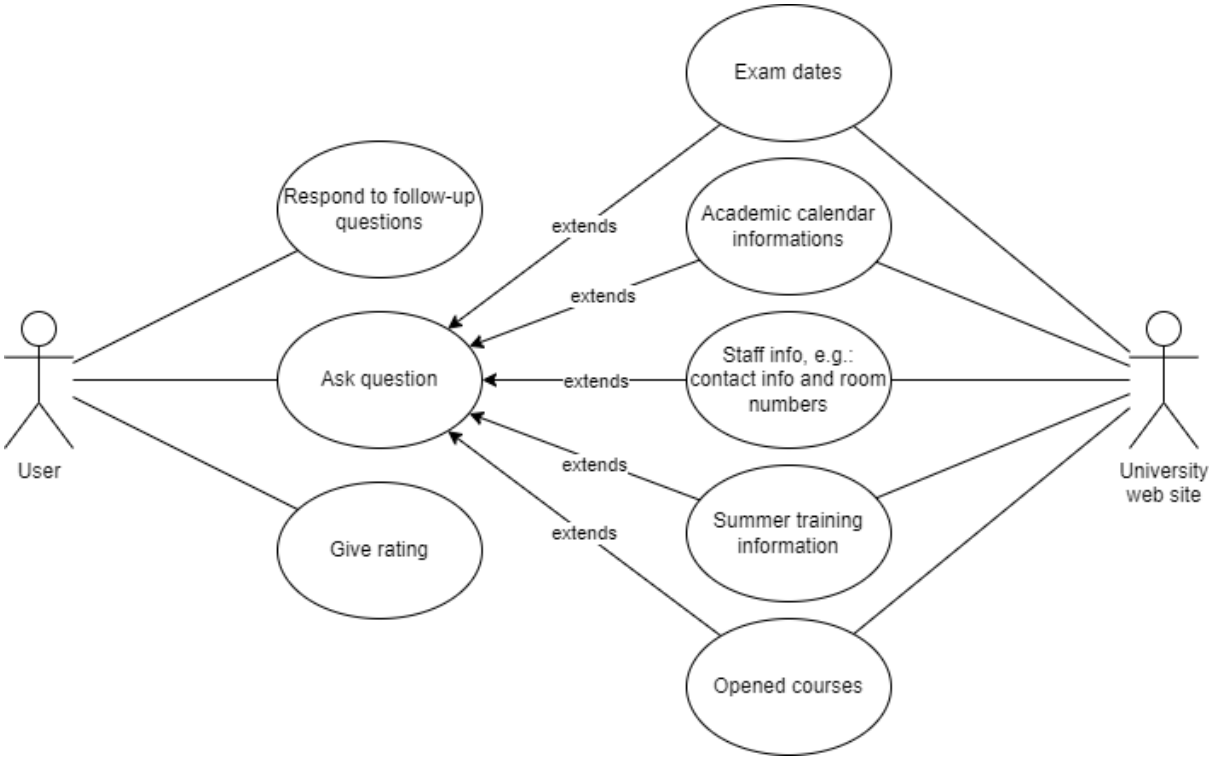

Figure 1. Use case model

Object and Class Model

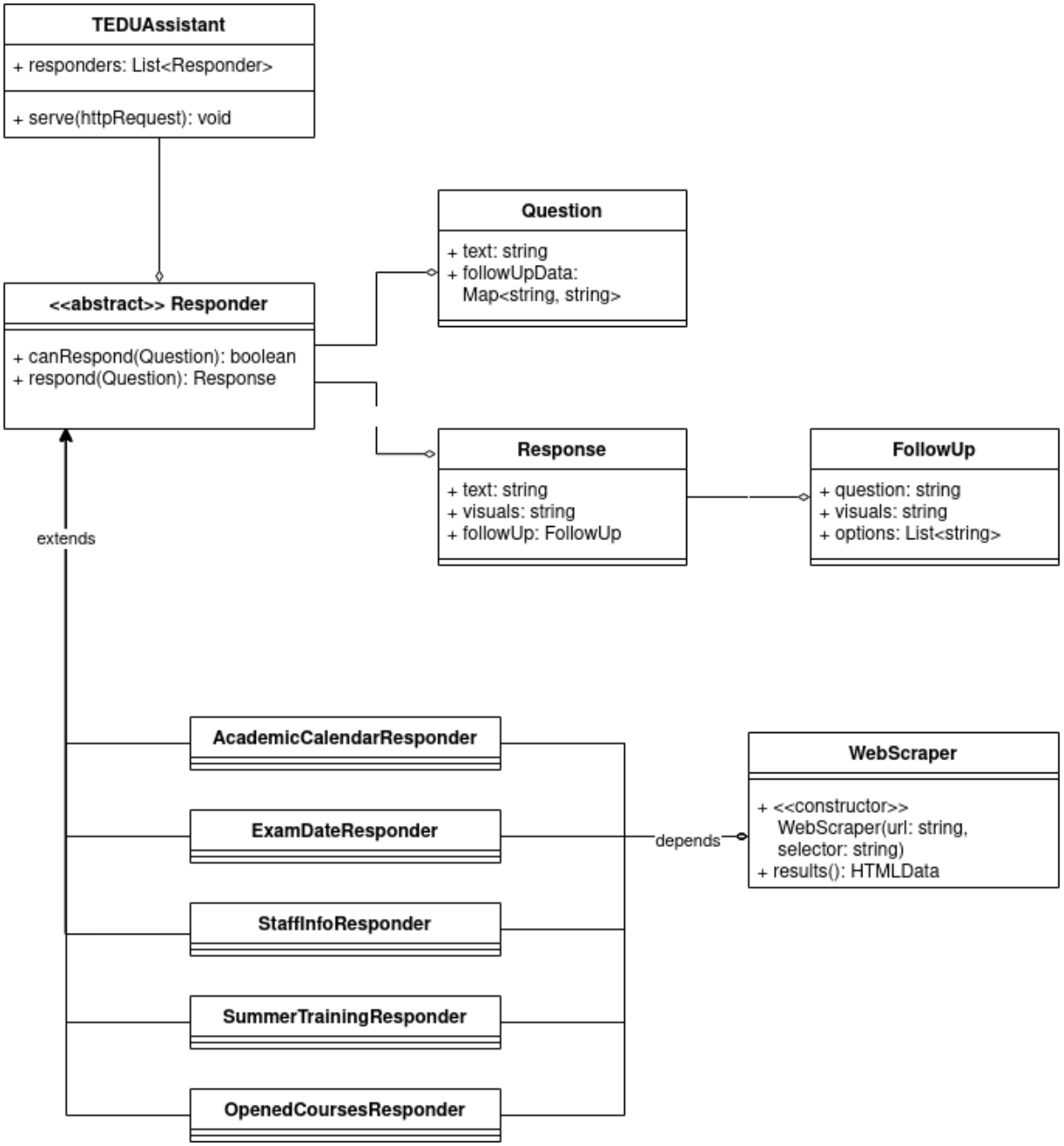

Figure 2. Object and class model in UML.

Use scenarios

1. A student is on campus and wants to meet an instructor to ask for help with coursework. He (the student) opens TEDU Assistant and asks: “Where is [instructor name]’s office?” TEDU Assistant responds with the room number of the instructor. The student then asks: “Is she in her office?” The system responds affirmatively and shows the instructor’s office hours. The student heads to the instructor’s office.

2. A student asks a question about summer training. TEDU Assistant is unable to answer this question. The student then asks: “Who can I ask about internships?” The system asks needed follow-up questions:
   q: “What is your department?”
   a: “Computer Engineering.”
   q: “Which of these internships are you taking? <CMPE399> <CMPE499>”
   a: “CMPE 499”.
   The system then shows the name and contact info of the CMPE 499 internship coordinator. The student emails the internship coordinator with their question.
3. Many students give low ratings to answers for their questions about internships. ___ notices this fact and tries to improve the internship-related answers. In doing so, they notice that the information available on the website about the subject is lacking in some parts. They notify relevant departments.

UI mockup

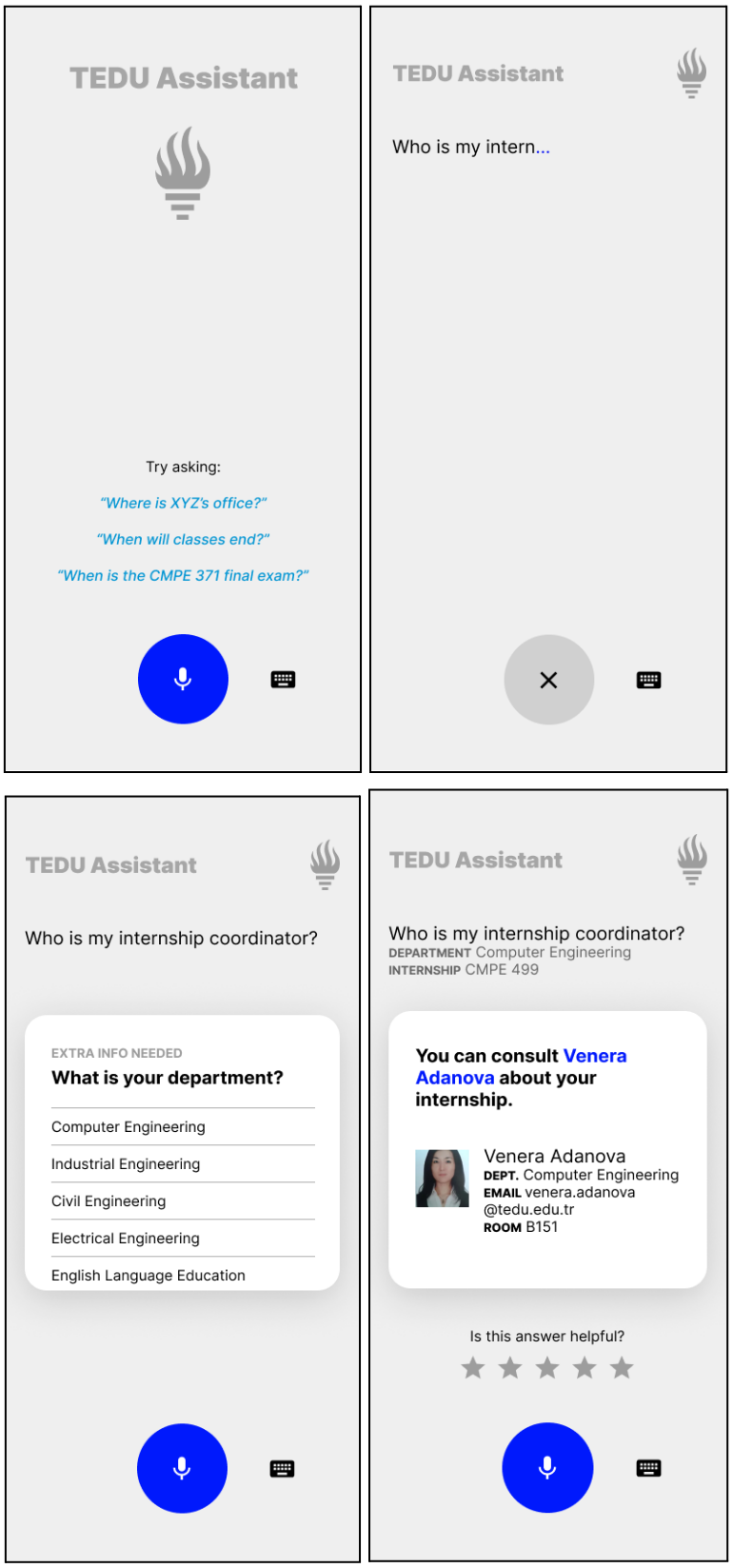

Figure 3. UI mockups. In order: Initial view, asking a question, receiving a follow-up question, receiving an answer with rich content.

Glossary

Chatbot: a software system accepting questions from users and automatically writing responses in a way that mimics human conversation
Follow-Up Question: questions asked *by the system to the user* when more information is required to answer the user's question
NLP: Natural Language Processing
Voice Assistant: a software system assisting users in their day-to-day tasks that can be controlled by spoken commands
Web Scraping: extracting data from websites, usually by parsing HTML

References

[1] Şenol, M.B. & Kurtcuoğlu, G. & Akşimşek, D. & Akmil, E., "Final Project Proposal—TEDU Assistant," https://tedu-cmpe491-group10.netlify.app/reports/proposal.pdf.
[2] https://gdpr-info.eu/
[3] https://www.kvkk.gov.tr/
[4] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=6698&MevzuatTur=1&MevzuatTertip=5
[5] W3C, "Media Capture and Streams," 17 November 2022, https://www.w3.org/TR/mediacapture-streams/. Retrieved 29 November 2022.