COMP3900

Hal_3900 Proposal

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1 Glossary

Missed Question A question which the chat bot was not able to answer

2 Background

2.1 The Problem

* could we survey lecturers and tutors to get an idea of the quantity of emails they get / how long they spend answering administrative questions per week? would this help our proposal?

Online learning is changing the way students access and engage with higher education. Courses with online delivery increase the flexibility and accessibility of courses by providing students with a platform to learn course content in their own time, at their own pace. Increasingly courses which are taught face to face include some online content delivery, including course materials, quizzes, online lecture recordings, and forums to ask questions and discuss the course content outside of class.

There is a delay between when students ask a question and when they get a response, and this can vary from hours to days. Answering individual student questions via email or on the forums requires a significant amount of time for tutors, course administrators and lecturers. Often the same questions will be asked many times by different students, making it inefficient to have course staff respond to each one individually.

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Some students need more learning support for course content (and don't always use the help sessions/tutorials effectively for this) Some students need more support with lab work and assignment organisation to keep on top of due dates etc.

* cite research about online learning from educator perspective Lecturers and tutors want to know what their students need the most help with, to target their teaching better. Students are in different places with their learning and often need more individualised support to learn either the basic content, or suggestions of more advanced material to extend themselves. This is difficult to provide in a large class properly.

2.2 The Existing Solution

Currently at UNSW, learning support is provided to students through email, forums and help sessions. This is very man hour heavy, requiring countless

tutors to be on hand to answer questions which of themselves are quite repetitive. In addition as these courses become larger with increasing enrollment sizes it becomes more difficult to be able to give students individual attention and personalised education.

Another side effect of growing cohort sizes is the fact that many tutors and lecturers are forced to spend most of their time answering admin related questions and helping students to clarify their understanding, time that could be spent bettering the course and writing course material. Hiring more staff and offloading many questions to forums has been the current approach used by courses to handle this increasing load but forums are full of repeat questions and require many tutors to man them.

This growth is becoming unsustainable and with the rise of online education platforms many students are eager to interact with course material in a more interactive meaningful way which works with their scedule. Waiting for a tutor to respond to them often creates a distance between the inital question and the answer which limits the effectivenes of a response. That is if the tutor finds time to respond at all.

In some areas of education chat bots have been deployed which interact with students in meaningful ways out of class hours (create a reference to https://botsify.com/education-chatbot) and some have even been created to answer higher education questions (reference https://www.canberra.edu.au/about-uc/media/newsroom/2018/february/students-make-new-friend-in-lucy-the-chatbot). However these tools are not able to me easily mapped to a unsw university course, it's administration, assessments and can not utilise archives of previous iterations of the course to learn common questions and issues.

2.3 Our Solution

The goal is to create a chat bot companion for students to enhance their learning experience. The chat bot will provide students with learning support by responding to their questions about course administration and the content they are learning, in real time, and monitoring their understanding of the course content with follow up questions.

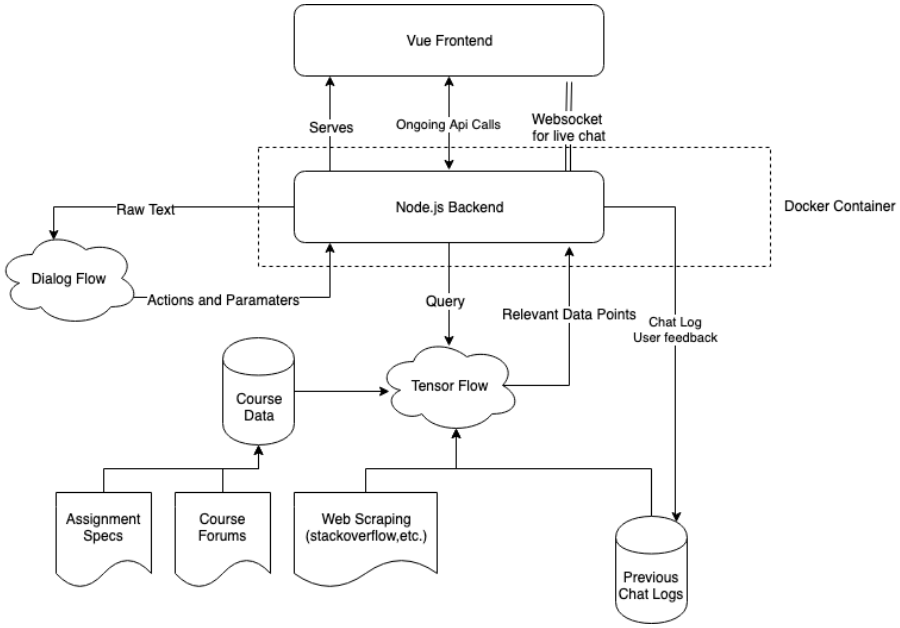
The chat bot will assist students with revision, and will provide organizational support by keeping students informed of their grades and upcoming due dates.

The chat bot will enhance course delivery by keeping staff informed of their students' learning needs and frequently asked questions. It will reduce the load on lecturers, tutors and course administration staff by answering many of the questions that students have, allowing them to focus on the overall delivery of the course.

2.4 Technical Details

For this bot we will be building servals layers to form our technical stack.

- A frontend will be build in Vue.js interaction with a Node.js backend via Websockets to provide a frontend to interact with the chatbot
- Dialogflow will be used to parse user input and provide the natural language processing aspect of this project
- Actions will be passed to the knowledge base of the bot, which built ontop of tensor flow which will utilise machine learning to classify data and form connections between a input query and the relevant data points.
- Data will be stored in s3 buckets
- Docker will be utilised to unify the several layers of this application into a holistic program.



The scope of this program is to have a bot which can answer most basic administration questions such as when assignments are due and has at least a 50% success rate with responding to direct questions with a simple data point response i.e "how do you print with no new line in python" should respond with "you can use sys.stdout.write". In addition the bot should have the ability to quiz students from a lecturer defined set of questions, a stretch goal would be for the bot to autogenerate these.

3 Epics

3.1 Answers administrative questions about course

3.2 Answers questions about course content

This is the next major category that student questions will fall into. Although questions in this category may be less common for course administrators compared to queries such as "when is assignment 2 due?", they make up a significant proportion of questions directed to tutors. Implementing this feature in this chat bot will remedy a number of problems that this poses.

- Gives immediate answers to students, eliminating the need to wait for tutors' responses.
- Reduces workload of tutors, who are typically only paid for one hour of associated work.
- Can answer questions beyond the scope of tutors' knowledge.
- Discourages plagiarism by providing an officially endorsed information bank.
- Offers an outlet for shy students to ask individual questions.

The bot's knowledge base can be built from a number of sources. Apart from manual input, this can also include information scraped from appropriate sources such as course syllabus, lecture slides and past assignment submissions.

Information not directly related to the course content should be considered out of scope. However as there is no clear divide between what constitutes course content and what doesn't, there will be some degree of leniency as to what is included.

As one of the primary features, it has an estimated difficulty score of 8/10 with a time estimate of 5 time units. That said, the actual implimentation is not unlike that of epic 1, so there is potential for this epic to be developed alongside epic 1 as the functionality may be shared.

3.3 Meaningfully quizzes and interacts with students

3.4 Informs course admin/staff about cohort

This feature will allow the chat bot to maintain information about the questions users are asking and the performance of users in the excersizes the bot sets forward. This will be accessable from the admin web interface available to course staff.

The main metrics that should be captured for a requested time frame are

- A list of the most common questions asked and their relative frequency
- A list of missed questions
- A list of the questions or triggers which the bot had a low satisifaction rate for
- A breakdown of every topic covered and it's retention rate amongst users (derived from interactive quizzing)
- General statistics on the bot's usage rate, uptime and the average computation time taken for a response

The web interface will provide the ability to

- View interactive sortable tablular data for the followed metrics
- View certain data such as usage rate and computation time as a graph against time
- Export the metrics as csv or json
- Register admin staff to be notified by email when certain conditions are met, i.e missed question rate rises past 50

Out of scope will be any more advanced interaction with the data other then simple tabulation and graphing against time. More forms of data visualisation should be derferred to specialist tools.

In addition this is simply to inform users of the bots performance and will not provide features to adjust the paramaters of the bot, this will be defered to the second epic involving the bot's interaction with course content.

This will be a somewhat difficult set of features to implement, it's estimated difficulty score is 7/10 with a time estimate of 5 time units.

3.5 Learns for more then one course without needing massive config

The chat bot is able to adapt to other courses provided at UNSW and start providing student support quickly Course admin gets a really easy setup wizard?? think about.... (make it plug and play basically) will improve the wording on this

4 Epic Selection

5 Summary