Owl Assist - A Chatbot for Keene State College

Matthew Pittendreigh — CS480 Machine Learning - Fall 2019

Introduction

Owl Assist is a chatbot designed to answer questions about Keene State College and assist its faculty and students. It will be able to provide info about residential life, course registration, financial aid, on-campus events and more. It will also tell jokes, make small talk, and execute institution-specific actions like checking your upcoming assignments on Canvas. This bot is sponsored by the School of Sciences and is scheduled to roll out in the March of 2020.

Motivation

Chatbots programmed to respond to enquiries about a university can act as a multifaceted asset to the institution.

Information System: Their primary function is as a centralized application for acquiring information. They can assist students to enroll in the university, engage in college events, and recall important deadlines.

Innovative Advertisement: Secondarily they serve as an advertisement, representing the school's ability and motivation to adapt to technological innovation.

Aids Student Enrollment: Given that the system can both encourage students to apply and assist them in completing the registration process, chatbots can lower the number of students that are accepted to but do not actually attend Keene State due to registration complications, a concept known as summer melt. For this reason, chatbots are an investment that should be considered by many US schools.

Prototype

The Owl Assist chatbot is a complex software system that leverages production and experimental technologies to accomplish the tasks of Natural Language Processing (NLP) and dynamic response.

Technology	Use
Dialogflow	Intent matching
FireBase and Knowledge Connectors	QnA response generation
Python and Scrapy Library	Webscraping keene.edu data
Google Assistant	DialogFlow intergration

The current prototype is integrated with Dialogflow's Web Demo, as Google Assistant deployment does not allow for immediate testing. It has limited functionality but will improve as we develop a larger set of training queries and implement more fulfillment calls.

Methodology

End-User Expressions: Inputs to the chatbot. They may be made by voice or text.

Intents: Categorize an end-user's intention for one conversation turn.

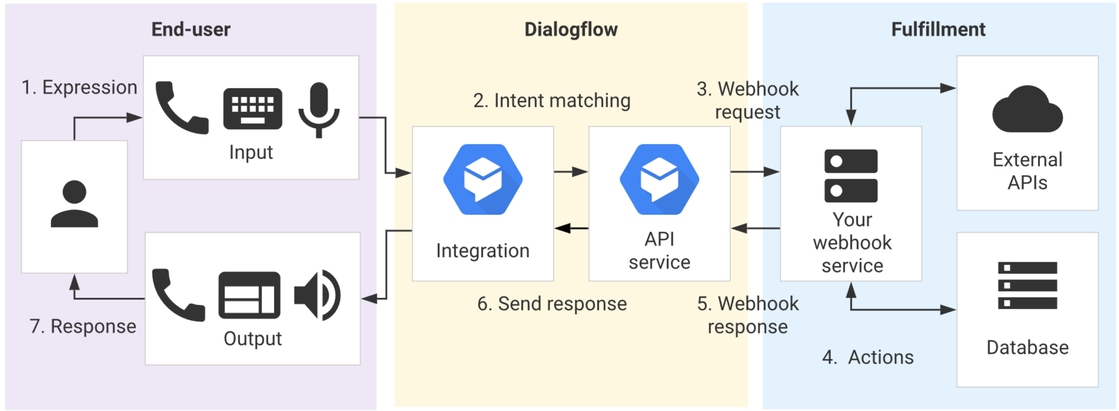
Dialogflow is a chatbot engine that uses natural language processing to match end-user expressions to intents. Through **intent classification**, the chatbot can interpret the sentiments of the user and carry a conversation.

Contexts: Pass information from one request to the next. For example, if a user simply states "Dining Commons", the bot will require context needed from earlier in that conversation.

Entities: How we parameterize the data extracted from end-user expressions. For example, the dining commons would be of entity type @building.

When Dialogflow matches an intent, it notes the active contexts and entities and either creates a response or passes that information through a webhook for fulfillment.

Fulfillment: Intents can provide largely static responses, made slightly more dynamic by integrating parameter values. Fulfillment allows for fully dynamic response by calling external API's and querying FAQ databases.



Owl assist uses FireBase and Dialogflow's integrated knowledge connectors to fulfill general information requests.

Future Work

The prototype still requires permissions to access institution specific information. This would allow us to provide administrative information like professor contacts. To gain permission we must migrate from FireBase to a custom implemented QnA engine using Python's spaCy library and a Node.js API due to security risk. We also aim to integrate academic API's like Canvas and Ellucian. Finally, we will look to deploy Owl Assist on more platforms like Facebook Messenger and Amazon Alexa. Once launched, students will see Owl Assist stations deployed on raspberry pi's popping up around canvas, as we will need a large dataset of queries to tune the bot.

References

[1] U.K. Bavishi "Implementing A College Enquiry Chatbot" 2019.
[2] P. Shetty "Pantomath: College Inquiry Chatbot" 2018.
[3] Google Cloud Dialogflow Documentation
[4] Node.js Documentation

Acknowledgements

I'd like to thank the School of Sciences, Sustainability, and Health for sponsoring this project.
Thanks to INBRE for its ongoing support of our research.
Most importantly, thanks to Dr. Meena Vimal Cruz and Dr. Sibi Chakkaravarthy for advising me on this project.