Introduction

This project is a functional Frequently Asked Questions (FAQ) window, designed for a New Orleans nonprofit organization called Families Helping Families (FHF). The window receives a user question and transforms it into a discrete vector, which it can compare to other vector-questions set by the staff at FHF. It will return a question-answer pair most similar to the user’s inquiry.

Problem statement

FHF has a small staff and serves a large population. The primary goal of this organization is to assist families in the Greater New Orleans area by “providing information and referral, training and education, and peer-to-peer support on issues related to disability.” The ability of staff to communicate on an individual basis with clients is precious and limited. The organization requested a tool to mitigate client phone calls by answering the most basic questions regarding educational resources and legal processes on the website.

Methods

Before the window’s final deployment, several tests were run that compared the efficacy of various question-matching models. In order to run these tests, the group developed several paraphrases of frequently asked questions to test the ability of the window to match questions correctly. Once a model was chosen, the group went through some fine-tuning experimentation that optimized the success rate of the answer retriever.

Paraphrase Generation

The group was provided with 50 sample FAQ questions from FHF, from which 10 representative questions were chosen based on their unique syntax. For each of the 10 questions, 5 paraphrased “variations” were created organically, with changes to sentence order, word choice, and question length. Each time, the meaning of the question was preserved.

Language Models

In initial phases of the project, 4 unique language processing approaches were experimented with and tested:

- Binary Vectorization
- Term Frequency Inverse Document Frequency (TFIDF) Vectorization
- “SpaCy” Natural Language Processing Pipeline
- Bidirectional Encoder Representations from Transformers (BERT)

Each model was given the chance to match 50 paraphrases to their “correct” counterpart in the FAQ database. The efficacy of each model’s ability to do so is represented in the chart below. It is important to note that each model utilized a vectorization process of some kind, calculating the cosine similarity between the user’s vector and all database vectors to determine the best answer. It is the process of creating this vector that differed between models.

Discussion

The intention of this project is not to completely solve a problem. Nonprofit employees are near ubiquitously overworked and under-resourced, and a coding project (likely) won’t ever change that. The intention of this project also is not to replace the human conversations which make FHF so effective in the service of their community. This project is an application of existing technology to help an organization more efficiently conduct its day-to-day operations, and to leave more employee time allocated to the complex and essential conversations that make FHF so effective in the service of their community. This project is an application of existing technology to help an organization more efficiently conduct its day-to-day operations, and to leave more employee time allocated to the complex and essential conversations that make FHF so effective in the service of their community.

References