

Computer Science Capstone Topic Approval Form

The purpose of this document is to help you clearly explain your capstone topic, project scope, and timeline. Identify each of these areas so that you will have a complete and realistic overview of your project. Your instructor cannot sign off on your project topic without this information.

Note: You must fill out and submit this form. Space beneath each number will expand as needed.

Note: Any costs associated with developing the application will be the responsibility of the student.

INFORM INSTRUCTOR:

Potential use of proprietary company information: (Y/N)

No. There will be no use of proprietary information in this document or machine learning project.

ANALYSIS:

1. Project topic and description:

Topic: Racism on a social media discussion platform

Description:

With the rise in competitors to social media platforms such as Twitter, some platforms may feel it is important to maintain a safe and inclusive environment for all their users. Our client will be a fictional social media platform that is trying to rival Twitter and is looking to create a safe and inclusive environment for all its users. Similar to Twitter, the company has a social media platform that allows its users to create text posts that can be seen by other users. The company needs a solution that can automatically detect and remove/hide offensive posts, reducing the amount of unwanted hate speech their users see on their platform.

This project will focus on creating a machine-learning model that can detect racism in social media posts. The model will be trained on a dataset of social media posts from Twitter that have been labeled as whether or not they contain any offensive racist material. The model will then be used to create a web application that will demo the machine learning model's capabilities by allowing users to post tweet-like posts to a central timeline that flags posts depending on their content. This will allow social media platforms to automatically detect and remove/hide offensive posts, reducing the amount of hate speech on their platforms. The timeline will by default hide posts that are flagged as offensive, but users will be able to toggle the visibility of these posts.



The machine learning model utilizes Natural Language Processing (NLP) to analyze the words, phrases, and sentences for sentiment analysis. The goal is to create a model that can classify and predict with a high degree of accuracy of at least 90% whether a short text post contains racism or not. Ideally, the machine learning service should also fail to classify posts at a rate of less than 25%. Since hiding offensive posts is the number one priority, the model can have a false positive (post is falsely labeled as offensive) rate of less than 25% but a false negative (falsely labeled as safe) rate of 15%.

2. Project purpose and goals:

The purpose of the project is to create a machine-learning model that can detect racism in offensive social media posts. This would allow the social media platform to automatically detect and remove/hide offensive posts, reducing the amount of hate speech on their platforms. Since the social media platform is marketing to users who want a safe environment for discussion, hiding offensive posts by default for users will likely increase engagement and time spent on the platform. The goal is to create a model integrated into a system that can accurately hide offensive posts on the platform.

3. Descriptive method:

The project will implement decision tree classification as the descriptive method to train on the dataset. This would allow the model to classify and predict with a high degree of accuracy whether a short text post contains racism or not.

4. Predictive or prescriptive method:

The project will utilize a classification model to predict whether a social media post contains racist or offensive material. It should be able to predict with a high degree of accuracy whether a short text post contains racism or not. The model should receive a string input of the social media post's text and return out a binary classification that will be shown to users via a frontend web application. From the model's predictions, the web application will be able to toggle hide posts that are flagged as offensive. The user will by default not read offensive posts but will be able to toggle the visibility of these posts.

DESIGN and DEVELOPMENT:

1. Computer science application type (select one):
 - Mobile (indicate Apple or Android)
 - Web
 - Stand-alone

The project will be a web application.

2. Programming/development language(s) you will use:



Machine Learning Model:

- Python
- Sci-kit Learn
- Pandas

Backend:

- Python
- FastAPI

Frontend:

- TypeScript
- Next.js
- Tailwind CSS

3. Operating system(s) or platform(s) you will use:

Operating Systems:

Any operating system that features a modern web browser will be able to access the web application.

The machine learning model will be trained and deployed on a Linux-based operating system.

Platforms:

- Vercel for front-end hosting
- Railway for back-end hosting

Vercel was chosen as the hosting platform for the front-end for its integration with Next.js and its free hosting tier for small projects will be sufficient for the scope of this project.

Railway was chosen as the hosting platform for the back end for its intuitive deployment/monitoring process as well as its compatibility with different frameworks.

4. Database Management System you will use:

- Postgres on Vercel DB

Postgres on Vercel DB was chosen for its cheap cost and ease of use. With a SQL interface, it will be a simple task to store and retrieve social media posts.

5. Estimated number of hours for the following:

- Planning and design: 20 hours
- Development: 50 hours
- Documentation: 10 hours
- Total: 80 hours

6. Projected completion date:

04/19/2024




IMPLEMENTATION and EVALUATION:

1. Describe how you will approach the execution of your project.

The project will be executed in the following steps:

1. Data Collection: Utilize a dataset of social media posts from Twitter that have been labeled on whether they contain any offensive racist material.
2. Data Preprocessing: Clean the data and prepare it for training.
3. Model Training: Using Pandas and Scikit-learn, train a machine learning model to detect racism in social media posts.,
4. Model Evaluation: Evaluate the model's performance using a test dataset.
5. Model Deployment: Create and deploy a backend FastAPI application that will serve as an API to the machine learning model.
5. Web Application Development: Create a frontend Next.js application that will demo the machine learning model's capabilities.
6. Documentation: Document the project and its development process.

☒ **This project does not involve human subjects research and is exempt from WGU IRB review.**

STUDENT'S SIGNATURE

By signing and submitting this form, you acknowledge that any costs associated with the development and execution of the application will be your (the student's) responsibility.



Charles Paddock

INSTRUCTOR'S SIGNATURE:

INSTRUCTOR APPROVAL DATE: 3/18/2024



