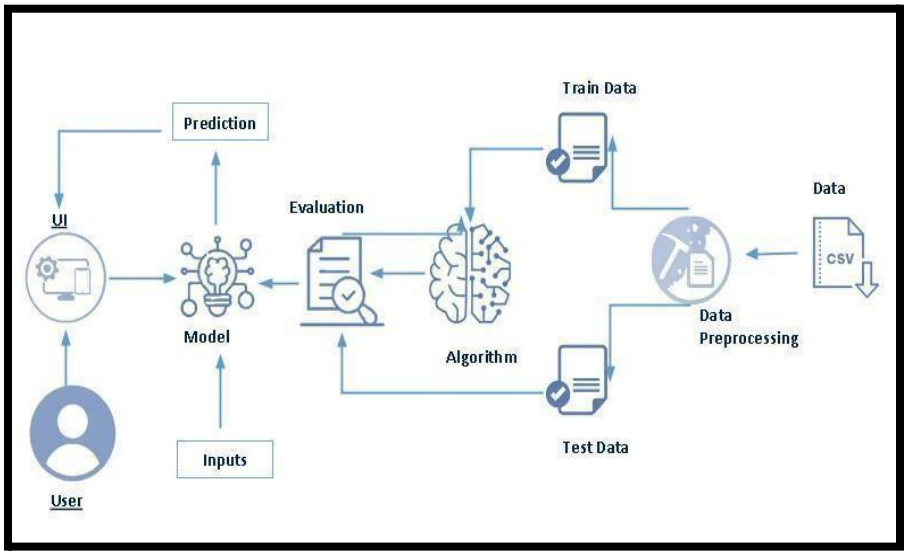
Optimizing Spam Filtering with Machine Learning

Over recent years, as the popularity of mobile phone devices has increased, Short Message Service (SMS) has grown into a multi-billion dollar industry. At the same time, reduction in the cost of messaging services has resulted in growth in unsolicited commercial advertisements (spams) being sent to mobile phones. Due to Spam SMS, Mobile service providers suffer from some sort of financial problems as well as it reduces calling time for users. Unfortunately, if the user accesses such Spam SMS they may face the problem of virus or malware. When SMS arrives at mobile it will disturb mobile user privacy and concentration. It may lead to frustration for the user. So Spam SMS is one of the major issues in the wireless communication world and it grows day by day.

To avoid such Spam SMS people use white and black list of numbers. But this technique is not adequate to completely avoid Spam SMS. To tackle this problem it is needful to use a smarter technique which correctly identifies Spam SMS. Natural language processing technique is useful for Spam SMS identification. It analyses text content and finds patterns which are used to identify Spam and Non-Spam SMS.

Technical Architecture:



Project Flow:

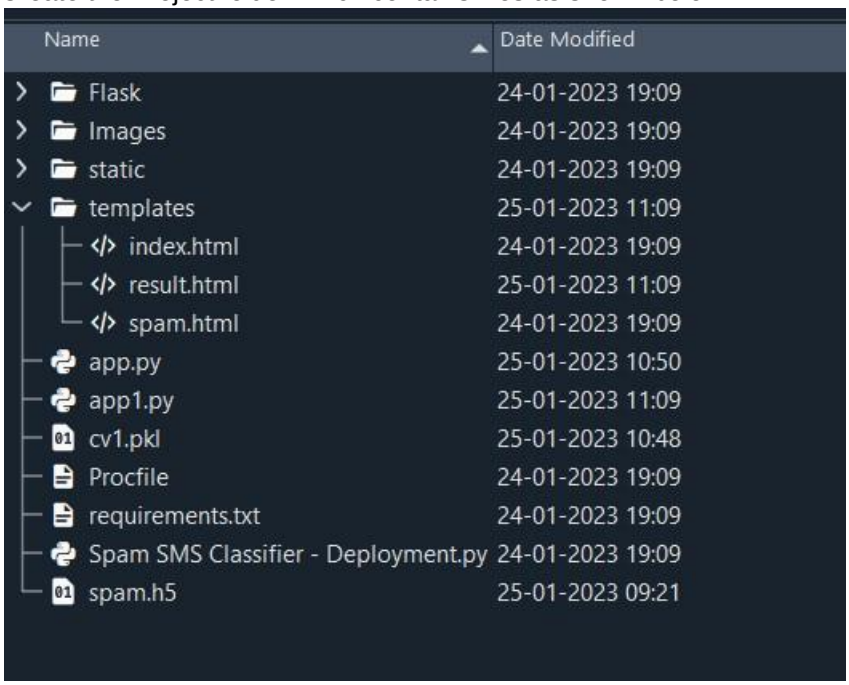
- User interacts with the UI to enter the input.
- Entered input is analysed by the model which is integrated.
- Once model analyses the input the prediction is showcased on the UI

To accomplish this, we have to complete all the activities listed below,

- Define Problem / Problem Understanding
  - Specify the business problem
  - Business requirements
  - Literature Survey
  - Social or Business Impact.
- Data Collection & Preparation
  - Collect the dataset
  - Data Preparation
- Exploratory Data Analysis
  - Descriptive statistical
  - Visual Analysis
- Model Building
  - Training the model in multiple algorithms
  - Testing the model
- Performance Testing & Hyperparameter Tuning
  - Testing model with multiple evaluation metrics
  - Comparing model accuracy before & after applying hyperparameter tuning
- Model Deployment
  - Save the best model
  - Integrate with Web Framework
- Project Demonstration & Documentation
  - Record explanation Video for project end to end solution
  - Project Documentation-Step by step project development procedure

Project Structure:

Create the Project folder which contains files as shown below



- We are building a flask application which needs HTML pages stored in the templates folder and a python script app.py for scripting.
- Spam.h5 is our saved model. Further we will use this model for flask integration.

Milestone 1: Define Problem / Problem Understanding

Activity 1: Specify the business problem

Refer Project Description

Activity 2: Business requirements

A business requirement for an SMS spam classification system would include the ability to accurately identify and flag spam messages, protect customers from unwanted or harmful messages, and comply with industry regulations and laws regarding spam messaging. Additionally, the system should be able to handle a high volume of messages, integrate with existing systems and databases, and provide reporting and analysis capabilities to track performance and improve the system over time. The system should also have an easy-to-use interface and be easy to maintain and update.

Activity 3: Literature Survey (Student Will Write)

project would involve researching and analysing existing studies, papers, and articles on the topic to gain a thorough understanding of the current state of SMS spam classification and to identify potential areas for improvement and future research. The survey would include looking at different methods and techniques used for identifying and flagging spam messages, such as machine learning algorithms, natural language processing, and rule-based systems. It would also involve evaluating the performance and effectiveness of these methods, as well as their limitations and challenges. Additionally, the literature survey would review the current state of SMS spam and trends in the industry, as well as any existing laws and regulations related to spam messaging. The survey would also investigate the datasets and feature representations used in previous studies, which would help to determine the best approach for the current project. Furthermore, It would be important to check the pre-processing techniques used in the research to understand how to properly clean and prepare the data for the classifier

.Activity 4: Social or Business Impact.

Social Impact:- it can help protect individuals from unwanted and potentially harmful messages. Spam messages can include phishing attempts, scams, and fraud, which can have serious financial and personal consequences for recipients. By accurately identifying and flagging spam messages, the system can help prevent these types of attacks and protect individuals from falling victim to them.

Business Model/Impact:- it can help protect their customers and improve their reputation. Spam messages can harm a business's reputation and lead to customer complaints and lost business. By accurately identifying and flagging spam messages, the system can help protect businesses and improve their customer's trust.

Milestone 2: Data Collection & Preparation

ML depends heavily on data. It is the most crucial aspect that makes algorithm training possible. So this section allows you to download the required dataset.