E-Mail Spam Classification

YZV 311E Term Project Proposal

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***Abstract*—This documents is the project proposal for the YZV 311E Data Mining course term project. It is about an E-Mail classification model using techniques like Natural Language Processing. It is being held by Abdullah Bilici and Bora Boyacıoğlu, Istanbul Technical University. Team number is 8.**

***Index Terms*—email, spam, classification, natural language processing**

I. Introduction

In this project, we will generate a classification to classify spam E-Mails.

As the companies do not care about data security and sell people's data to other companies, frauds use this data to send spam E-Mails. These kinds of E-Mails sometimes look very realistic and most of the people think of it as a legitimate E-Mail. They may want people to enter their passwords, share their credit cards, and so on. However, most of the E-Mails are actually not very realistic. Though, sometimes people fall for their traps when they tell the people that they won money.

Therefore, classifying these E-Mails as spam is a critical task for E-Mail companies. There are some easy signs indicating that the E-Mail is spam, but there are also very professional spams. It is hard to separate them from legitimate ones.

One way to do this classification is actually to create a model using already human-classified data and look up the new E-Mails using this model. In the next section, dataset will be introduced.

Our team consists of two members: Abdullah Bilici and Bora Boyacıoğlu. We are both from Istanbul Technical University, Artificial Intelligence and Data Engineering department.

II. Dataset

We are going to be using a dataset from Kaggle. It is called **Email Spam Classification** (Harsh Sinha, 2020) [1] and contains basic E-Mail messages alongside a category *(spam/ham)*. Therefore, it only has two features: Text *(str)* and Spam *(bool)*. It contains 5728 values and has *8.95 MB* size. It uses *CSV* format.

All of the rows have a value **1** or **0** indicating whether the given E-Mail is spam or legitimate, and the message (content) of the E-Mail. Randomly selected six rows of the dataset are given in Table I.

TABLE I
E-Mail Classification Dataset

Text	**Spam**
subject : naturally irresistible your corporate identity lt is really hard to recollect a company : the market is full of suqgestions…	True
subject : greatly improve your stamina the longz system , both the capsules and the free instructional manual , give you the…	True
subject : new basis report bhavna : the basis report has been updated to cover 2000 prices . it is called basisnw 7 . xls and…	False
subject : localized software , all languages available . hello , we would like to offer localized software versions qerman , …	True
subject : approval for reviewer krishnarao , pinnamaneni v has suggested reviewers and submitted them for your approval . …	False
subject : research prc next steps the pep system is no longer available to accept feedback from reviewers . if necessary , …	False

III. Methodology

In this section, we outline a high-level methodology for building our email spam classifier. We'll provide an overview of the essential steps in our approach.

A. Text Preprocessing

To prepare the data for modeling, we will perform text preprocessing. This includes standardization tasks like removing special characters, converting text to lowercase, and tokenization. Additionally, we need to solve the issue of class imbalance.

B. Feature Engineering

In feature engineering, we will transform the preprocessed text data into a numerical format suitable for modeling. We will create feature vectors or representations that capture essential information from the emails.

C. Data Splitting

We will split our dataset into a training set and a testing set. This division is essential for assessing the performance of our classifier.

D. Model Selection and Training

We will select and train a machine learning model suitable for text classification. The training process involves teaching the model to distinguish between spam and ham emails.

IV. Evaluation Methods

In our evaluation process, we will assess the success of our email spam classification project using the following steps:

A. Performance Metrics

We will employ standard evaluation metrics such as accuracy, precision, recall, F1-score, and AUC-ROC to measure the effectiveness of our models.

B. Algorithm Selection

We will experiment with different algorithms. We consider the following algorithms for email classification:

- Naive Bayes
- Logistic Regression
- Random Forest
- Support Vector Machines (SVM)

Our project's success will be judged based on the ability of the chosen algorithm to outperform the baseline model and achieve high performance metrics. The goal is to develop an effective and accurate email spam classification solution.

V. GitHub Repository

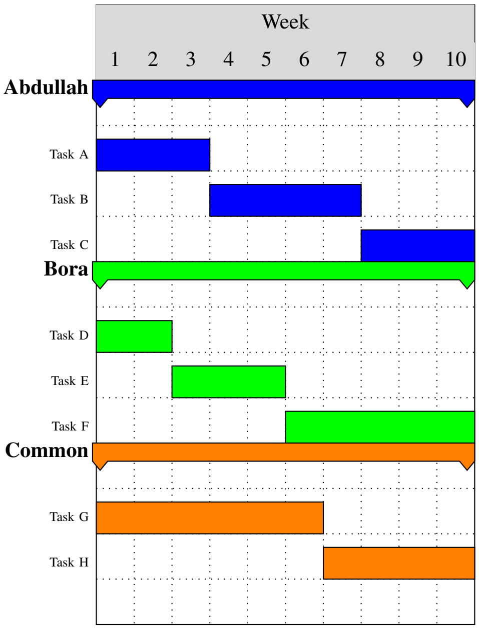
You can access our Github repository using this link: https://github.com/abdullahbilici/E-mail-Spam-Classification.

We have already sent invitations to teaching assistants. So, they will be able to see our progress. We also wanted to share the Personal Access Token for our repository: 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

We are going to be updating the file `Progress.txt` in order to show our progress.

VI. Time Plan & Distribution of Work

TABLE II
Timeline and Work Distribution



In this section, create a timeline or Gantt chart to outline the project's schedule. Define key milestones and deadlines, including dates for data collection, preprocessing, model development, and testing. Additionally, specify how the work will be distributed among the team members. Describe the roles and responsibilities of each team member, emphasizing their individual contributions to the project's success. Each team member should describe his/her subproject by indicating his/her contribution to solve the problem.

VII. Conclusion

Summarize the main points of your proposal, highlighting the importance of your project and the potential impact it could have. Reiterate the problem, objectives, and your plan for addressing it. End with a clear call to action, emphasizing the significance of the project for the intended audience.

References

[1] Harsh Sinha, Email Spam Classification, 2020, Kaggle https://www.kaggle.com/code/harshsinha1234/email-spam-classification-nlp/input