Email Spam Prediction

Web App by using Machine Learning and Flask with Python

Abstract:

This project aims to develop a web application for predicting email spam based on machine learning algorithms. The application utilizes Flask, a Python micro-web framework, to create a user-friendly interface and leverages machine learning libraries such as scikit-learn and joblib for predictive modeling.

The project follows a systematic approach:

1. Prerequisites: Ensure Python and pip are installed, and install Visual Studio Code.
2. Create a virtual environment to manage dependencies.
3. Install necessary Python packages: Flask, joblib, and scikit-learn.
4. Develop and run the application using the **app.py** file.
5. Test the system with sample emails.

The application uses a machine learning model trained on a dataset of emails labeled as spam or not spam. The model calculates a probability for each email, and the prediction is based on the probability threshold:

- If **prediction Probability** is 0% then **Prediction** will be Spam.
- If **prediction Probability** is 100% then **Prediction** will be Not Spam.

Prerequisites and Procedures:

1. **Python:**
   Ensure that Python is installed on your system. You can download the latest version of Python from the official Python website.
2. **Pip:**
   Pip is the package installer for Python. It Usually comes with Python installations, but it's a good idea to makes sure it's up-to-date. You can upgrade pip using the following command:

   ```
   pip install --upgrade pip
   ```

3. **Install Visual Studio Code:**
   Make sure you have Visual Studio Code installed on your system. You can download it from the Official website.
4. **Open a Python Project Folder:**

Open a Python Project Folder containing **Email Spam Prediction System** in Visual Studio Code. This is necessary to activate the Python extension.

5. **Create Virtual Environment:**
   Open the integrated terminal in Visual Studio Code (you can use **Ctrl+`` or go to** View > Terminal`). In the terminal, navigate to the location where you want to create the virtual environment.
   Run the following command to create a virtual environment:

   ```
   python -m venv venv
   ```

   Here, **venv** is the name of the virtual environment. You can choose a different name if you prefer.
6. **Activate the Virtual Environment:**
   After creating the virtual environment, you need to activate it. In the terminal, run the appropriate activation command based on your operating system:

- **On Windows:**

  ```
  .\venv\Scripts\activate
  ```

- **On macOS/Linux:**

  ```
  source venv/bin/activate
  ```

  Once activated, you should see the virtual environment name in your terminal prompt.

7. **Install Dependencies:**
   While the virtual environment is activated, you can install Python packages using **pip**. Such as flask, joblib, and scikit-learn by using the following commands:

- **Install flask:**

  ```
  pip install flask
  ```

- **Install joblib:**

  ```
  pip install joblib
  ```

- **Install scikit-learn :**

  ```
  pip install scikit-learn
  ```

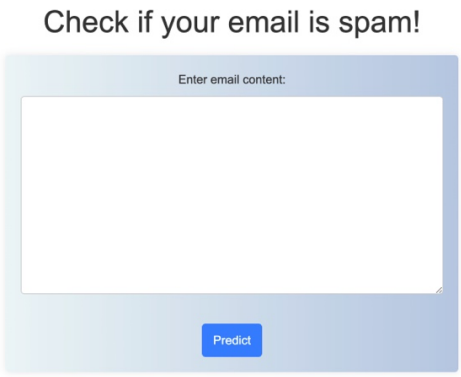
  After installed the necessary packages and dependencies for the Email Spam Prediction System app is ready to execute.

8. **Run the App:**
   If you have installed the necessary packages and dependencies for your Email Spam Prediction System app, you can proceed with developing and running your application. Run the following command to Run the app.py file:

   Python app.py

   After executed the Email Spam Prediction System Web app using machine learning and flask with python is successful show the running localhost port for you such like **http://127.6.8.9:5000**.

   Sample Output:



   The Output of Prediction Result will show you two labels such as prediction Probability and **Prediction.**

- If **prediction Probability** is 0% then **Prediction** will be Spam.
- If **prediction Probability** is 100% then **Prediction** will be Not Spam.

9. **Test Email Spam Prediction System with Sample mails are pinned below:**

Spam:
Subject: photoshop , windows , office . cheap .
main trending abasements darer prudently fortuitous undergone lighthearted charm orinoco taster railroad affluent pornographic cuvier irvin parkhouse blameworthy chlorophyll robed diagrammatic fogarty clears bayda inconveniencing managing represented smartness hashish academies shareholders unload badness danielson pure caffein spaniard chargeable levin

Not Spam:
Subject: neon retreat
ho ho ho , we ' re around to that most wonderful time of the year - - - neon leaders retreat time !
i know that this time of year is extremely hectic , and that it ' s tough to think about anything past the holidays , but life does go on past the week of december 25 through january 1 , and that ' s what i ' d like you to think about for a minute .
on the calender that i handed out at the beginning of the fall semester , the retreat was scheduled for the weekend of january 5 - 6 . but because of a youth ministers conference that brad and dustin are connected with that week , we ' re going to change the date to the following weekend , january 12 - 13 . now comes the part you need to think about .
i think we all agree that it ' s important for us to get together and have some time to recharge our batteries before we get to far into the spring semester , but it can be a lot of trouble and difficult for us to get away without kids , etc . so , brad came up with a potential alternative for how we can get together on that weekend , and then you can let me know which you prefer .
the first option would be to have a retreat similar to what we ' ve done the past several years . this year we could go to the heartland country inn (www . . com) outside of brenham . it ' s a nice place , where we ' d have a 13 - bedroom and a 5 - bedroom house side by side . it ' s in the country , real relaxing , but also close to brenham and only about one hour and 15 minutes from here . we can golf , shop in the antique and craft stores in brenham , eat dinner together at the ranch , and spend time with each other . we ' d meet on saturday , and then return on sunday morning , just like what we ' ve done in the past .
the second option would be to stay here in houston , have dinner together at a nice restaurant , and then have dessert and a time for visiting and recharging at one of our homes on that saturday evening . this might be easier , but the trade off would be that we wouldn ' t have as much time together . i ' ll let you decide .
email me back with what would be your preference , and of course if you ' re available on that weekend . the democratic process will prevail - - majority vote will rule ! let me hear from you as soon as possible , preferably by the end of the weekend . and if the vote doesn ' t go your way , no complaining allowed (like i tend to do !)
have a great weekend , great golf , great fishing , great shopping , or whatever makes you happy !
bobby

Result will be the binary form either Spam or Not Spam:

- If **prediction Probability** is 0% then **Prediction** will be Spam.
- If **prediction Probability** is 100% then **Prediction** will be Not Spam.