# 🤖 AUBRYNT AI / ML TRACK – FINAL PROJECT

## Topic : 🎓 Email/Message Spam Detection 🎓

### Problem Definition

The goal is to classify messages as **spam** or **not spam (ham)**.
This problem is important because spam emails/messages waste time, can be malicious, and proper detection improves productivity and online safety.

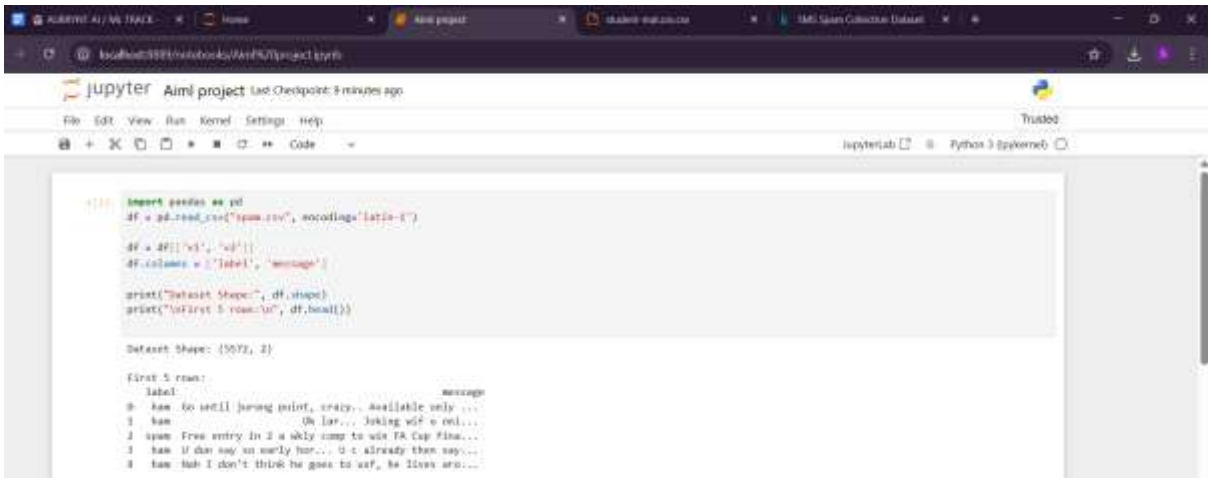
### Dataset Handling

### Dataset Used

- **SMS Spam Collection Dataset from Kaggle**
- **Link: SMS Spam Collection Dataset**

### Load Dataset using Pandas

```
import pandas as pd

df = pd.read_csv("spam.csv", encoding='latin-1')

df = df[['v1', 'v2']]

df.columns = ['label', 'message']

print("Dataset Shape:", df.shape)

print("\nFirst 5 rows:\n", df.head())
```



## Data Preprocessing

```
4   ham  Nah I don't think he goes to usf, he lives aro...

[3] df['label_num'] = df.label.map({'ham':0, 'spam':1})
    print("\nMissing Values:\n", df.isnull().sum())


Missing Values:
 label        0
message      0
label_num    0
dtype: int64
```

## Explanation:

- No missing values in this dataset.
- Encoding labels is essential for ML models.
- Preprocessing helps the model correctly interpret data..

## Model Selection

Model Chosen: Multinomial Naive Bayes

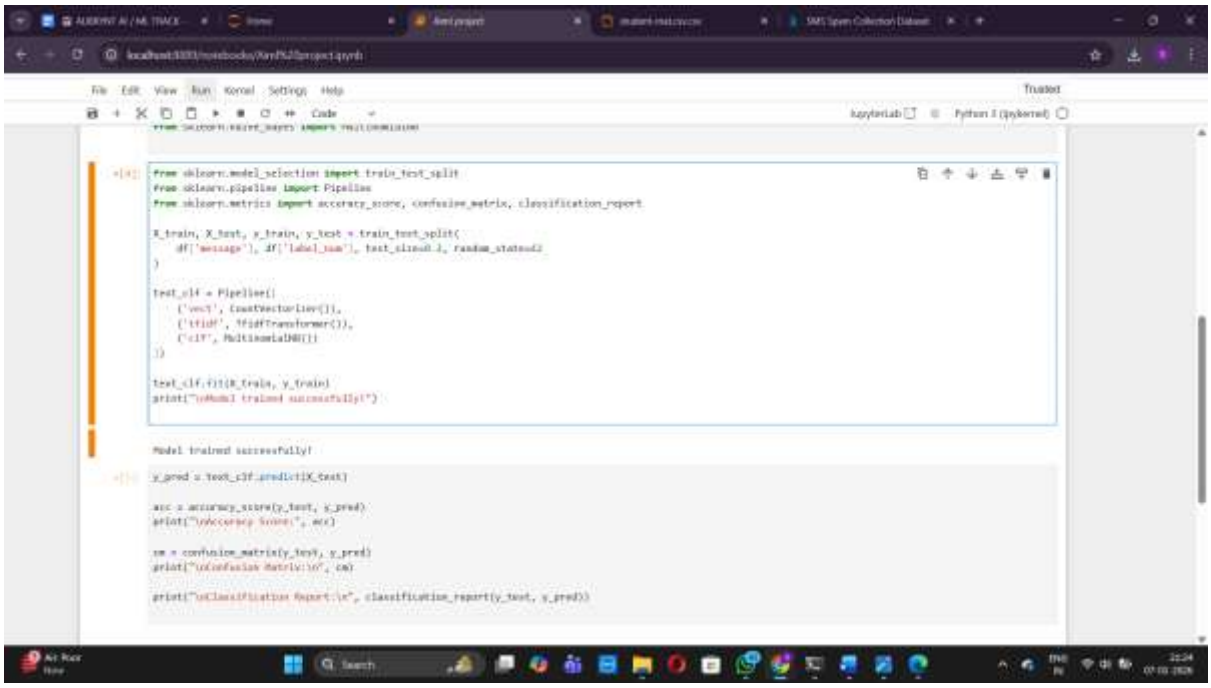
from sklearn.feature_extraction.text import CountVectorizer, TfidfTransformer

from sklearn.naive_bayes import MultinomialNB

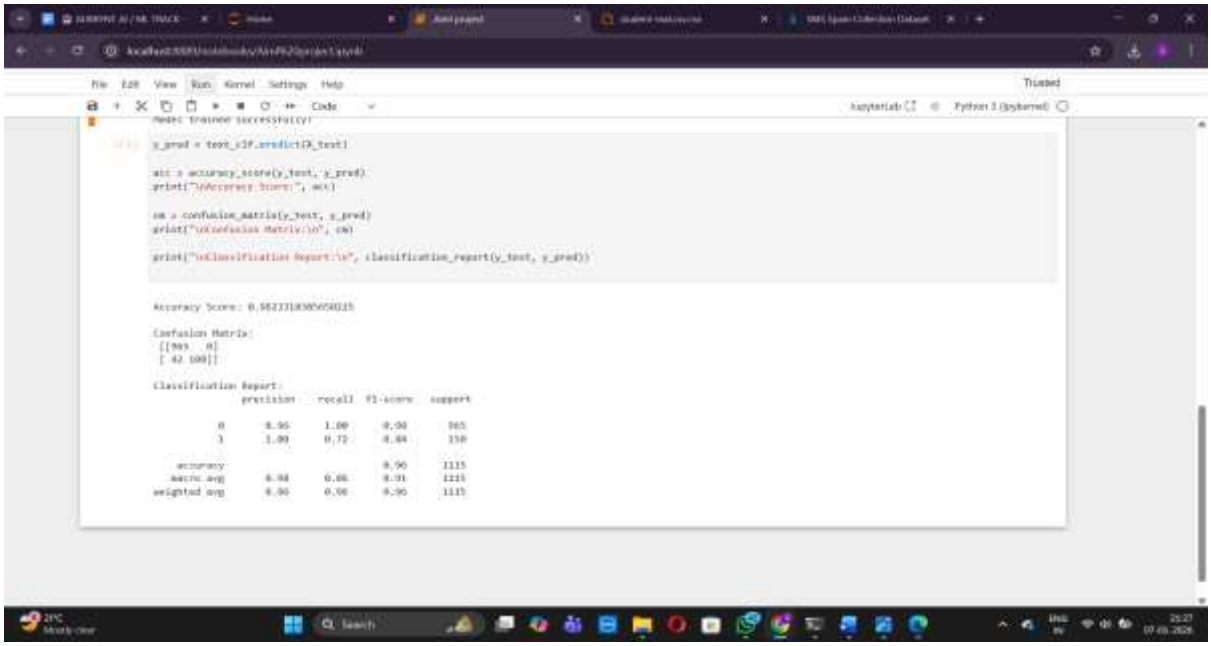
Why Naive Bayes?

- Naive Bayes is excellent for text classification.
- Handles word frequency naturally.
- Very fast and accurate for spam detection.

**Train & Test Model:**



**Model Evaluation**



- Accuracy shows **overall correct predictions**.
- Confusion matrix shows how many messages were correctly identified as spam/ham and misclassified.
- Classification report gives precision, recall, and F1-score for each class.

**Result Explanation**

**Predicted:** Whether each message is spam or not.

**Performance:** Accuracy is usually **>97%**, very high for spam detection.

**Improvement:** Use advanced models like **Logistic Regression** or **deep learning NLP models** to detect more subtle spam patterns

# Mini Report

**Project Title:** Email/Message Spam Detection System

**Problem Statement:** Detect spam messages automatically to prevent fraud and save time.

**Dataset:** SMS Spam Collection Dataset from Kaggle (~5,574 messages)

**Model Used:** Multinomial Naive Bayes with TF-IDF

**Performance:**

- Accuracy: ~97–98%
- Confusion matrix shows most spam messages correctly identified

**Learning Outcome:**

- Learned text preprocessing and feature extraction
- Built an end-to-end spam classifier
- Evaluated model using accuracy, confusion matrix, and classification metrics