### **Begin Building smarter AI power spam loading and preprocessing the dataset**

**In[1]:**

**import numpy as** **np**

*# linear algebra*

**import pandas as** **pd**

*# data processing, CSV file I/O (e.g. pd.read\_csv)*

**from nltk.corpus import** **stopwords import** **nltk**

**nltk.download('stopwords')**

**from sklearn.pipeline import** **Pipeline**

**from sklearn.naive\_bayes import** **BernoulliNB , MultinomialNB , GaussianNB**

**from sklearn.metrics import** **accuracy\_score**

**import** **os**

**for** **dirname, \_, filenames in os.walk('/kaggle/input'):**

**for** **filename in filenames:**

**print(os.path.join(dirname, filename))**

[nltk\_data] Downloading package stopwords to /usr/share/nltk\_data...

[nltk\_data] Package stopwords is already up-to-date!

/kaggle/input/sms-spam-collection-dataset/spam.csv

#### **Understand the spam collection data !**

**In [2]:**

**filepath = '/kaggle/input/sms-spam-collection-dataset/spam.csv'**

**data\_import = pd.read\_csv(filepath , encoding = 'ISO-8859-1')**

**data\_import.head()**

**Out[2]**:

|  | v1 | v2 | Unnamed: 2 | Unnamed: 3 | Unnamed: 4 |
| --- | --- | --- | --- | --- | --- |
| 0 | ham | Go until jurong point, crazy.. Available only ... | NaN | NaN | NaN |
| 1 | ham | Ok lar... Joking wif u oni... | NaN | NaN | NaN |
| 2 | spam | Free entry in 2 a wkly comp to win FA Cup fina... | NaN | NaN | NaN |
| 3 | ham | U dun say so early hor... U c already then say... | NaN | NaN | NaN |
| 4 | ham | Nah I don't think he goes to usf, he lives aro... | NaN | NaN | NaN |

### **Preprocessing !**

### **In [3]:**

**df = data\_import.drop(['Unnamed: 2' , 'Unnamed: 3' , 'Unnamed: 4'] , axis1)**

**df.head()**

**Out[3]:**

|  | v1 | v2 |
| --- | --- | --- |
| 0 | ham | Go until jurong point, crazy.. Available only ... |
| 1 | ham | Ok lar... Joking wif u oni... |
| 2 | spam | Free entry in 2 a wkly comp to win FA Cup fina... |
| 3 | ham | U dun say so early hor... U c already then say... |
| 4 | ham | Nah I don't think he goes to usf, he lives aro... |

**In [4]:**

*### Removing stopwords from the feature column.*

**sw = stopwords.words('english')**

**def** **stopword(text) :**

**txt = [word.lower()**

**for word in text.split()**

**if word.lower() not in sw]**

**return** **txt**

**df['v2'] = df['v2'].apply(stopword)**

**df.head()**

**Out[4]:**

|  | v1 | v2 |
| --- | --- | --- |
| 0 | ham | [go, jurong, point,, crazy.., available, bugis... |
| 1 | ham | [ok, lar..., joking, wif, u, oni...] |
| 2 | spam | [free, entry, 2, wkly, comp, win, fa, cup, fin... |
| 3 | ham | [u, dun, say, early, hor..., u, c, already, sa... |
| 4 | ham | [nah, think, goes, usf,, lives, around, though] |

### **Stemming**

### **In [5]:**

**from nltk.stem.snowball**

**import** **SnowballStemmer**

**ss = SnowballStemmer("english")**

**def** **stemming(text) :**

**text = [ss.stem(word)**

**for word in text**

**if word.split()]**

**return "".****join(text)**

**df['v2'] = df['v2'].apply(stemming)**

**In [6]:**

**df.head()**

**Out[6]:**

|  | v1 | v2 |
| --- | --- | --- |
| 0 | ham | gojurongpoint,crazy..availbugingreatworldlaebu... |
| 1 | ham | oklar...jokewifuoni... |
| 2 | spam | freeentri2wklicompwinfacupfinaltkts21stmay2005... |
| 3 | ham | udunsayearlihor...ucalreadisay... |
| 4 | ham | nahthinkgoeusf,livearoundthough |

**In [7]:**

### TF-IDF { Term Frequency , Inverse Document Frequency }

**from sklearn.feature\_extraction.text**

**import** **TfidfVectorizer**

**tfid\_vect = TfidfVectorizer()**

# Extract the tfid representation matrix of the test data.

tfid\_matrix = tfid\_vect.fit\_transform(df['v2'])

**print(f"Type :{type(tfid\_matrix)} , Matrix at 0 : {tfid\_matrix[0]} , Shape : {tfid\_matrix.shape}")**

Type :<class 'scipy.sparse.\_csr.csr\_matrix'> , Matrix at 0 : (0, 1827) 0.5056391989470028

(0, 1030) 0.5056391989470028

(0, 2166) 0.48268727087494234

(0, 3635) 0.5056391989470028 , Shape : (5572, 12124)

**In [8]:**

# Collect sparse matrix into dense

**array = tfid\_matrix.todense()**

**In [9]:**

**df1 = pd.DataFrame(array)**

**df1[df1[10] != 0].head()**

**Out[9]:**

|  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ... | 12114 | 12115 | 12116 | 12117 | 12118 | 12119 | 12120 | 12121 | 12122 | 12123 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 12 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5285 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

2 rows × 12124 columns

**In [10]:**

**df1['v1'] = df['v1']**

**In [11]:**

**df1.head()**

**Out[11]:**

|  | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **...** | **12115** | **12116** | **12117** | **12118** | **12119** | **12120** | **12121** | **12122** | **12123** | **v1** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ham |
| 1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ham |
| 2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | spam |
| 3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ham |
| 4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ham |

5 rows × 12125 columns

**In [12]:**

**from sklearn.model\_selection**

**import** **train\_test\_split**

**features = df1.drop('v1' , axis = 1)**

**label = df1['v1']**

**x\_train , x\_test , y\_train , y\_test = train\_test\_split(features , label , test\_size = 0.3)**

**print(f"X train shape : {x\_train.shape}\nY train shape : {y\_train.shape}\nX test shape : {x\_test.shape}\nY test shape : {y\_test.shape}")**

**X train shape : (3900, 12124)**

**Y train shape : (3900,)**

**X test shape : (1672, 12124)**

**Y test shape : (1672,)**

**In [13]:**

**ber\_pipe = Pipeline(steps = [( 'ber\_model' ,** **BernoulliNB())])**

**multi\_pipe = Pipeline(steps = [('multi\_model' ,** **MultinomialNB())])**

**guass\_pipe = Pipeline(steps = [('guass\_model' ,** **GaussianNB())])**

**In [14]:**

**def** **model\_evaluation(model) :**

**model.fit(x\_train , y\_train)**

**y\_pred\_model = model.predict(x\_test)**

**acc\_score = accuracy\_score(y\_test , y\_pred\_model)**

**print(f"Accuracy Score of {model[0]} : {acc\_score}")**

**model\_evaluation(ber\_pipe)**

**model\_evaluation(multi\_pipe)**

**model\_evaluation(guass\_pipe)**

**Accuracy Score of BernoulliNB() : 0.8947368421052632**

**Accuracy Score of MultinomialNB() : 0.9204545454545454**

**Accuracy Score of GaussianNB() : 0.46411483253588515**