

#### Assignment -4

## SMS SPAM Classification

Assignment Date	04 November 2022
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Student Roll Number	211419205104
Maximum Marks	2 Marks

### Question-1:

Download the dataset

### Question-2:

Import required library

#### Solution

```
import nltk
import pandas as pd
import re
from nltk.corpus import stopwords
from nltk.stem.porter import PorterStemmer
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.model_selection import train_test_split
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
```



The screenshot shows a Jupyter Notebook cell with the following code:

```
Q Import necessary libraries
{x}
[ ] import nltk
import pandas as pd
import re

[ ] from nltk.corpus import stopwords
from nltk.stem.porter import PorterStemmer

[ ] from sklearn.feature_extraction.text import CountVectorizer

[ ] from sklearn.model_selection import train_test_split

[ ] from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
```

The cell has a play button icon indicating it is executable. The code is displayed in a light gray background, while the cell header and other parts of the interface are white.

### Question-3:

Read dataset and do pre-processing

#### Solution

```
data=pd.read_csv('/content/drive/MyDrive/assignment 4/spam.csv',encoding='latin')
```

```

nltk.download('stopwords')
ps=PorterStemmer()
input=[]
for i in range(0,5572):
    review=data['v2'][i]
    review=re.sub('[^a-zA-Z]',' ',review)
    review=review.lower()
    review=review.split()
    review=[ps.stem(word) for word in review if not word in set(stopwords.words('english'))]
    review=' '.join(review)
    input.append(review)
cv=CountVectorizer(max_features=7000)
x=cv.fit_transform(input).toarray()
y=data['v1'].values
x_train,x_test,y_train,y_test= train_test_split(x,y,test_size=0.2)

```

Read dataset

```
[ ] data=pd.read_csv('/content/drive/MyDrive/assignment_4/spam.csv',encoding='latin')
```

Preprocessing

```
[ ] nltk.download('stopwords')
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data] Package stopwords is already up-to-date!
True
```

```
[ ] ps=PorterStemmer()
input=[]

[ ] for i in range(0,5572):
    review=data['v2'][i]
    review=re.sub('[^a-zA-Z]',' ',review)
    review=review.lower()
    review=review.split()
    review=[ps.stem(word) for word in review if not word in set(stopwords.words('english'))]
    review=' '.join(review)
    input.append(review)
```

Activate Windows  
Go to Settings to activate Windows.

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```
[ ] cv=CountVectorizer(max_features=7000)

[ ] x=cv.fit_transform(input).toarray()
x
```

```
array([[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]])
```

```
[ ] y=data['v1'].values
y
```

```
array(['ham', 'ham', 'spam', ..., 'ham', 'ham', 'ham'], dtype=object)
```

x.shape

```
(5572, 6221)
```

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```
[ ] x_train,x_test,y_train,y_test= train_test_split(x,y,test_size=0.2)
```

#### Question-4:

Create Model

### Solution

```
model=Sequential()
```

### Question-5:

Add Layers (LSTM, Dense-(Hidden Layers), Output)

### Solution

```
model.add(Dense(units=6221,activation='relu'))  
model.add(Dense(units=7000,activation='relu'))  
model.add(Dense(units=1,activation='sigmoid'))
```

The screenshot shows a Jupyter Notebook interface. At the top, there are tabs for '+ Code' and '+ Text'. Below the tabs, the text 'Create model' is visible. The main area contains the following code:

```
[ ] model=Sequential()  
  
Add layers  
  
Input layer  
  
[ ] model.add(Dense(units=6221,activation='relu'))  
  
Hidden layer  
  
[ ] model.add(Dense(units=7000,activation='relu'))  
  
Output layer  
  
[ ] model.add(Dense(units=1,activation='sigmoid'))
```

At the bottom right of the interface, there is a watermark that says 'Activate Windows' and 'Go to Settings to activate Windows.'

### Question-6:

Compile The Model

### Solution

```
model.compile(optimizer='adam',loss='binary_crossentropy',metrics=['accuracy'])
```

The screenshot shows a Jupyter Notebook interface. At the top, the text 'Compile the model' is visible. The main area contains the following code:

```
[ ] model.compile(optimizer='adam',loss='binary_crossentropy',metrics=['accuracy'])
```

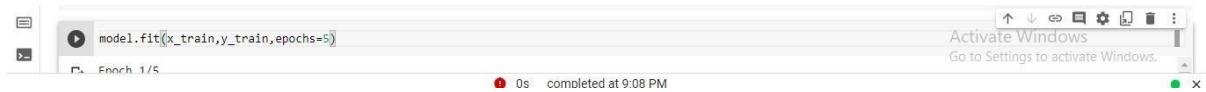
At the bottom right of the interface, there is a watermark that says 'Activate Windows' and 'Go to Settings to activate Windows.'

### Question-7:

Fit The Model

### Solution

```
model.fit(x_train,y_train,epochs=5)
```



```
model.fit(x_train,y_train,epochs=5)
Epoch 1/5
```

### Question-7:

Save The Model

#### Solution

```
model.save("Flowers.h5")
```

Fit the model

```
[ ] model.save('spam.h5')
```