

Assignment -4

SMS SPAM Classification

Assignment Date	22 October 2022
Student Name	Priyanka K
Student Roll Number	211419205132
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 interface with a search bar at the top containing the text "Import necessary libraries". Below the search bar, there are five code cells, each containing a set of import statements. The first cell imports nltk, pandas as pd, and re. The second cell imports stopwords from nltk.corpus and PorterStemmer from nltk.stem.porter. The third cell imports CountVectorizer from sklearn.feature_extraction.text. The fourth cell imports train_test_split from sklearn.model_selection. The fifth cell imports Sequential from tensorflow.keras.models and Dense from tensorflow.keras.layers. The notebook interface includes a left sidebar with a search icon, a file explorer icon, and a code editor icon. The code editor shows the code for the first cell, and the other cells are collapsed. The output area at the bottom is empty.

```
Import necessary libraries

[ ] 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
```

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)
```

0s

completed at 8:54 PM

Activate Windows

Go to Settings to activate Windows.

```
[ ] 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)

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

Activate Windows

Go to Settings to activate Windows.

Question-4:

Create Model

Solution

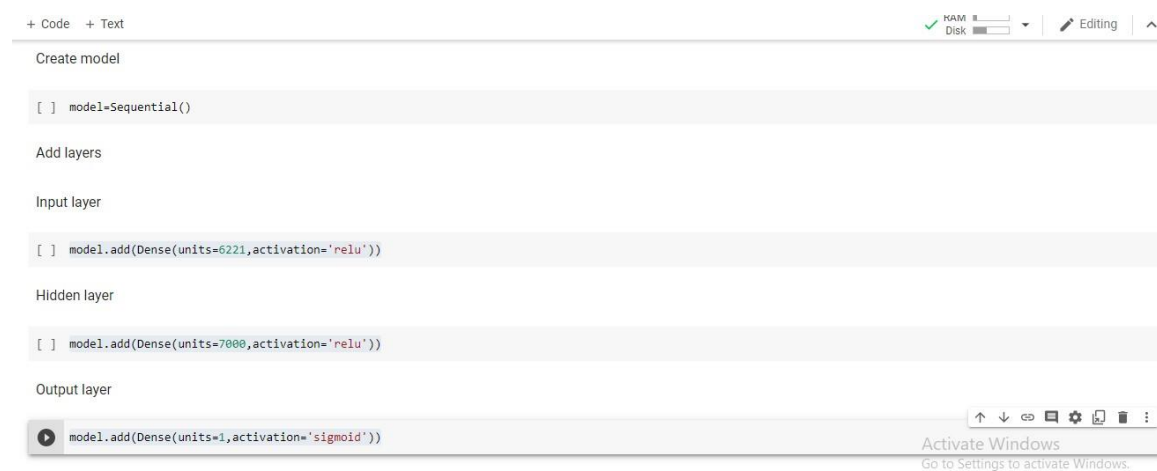
```
model=Sequential()
```

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 code editor with a toolbar at the top containing '+ Code', '+ Text', 'RAM', 'Disk', 'Editing', and an upward arrow. The editor content is as follows:

```
Create model

[ ] 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 editor, there is a watermark that says 'Activate Windows 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 code editor with a toolbar at the top containing 'RAM', 'Disk', 'Editing', and an upward arrow. The editor content is as follows:

```
Compile the model

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

Fit the model
```

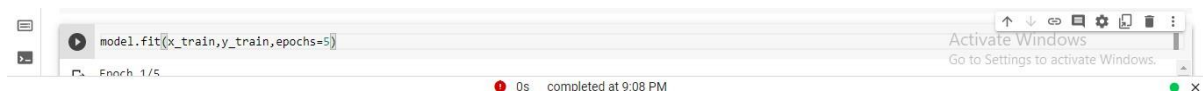
At the bottom right of the editor, there is a watermark that says 'Activate Windows Go to Settings to activate Windows.'

Question-7:

Fit The Model

Solution

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



Question-7:

Save The Model

Solution

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

Fit the model

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