

```

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        "### Import necessary libraries"
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        "import pandas as pd\n",
        "import numpy as np\n",
        "from sklearn.model_selection import train_test_split\n",
        "from sklearn.preprocessing import LabelEncoder\n",
        "from tensorflow.keras.models import Sequential\n",
        "from tensorflow.keras.layers import LSTM, Dense, Dropout, Embedding\n",
        "from tensorflow.keras.optimizers import RMSprop\n",
        "from tensorflow.keras.preprocessing.text import Tokenizer\n",
        "from tensorflow.keras.preprocessing import sequence"
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              "    }\n",
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}

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"      <th>v2</th>\n",
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"      <th>Unnamed: 3</th>\n",
"      <th>Unnamed: 4</th>\n",
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"  </thead>\n",
"  <tbody>\n",
"    <tr>\n",
"      <th>0</th>\n",
"      <td>ham</td>\n",
"      <td>Go until jurong point, crazy.. Available only ...</td>\n",
"      <td>NaN</td>\n",
"      <td>NaN</td>\n",
"      <td>NaN</td>\n",
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"      <td>ham</td>\n",
"      <td>Ok lar... Joking wif u oni...</td>\n",
"      <td>NaN</td>\n",
"      <td>NaN</td>\n",
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"    <tr>\n",
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"      <td>Free entry in 2 a wkly comp to win FA Cup fina...</td>\n",
"      <td>NaN</td>\n",
"      <td>NaN</td>\n",
"      <td>NaN</td>\n",
"    </tr>\n",
"    <tr>\n",
"      <th>3</th>\n",
"      <td>ham</td>\n",
"      <td>U dun say so early hor... U c already then say...</td>\n",
"      <td>NaN</td>\n",
"      <td>NaN</td>\n",
"      <td>NaN</td>\n",
"    </tr>\n",
"    <tr>\n",
"      <th>4</th>\n",
"      <td>ham</td>\n",
"      <td>Nah I don't think he goes to usf, he lives aro...</td>\n",
"      <td>NaN</td>\n",
"      <td>NaN</td>\n",
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\\n",
        "0    ham    Go until jurong point, crazy.. Available only ...      NaN
\n",
        "1    ham                                     Ok lar... Joking wif u oni...      NaN
\n",
        "2    spam    Free entry in 2 a wkly comp to win FA Cup fina...      NaN
\n",
        "3    ham    U dun say so early hor... U c already then say...      NaN
\n",
        "4    ham    Nah I don't think he goes to usf, he lives aro...      NaN
\n",
        "\n",
        "    Unnamed: 3 Unnamed: 4  \n",
        "0      NaN      NaN  \n",
        "1      NaN      NaN  \n",
        "2      NaN      NaN  \n",
        "3      NaN      NaN  \n",
        "4      NaN      NaN  "
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    "df.head()"
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                "Data columns (total 2 columns):\n",
                "#      Column  Non-Null Count  Dtype \n",
                "---  -\n",
                "0     v1      5572 non-null    object\n",
                "1     v2      5572 non-null    object\n",
                "dtypes: object(2)\n",
                "memory usage: 87.2+ KB"
            ]
        }
    ]
}
],

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        "df.drop(['Unnamed: 2', 'Unnamed: 3', 'Unnamed: 4'], axis=1,
inplace=True)\n",
        "df.info()"
    ]
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        "X = df.v2\n",
        "Y = df.v1\n",
        "encoder = LabelEncoder()\n",
        "Y = encoder.fit_transform(Y)\n",
        "Y = Y.reshape(-1,1)"
    ]
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        "X_train, X_test, y_train, y_test = train_test_split(X, Y,
test_size=0.2)"
    ]
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        "tokenizer = Tokenizer(num_words=2000, lower=True)\n",
        "tokenizer.fit_on_texts(X_train)\n",
        "sequences = tokenizer.texts_to_sequences(X_train)\n",
        "X_train = sequence.pad_sequences(sequences, maxlen=200)"
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        "### Create model"
    ]
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        "model = Sequential()"
    ]
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  "### Compile the model"
]
},
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metrics=['accuracy'])"
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    "### Fit the model"
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        "Epoch 1/10\n",
        "28/28 [=====] - 4s 49ms/step - loss: 0.3426 - accuracy: 0.8738 - val_loss: 0.1774 - val_accuracy: 0.9585\n",
        "Epoch 2/10\n",
        "28/28 [=====] - 1s 27ms/step - loss: 0.1026 - accuracy: 0.9745 - val_loss: 0.0607 - val_accuracy: 0.9809\n",
        "Epoch 3/10\n",
        "28/28 [=====] - 1s 27ms/step - loss: 0.0417 - accuracy: 0.9882 - val_loss: 0.0606 - val_accuracy: 0.9832\n",
        "Epoch 4/10\n",
        "28/28 [=====] - 1s 27ms/step - loss: 0.0253 - accuracy: 0.9927 - val_loss: 0.0579 - val_accuracy: 0.9843\n",
        "Epoch 5/10\n",
        "28/28 [=====] - 1s 26ms/step - loss: 0.0191 - accuracy: 0.9947 - val_loss: 0.0744 - val_accuracy: 0.9865\n",
        "Epoch 6/10\n",
        "28/28 [=====] - 1s 28ms/step - loss: 0.0131 - accuracy: 0.9961 - val_loss: 0.0762 - val_accuracy: 0.9865\n",
        "Epoch 7/10\n",
        "28/28 [=====] - 1s 26ms/step - loss: 0.0085 - accuracy: 0.9969 - val_loss: 0.1080 - val_accuracy: 0.9854\n",
        "Epoch 8/10\n",
        "28/28 [=====] - 1s 26ms/step - loss: 0.0075 - accuracy: 0.9978 - val_loss: 0.0998 - val_accuracy: 0.9809\n",
        "Epoch 9/10\n",

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        "28/28 [=====] - 1s 26ms/step - loss: 0.0053 -
accuracy: 0.9978 - val_loss: 0.1187 - val_accuracy: 0.9843\n",
        "Epoch 10/10\n",
        "28/28 [=====] - 1s 26ms/step - loss: 0.0031 -
accuracy: 0.9994 - val_loss: 0.1409 - val_accuracy: 0.9843\n"
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validation_split=0.2)"
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    "source": [
        "test_sequences = tokenizer.texts_to_sequences(X_test)\n",
        "X_test = sequence.pad_sequences(test_sequences, maxlen=200)"
    ]
},
{

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accuracy: 0.9839\n"
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    "    txt = tokenizer.texts_to_sequences(message)\n",
    "    txt = sequence.pad_sequences(txt, maxlen=200)\n",
    "    preds = model.predict(txt)\n",
    "    if preds > 0.5:\n",
    "        print(\"Spam\")\n",
    "    else:\n",
    "        print(\"Not Spam\")"
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        "Not Spam\n"
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