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    "from keras.models import Model\n",
    "from keras.layers import LSTM, Activation, Dense, Dropout, Input, Embedding\n",
    "from keras.optimizers import RMSprop\n",
    "from keras.preprocessing.text import Tokenizer\n",
    "from keras_preprocessing import sequence\n",
    "from keras.utils import to_categorical\n",
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```

```
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"3   ham  U dun say so early hor... U c already then say...       NaN   \n",
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  "plt.title('Number of ham and spam messages')"
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  "X = df.v2\n",
  "Y = df.v1\n",
  "le = LabelEncoder()\n",
  "Y = le.fit_transform(Y)\n",
  "Y = Y.reshape(-1,1)"
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 ]
```

```
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  "max_len = 150\n",
  "tok = Tokenizer(num_words=max_words)\n",
  "tok.fit_on_texts(X_train)\n",
  "sequences = tok.texts_to_sequences(X_train)\n",
  "\n",
  "sequences_matrix = sequence.pad_sequences(sequences,maxlen=max_len)\n"
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  "inputs = Input(name='inputs',shape=[max_len])\n",
  "layer = Embedding(max_words,50,input_length=max_len)(inputs)\n",
  "layer = LSTM(64)(layer)\n",
  "layer = Dense(256,name='FC1')(layer)\n",
  "layer = Activation('relu')(layer)\n",
  "layer = Dropout(0.5)(layer)\n",
```

```
  "layer = Dense(1,name='out_layer')(layer)\n",
  "layer = Activation('sigmoid')(layer)"
 ]
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    "                                                                 \n",
    " embedding (Embedding)       (None, 150, 50)           50000     \n",
    "                                                                 \n",
    " lstm (LSTM)                 (None, 64)                29440     \n",
    "                                                                 \n",
    " FC1 (Dense)                 (None, 256)               16640     \n",
    "                                                                 \n",
    " activation (Activation)     (None, 256)               0         \n",
    "                                                                 \n",
    " dropout (Dropout)           (None, 256)               0         \n",
    "                                                                 \n",
    " out_layer (Dense)           (None, 1)                 257       \n",
```

```
    "                                                \n",
    " activation_1 (Activation)   (None, 1)              0         \n",
    "                                                \n",
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  "model.summary()\n",
  "model.compile(loss='binary_crossentropy',optimizer=RMSprop(),metrics=['accuracy'])"
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    "30/30 [==============================] - 14s 282ms/step - loss: 0.3317 - accuracy: 0.8720 - val_loss: 0.1777 - val_accuracy: 0.9768\n",
    "Epoch 2/10\n",
```

```
    "30/30 [==============================] - 7s 226ms/step - loss: 0.0930 - accuracy: 0.9776 - val_loss: 0.0651 - val_accuracy: 0.9842\n"
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  "model.fit(sequences_matrix,Y_train,batch_size=128,epochs=10,\n",
  "          validation_split=0.2,callbacks=[EarlyStopping(monitor='val_loss',min_delta=0.0001)])"
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```

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   ]
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    "INFO:tensorflow:Assets written to: my_model\\assets\n"
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  "model.save(\"my_model\")"
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  "# model = load_model('saved_model/my_model')"
```

```
 ]
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{
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  "test_sequences_matrix  = sequence.pad_sequences(test_sequences,maxlen=max_len)"
 ]
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```

```
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    "  Accuracy: 0.984\n"
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    " [0]\n",
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