

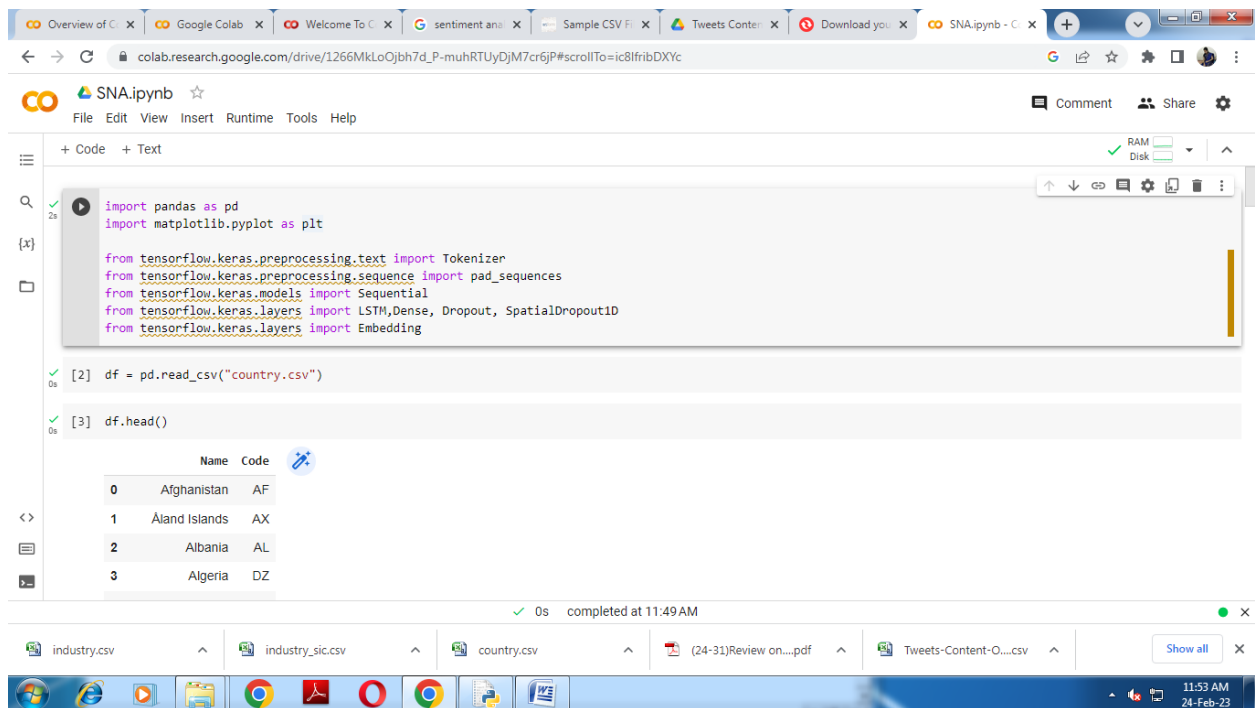
NAME – ARYA MORE

ROLL NO - 527

Sentiment Analysis

The process of computationally identifying and categorizing opinions expressed in a piece of text, especially in order to determine whether the writer's attitude towards a particular topic, product, etc. is positive, negative, or neutral.

STEP 1



The screenshot shows a Google Colab notebook titled 'SNA.ipynb'. The code in the first cell is as follows:

```
import pandas as pd
import matplotlib.pyplot as plt

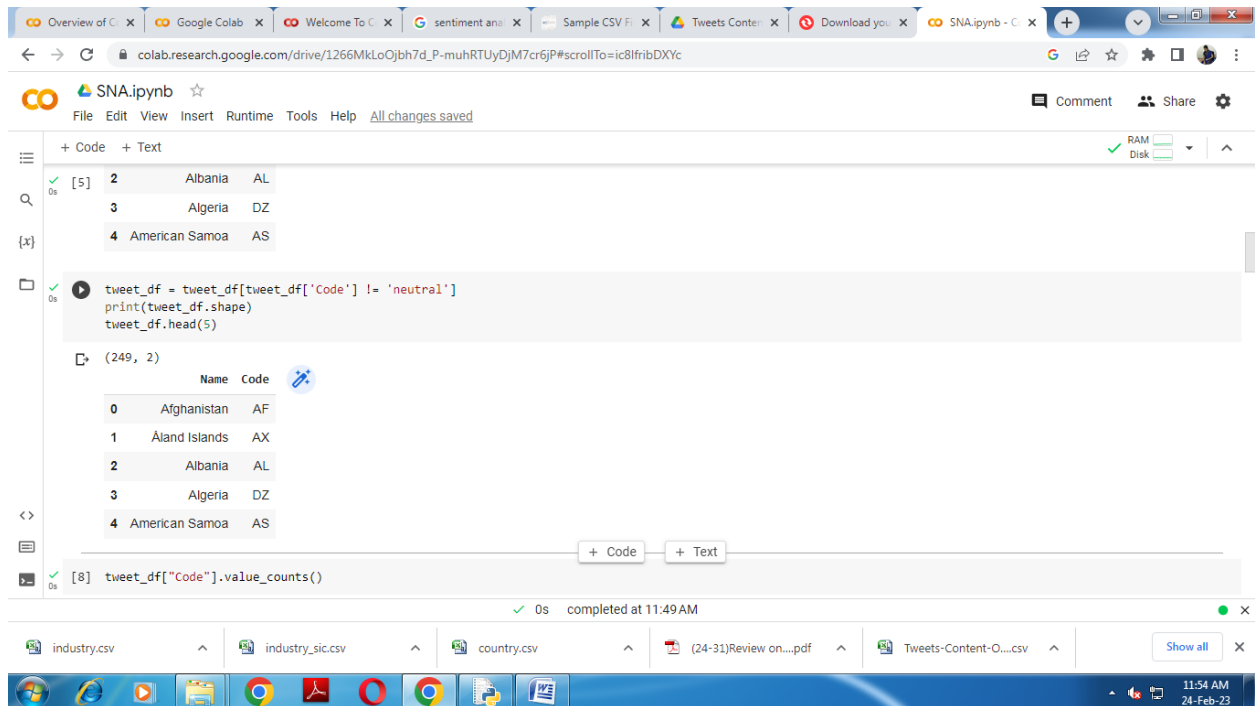
from tensorflow.keras.preprocessing.text import Tokenizer
from tensorflow.keras.preprocessing.sequence import pad_sequences
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import LSTM, Dense, Dropout, SpatialDropout1D
from tensorflow.keras.layers import Embedding
```

The second cell executes the command `df = pd.read_csv("country.csv")`. The third cell executes `df.head()`, resulting in the following DataFrame:

	Name	Code
0	Afghanistan	AF
1	Åland Islands	AX
2	Albania	AL
3	Algeria	DZ

The notebook interface shows the file 'country.csv' is loaded, and the code is completed at 11:49 AM. The taskbar at the bottom shows various applications and the system clock indicating 11:53 AM on 24-Feb-23.

STEP 2



Overview of C x Google Colab x Welcome To C x sentiment ana x Sample CSV Fi x Tweets Cont x Download you x SNA.ipynb - C x

colab.research.google.com/drive/1266MkLoOjhh7d_P-muhRTUyDjM7cr6jP#scrollTo=ic8lfrbDXYc

SNA.ipynb

File Edit View Insert Runtime Tools Help All changes saved

+ Code + Text

```
[5] 2 Albania AL
     3 Algeria DZ
     4 American Samoa AS
```

```
tweet_df = tweet_df[tweet_df['Code'] != 'neutral']
print(tweet_df.shape)
tweet_df.head(5)
```

```
(249, 2)
```

	Name	Code
0	Afghanistan	AF
1	Aland Islands	AX
2	Albania	AL
3	Algeria	DZ
4	American Samoa	AS

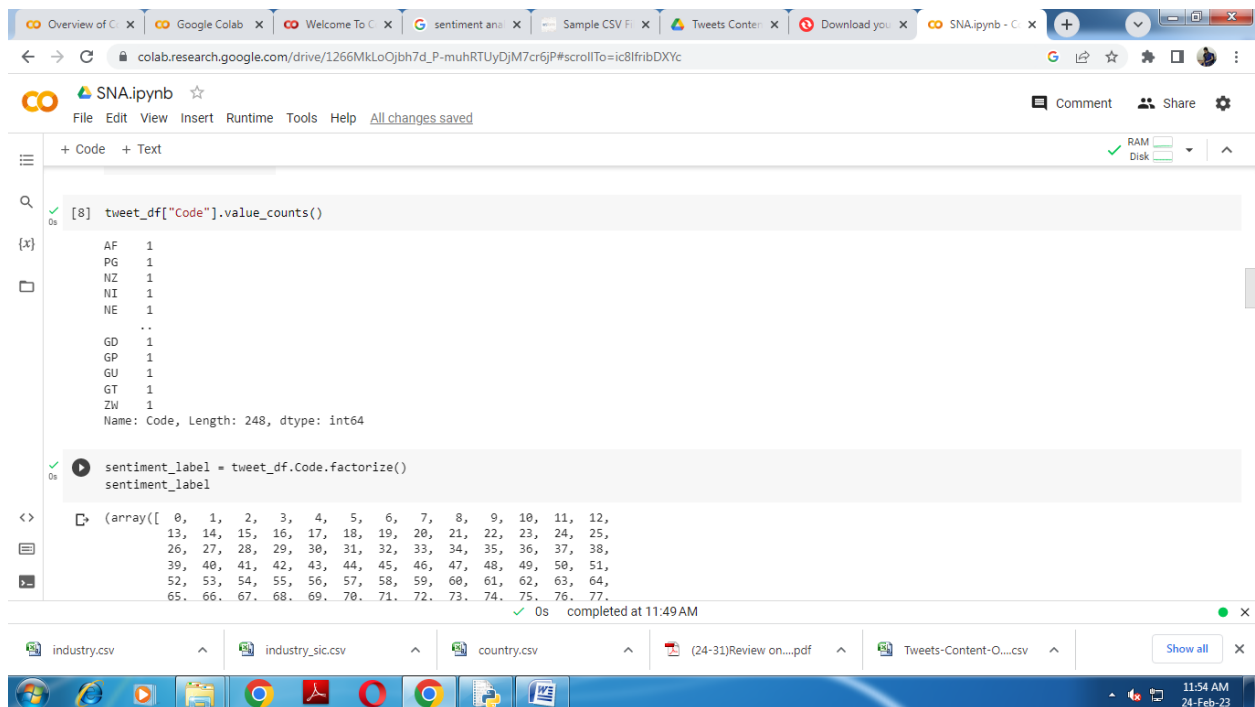
```
[8] tweet_df["Code"].value_counts()
```

completed at 11:49 AM

industry.csv industry_sic.csv country.csv (24-31)Review on....pdf Tweets-Content-O....csv Show all

11:54 AM 24-Feb-23

STEP 3



Overview of C x Google Colab x Welcome To C x sentiment ana x Sample CSV Fi x Tweets Cont x Download you x SNA.ipynb - C x

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SNA.ipynb

File Edit View Insert Runtime Tools Help All changes saved

+ Code + Text

```
[8] tweet_df["Code"].value_counts()
```

```
AF 1
PG 1
NZ 1
NI 1
NE 1
..
GD 1
GP 1
GU 1
GT 1
ZW 1
Name: Code, Length: 248, dtype: int64
```

```
sentiment_label = tweet_df.Code.factorize()
sentiment_label
```

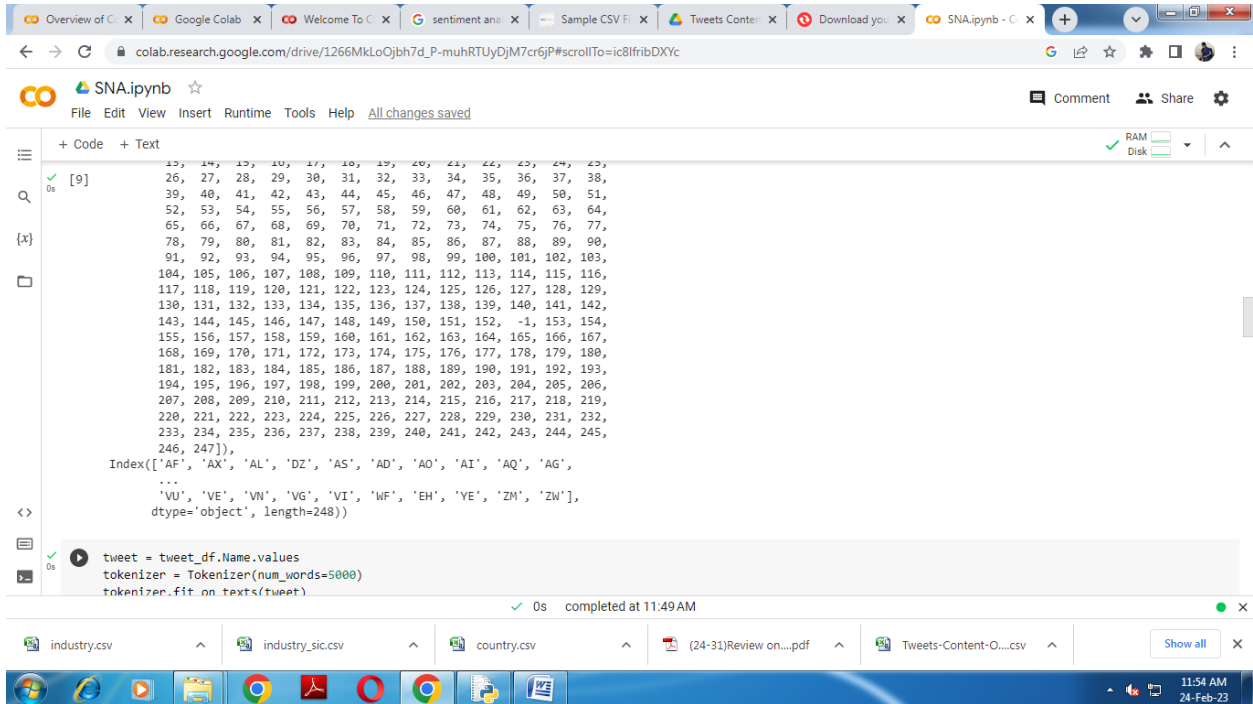
```
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        52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64,
        65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77,
```

completed at 11:49 AM

industry.csv industry_sic.csv country.csv (24-31)Review on....pdf Tweets-Content-O....csv Show all

11:54 AM 24-Feb-23

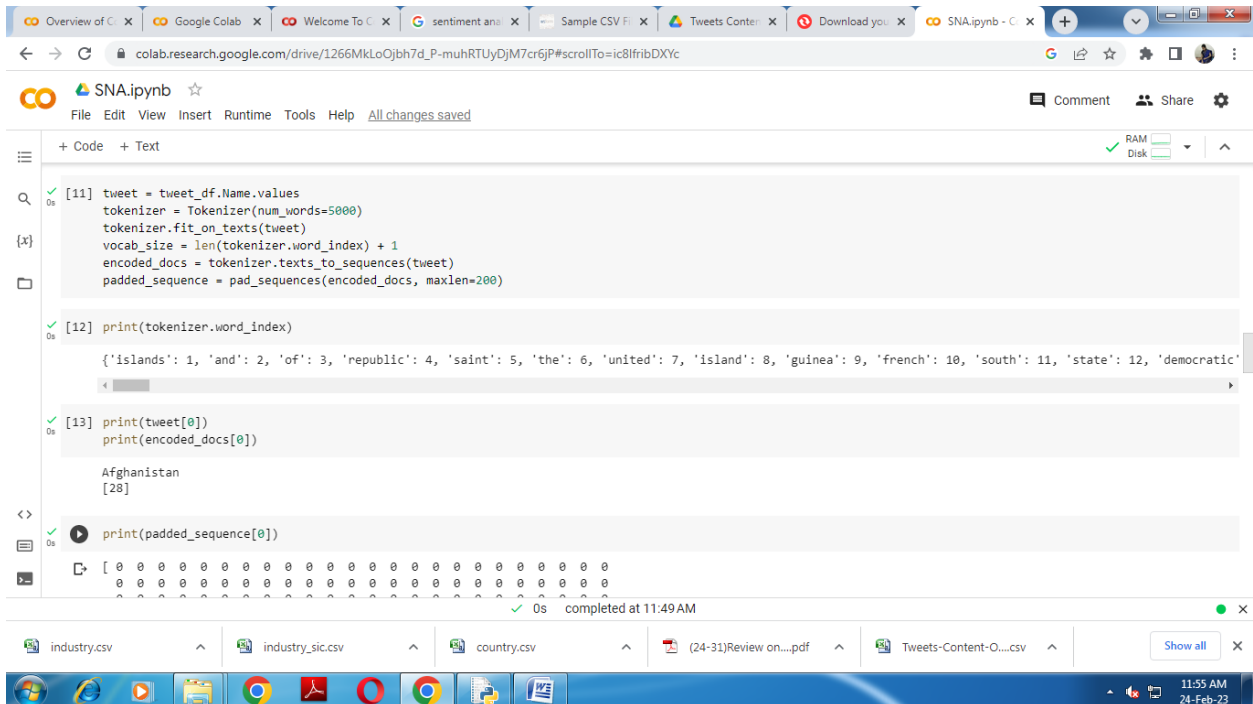
STEP 4



```
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    246, 247]],
    Index(['AF', 'AX', 'AL', 'DZ', 'AS', 'AD', 'AO', 'AI', 'AQ', 'AG',
    ...
    'VU', 'VE', 'VN', 'VG', 'VI', 'WF', 'EH', 'YE', 'ZH', 'ZW'],
    dtype='object', length=248))

tweet = tweet_df.Name.values
tokenizer = Tokenizer(num_words=5000)
tokenizer.fit_on_texts(tweet)
```

STEP 5



```
[11] tweet = tweet_df.Name.values
     tokenizer = Tokenizer(num_words=5000)
     tokenizer.fit_on_texts(tweet)
     vocab_size = len(tokenizer.word_index) + 1
     encoded_docs = tokenizer.texts_to_sequences(tweet)
     padded_sequence = pad_sequences(encoded_docs, maxlen=200)

[12] print(tokenizer.word_index)

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```

STEP 6

The screenshot shows a Google Colab notebook titled "SNA.ipynb". The code cell contains the following Python code:

```
embedding_vector_length = 32
model = Sequential()
model.add(Embedding(vocab_size, embedding_vector_length, input_length=200))
model.add(SpatialDropout1D(0.25))
model.add(LSTM(50, dropout=0.5, recurrent_dropout=0.5))
model.add(Dropout(0.2))
model.add(Dense(1, activation='sigmoid'))
model.compile(loss='binary_crossentropy', optimizer='adam', metrics=['accuracy'])
print(model.summary())
```

The output of the code is a summary of the model structure:

Layer (type)	Output Shape	Param #
embedding (Embedding)	(None, 200, 32)	10272
spatial_dropout1d (SpatialDropout1D)	(None, 200, 32)	0
lstm (LSTM)	(None, 50)	15500
dropout (Dropout)	(None, 50)	0
dense (Dense)	(None, 1)	51

The notebook interface shows the file explorer with "industry.csv", "industry_sic.csv", "country.csv", and "Tweets-Content-O...csv". The status bar indicates the notebook is completed at 11:49 AM.

STEP 7

The screenshot shows the same Google Colab notebook "SNA.ipynb". The code cell contains the following Python code:

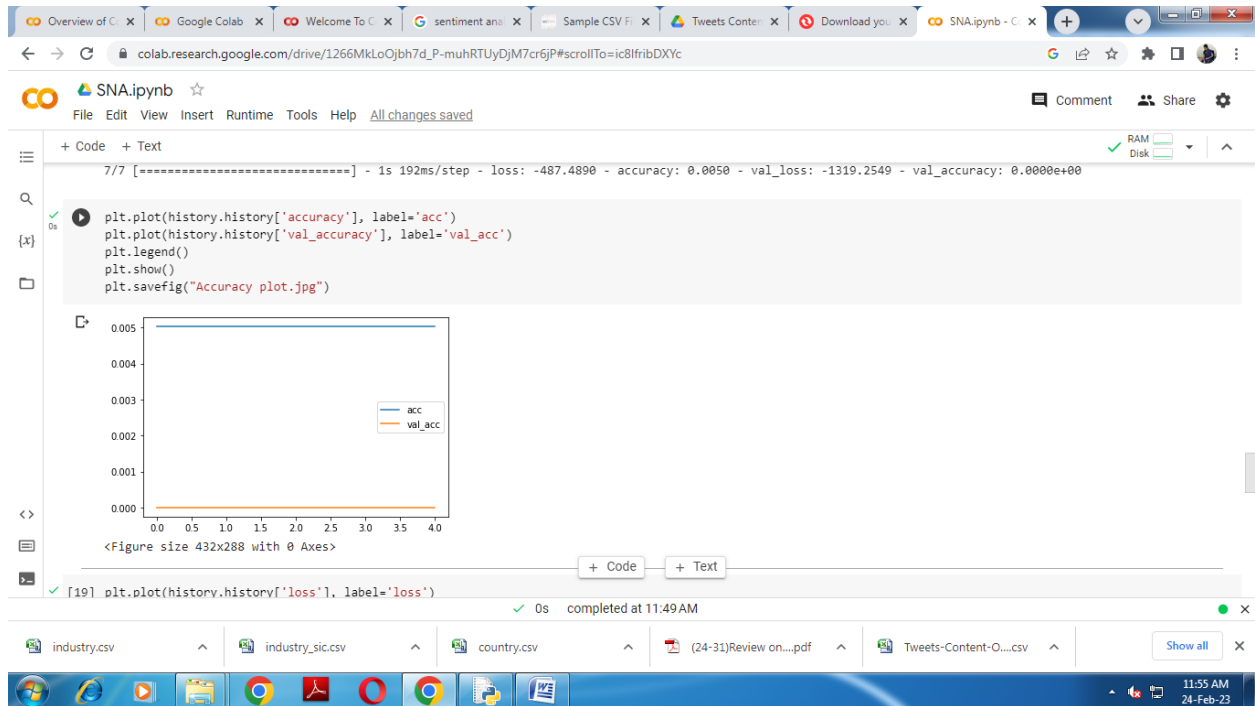
```
history = model.fit(padded_sequence, sentiment_label[0], validation_split=0.2, epochs=5, batch_size=32)
```

The output of the code is a summary of the model's performance over 5 epochs:

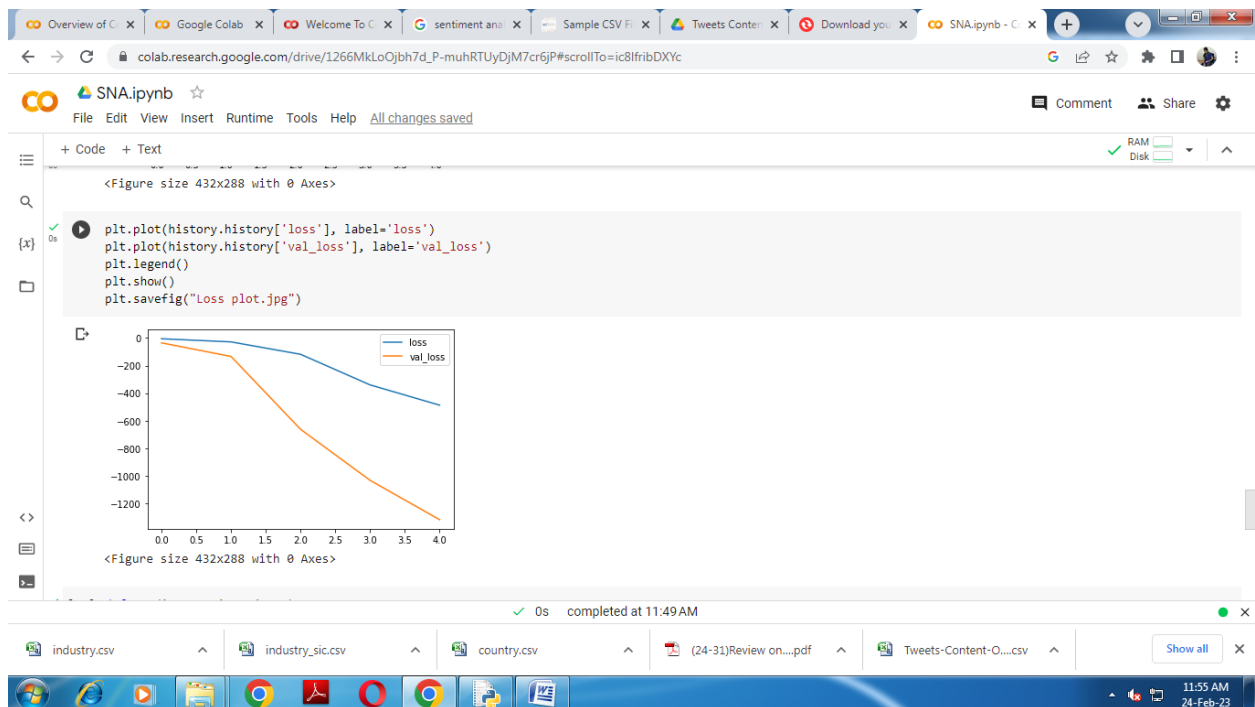
Epoch	Time	Loss	Accuracy	Val Loss	Val Accuracy
1/5	7/7	-5.2848	0.0050	-35.0668	0.0000e+00
2/5	7/7	-28.0784	0.0050	-133.8500	0.0000e+00
3/5	7/7	-118.1738	0.0050	-662.5535	0.0000e+00
4/5	7/7	-340.2835	0.0050	-1033.2371	0.0000e+00
5/5	7/7	-487.4890	0.0050	-1319.2549	0.0000e+00

The notebook interface shows the file explorer with "industry.csv", "industry_sic.csv", "country.csv", and "Tweets-Content-O...csv". The status bar indicates the notebook is completed at 11:49 AM.

STEP 8



STEP 9



STEP 10

The screenshot shows a Google Colab notebook titled "SNA.ipynb". The code cell contains the following Python code:

```
[3] 3      Algeria  DZ
     4 American Samoa  AS

[4] df.columns
Index(['Name', 'Code'], dtype='object')

tweet_df = df[['Name', 'Code']]
print(tweet_df.shape)
tweet_df.head(5)
```

The output of the code is a DataFrame with 249 rows and 2 columns. The first five rows are shown in the preview:

	Name	Code
0	Afghanistan	AF
1	Åland Islands	AX
2	Albania	AL
3	Algeria	DZ
4	American Samoa	AS

The notebook interface includes a menu bar (File, Edit, View, Insert, Runtime, Tools, Help), a toolbar with icons for RAM and Disk usage, and a file explorer at the bottom showing files like "industry.csv", "industry_sic.csv", "country.csv", and "Tweets-Content-O....csv". The status bar at the bottom indicates the notebook is "completed at 11:49 AM" on "24-Feb-23".

STEP 11

Overview of C X Google Colab X Welcome To C X sentiment ana X Sample CSV F X Tweets Cont X Download you X SNA.ipynb - C X

colab.research.google.com/drive/1266MkLoOj7d_P-muhRTUyDjM7cr6jP#scrollTo=ic8lfrbDXYc

SNA.ipynb

File Edit View Insert Runtime Tools Help All changes saved

+ Code + Text

[5] 3 Algeria DZ
4 American Samoa AS

[7] tweet_df = tweet_df[tweet_df['Code'] != 'neutral']
print(tweet_df.shape)
tweet_df.head(5)

(249, 2)

	Name	Code
0	Afghanistan	AF
1	Åland Islands	AX
2	Albania	AL
3	Algeria	DZ
4	American Samoa	AS

tweet_df["Code"].value_counts()

	AF	PG
	1	1

0s completed at 11:49 AM

industry.csv industry_sic.csv country.csv (24-31)Review on....pdf Tweets-Content-O....csv Show all X

11:56 AM 24-Feb-23

STEP 12

Overview of C X Google Colab X Welcome To C X sentiment ana X Sample CSV F X Tweets Cont X Download you X SNA.ipynb - C X

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SNA.ipynb

File Edit View Insert Runtime Tools Help All changes saved

+ Code + Text

[8] tweet_df["Code"].value_counts()

	AF	PG	NZ	NI	NE	..	GD	GP	GU	GT	ZW
	1	1	1	1	1		1	1	1	1	1

Name: Code, Length: 248, dtype: int64

sentiment_label = tweet_df.Code.factorize()
sentiment_label

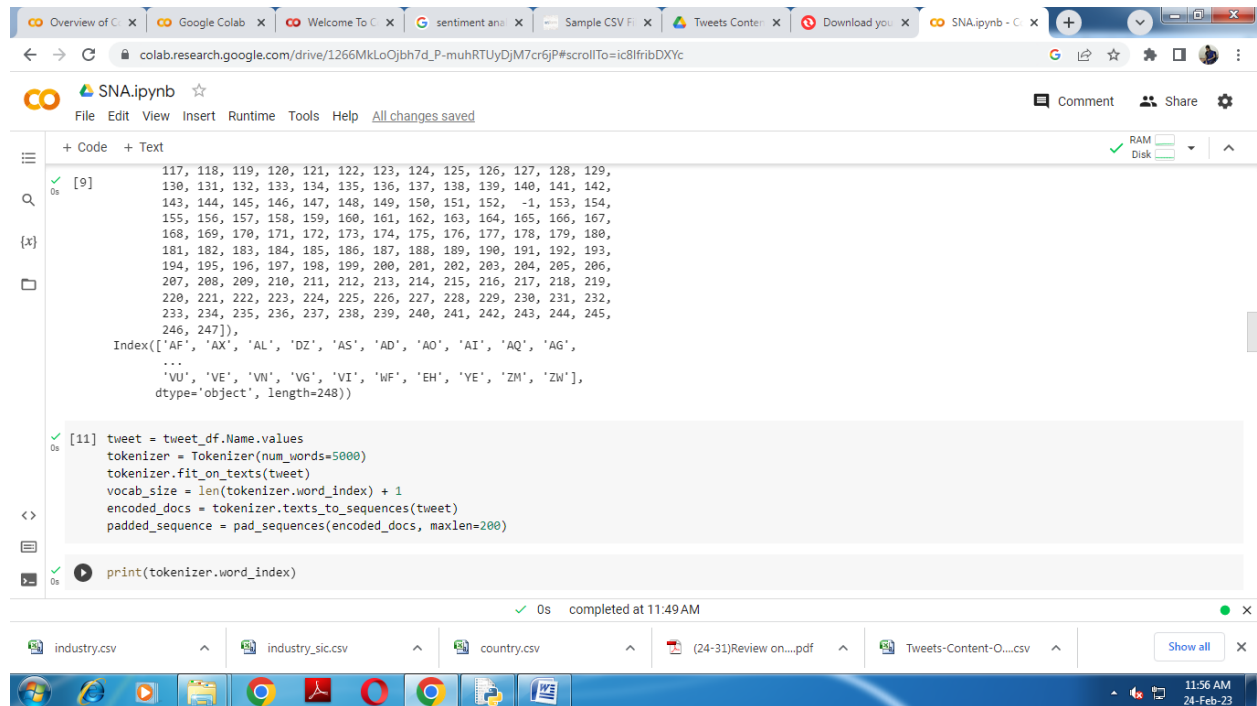
(array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103])

0s completed at 11:49 AM

industry.csv industry_sic.csv country.csv (24-31)Review on....pdf Tweets-Content-O....csv Show all X

11:56 AM 24-Feb-23

STEP 13



The screenshot shows a Google Colab notebook titled "SNA.ipynb". The browser tabs at the top include "Overview of C...", "Google Colab", "Welcome To C...", "sentiment ana...", "Sample CSV Fi...", "Tweets Cont...", "Download you...", and "SNA.ipynb - C...". The notebook interface shows a code cell with the following output:

```
[9] 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129,
    130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142,
    143, 144, 145, 146, 147, 148, 149, 150, 151, 152, -1, 153, 154,
    155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167,
    168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180,
    181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193,
    194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206,
    207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219,
    220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232,
    233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245,
    246, 247]],
    Index(['AF', 'AX', 'AL', 'DZ', 'AS', 'AD', 'AO', 'AI', 'AQ', 'AG',
    ...,
    'VU', 'VE', 'VN', 'VG', 'VI', 'WF', 'EH', 'YE', 'ZM', 'ZW'],
    dtype='object', length=248))
```

Below the output, there is a code cell with the following code:

```
[11] tweet = tweet_df.Name.values
     tokenizer = Tokenizer(num_words=5000)
     tokenizer.fit_on_texts(tweet)
     vocab_size = len(tokenizer.word_index) + 1
     encoded_docs = tokenizer.texts_to_sequences(tweet)
     padded_sequence = pad_sequences(encoded_docs, maxlen=200)
```

At the bottom, there is a code cell with the following code:

```
print(tokenizer.word_index)
```

The notebook status bar at the bottom indicates "0s completed at 11:49 AM". The taskbar at the bottom shows various application icons and the system clock displaying "11:56 AM 24-Feb-23".

STEP 14



Overview of C X Google Colab X Welcome To C X sentiment ana X Sample CSV Fi X Tweets Conter X Download you X SNA.ipynb - C X

colab.research.google.com/drive/1266MkLoQjbh7d_P-muhrTUyDjM7cr6jP#scrollTo=ic8lfrbDXyc

SNA.ipynb

File Edit View Insert Runtime Tools Help All changes saved

+ Code + Text

RAM Disk

```
[15]
ropout1D)

lstm (LSTM)          (None, 50)          16600

dropout (Dropout)    (None, 50)          0

dense (Dense)        (None, 1)           51

=====
Total params: 26,923
Trainable params: 26,923
Non-trainable params: 0

None

history = model.fit(padded_sequence,sentiment_label[0],validation_split=0.2, epochs=5, batch_size=32)

Epoch 1/5
7/7 [=====] - 5s 266ms/step - loss: -5.2848 - accuracy: 0.0050 - val_loss: -35.0668 - val_accuracy: 0.0000e+00
Epoch 2/5
7/7 [=====] - 1s 201ms/step - loss: -28.0784 - accuracy: 0.0050 - val_loss: -133.8500 - val_accuracy: 0.0000e+00
Epoch 3/5
7/7 [=====] - 1s 200ms/step - loss: -118.1738 - accuracy: 0.0050 - val_loss: -662.5535 - val_accuracy: 0.0000e+00
Epoch 4/5
7/7 [=====] - 1s 190ms/step - loss: -340.2835 - accuracy: 0.0050 - val_loss: -1033.2371 - val_accuracy: 0.0000e+00
Epoch 5/5
7/7 [=====] - 1s 192ms/step - loss: -487.4890 - accuracy: 0.0050 - val_loss: -1319.2549 - val_accuracy: 0.0000e+00
0s completed at 11:49 AM
```

industry.csv industry_sic.csv country.csv (24-31)Review on....pdf Tweets-Content-O....csv Show all X

11:57 AM 24-Feb-23

STEP 17

Overview of C X Google Colab X Welcome To C X sentiment ana X Sample CSV Fi X Tweets Conter X Download you X SNA.ipynb - C X

colab.research.google.com/drive/1266MkLoQjbh7d_P-muhrTUyDjM7cr6jP#scrollTo=ic8lfrbDXyc

SNA.ipynb

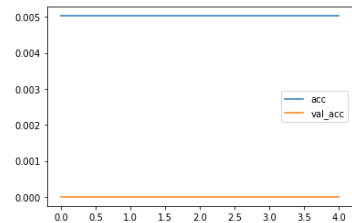
File Edit View Insert Runtime Tools Help All changes saved

+ Code + Text

RAM Disk

```
[17]
7/7 [=====] - 1s 200ms/step - loss: -118.1738 - accuracy: 0.0050 - val_loss: -662.5535 - val_accuracy: 0.0000e+00
Epoch 4/5
7/7 [=====] - 1s 190ms/step - loss: -340.2835 - accuracy: 0.0050 - val_loss: -1033.2371 - val_accuracy: 0.0000e+00
Epoch 5/5
7/7 [=====] - 1s 192ms/step - loss: -487.4890 - accuracy: 0.0050 - val_loss: -1319.2549 - val_accuracy: 0.0000e+00

[18]
plt.plot(history.history['accuracy'], label='acc')
plt.plot(history.history['val_accuracy'], label='val_acc')
plt.legend()
plt.show()
plt.savefig("Accuracy plot.jpg")
```

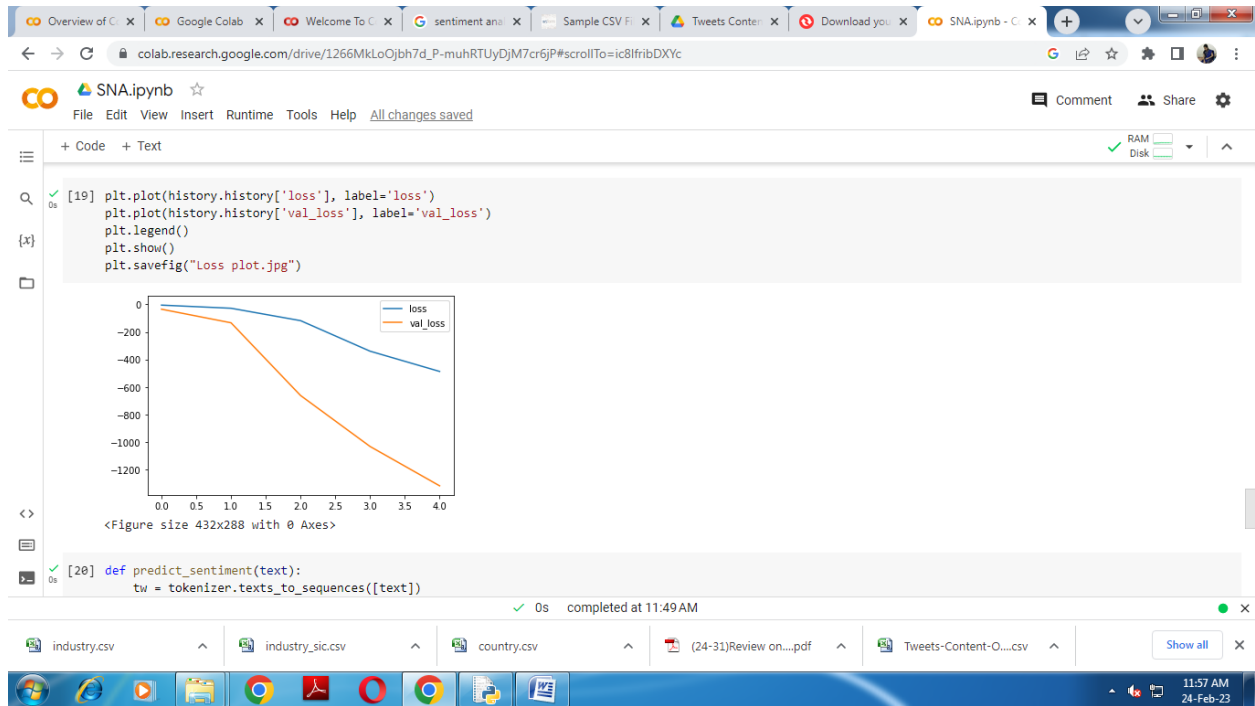


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industry.csv industry_sic.csv country.csv country.csv (24-31)Review on....pdf Tweets-Content-O....csv Show all X

11:57 AM 24-Feb-23

STEP 18



STEP 19

Overview of C X Google Colab X Welcome To C X sentiment ana X Sample CSV Fi X Tweets Conter X Download you X SNA.ipynb - C X

colab.research.google.com/drive/1266MkLoJbh7d_P-muhRTUyDjM7cr6jP#scrollTo=ic8lfribDXyc

SNA.ipynb

File Edit View Insert Runtime Tools Help All changes saved

+ Code + Text

```
[20] def predict_sentiment(text):
      tw = tokenizer.texts_to_sequences([text])
      tw = pad_sequences(tw,maxlen=200)
      prediction = int(model.predict(tw).round().item())
      print("Predicted label: ", sentiment_label[1][prediction])

[21] test_sentence1 = "I enjoyed my journey on this flight."
      predict_sentiment(test_sentence1)

      test_sentence2 = "This is the worst flight experience of my life!"
      predict_sentiment(test_sentence2)
```

1/1 [=====] - 0s 232ms/step
Predicted label: AX
1/1 [=====] - 0s 32ms/step
Predicted label: AX

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