ALGORITHM FOR WEB INFORMATION RETRIEVAL ASSIGNMENT - UE19CS332

PROJECT TITLE: **DISASTER TWEET ANALYSIS**

PROJECT BATCH – **TEAM NO 15**

TEAM MEMBERS:

BHOOMIKA P BHAVIMATH – PES2UG19CS091

DEEPALI SURAJ ATTAVAR - PES2UG19CS106

K KEERTHANA - PES2UG19CS170

INTRODUCTION:

Twitter has become an important communication channel in times of emergency. The iniquitousness of smartphones enables people to announce an emergency they're observing in real-time. Because of this, more agencies are interested in programmatically monitoring Twitter.

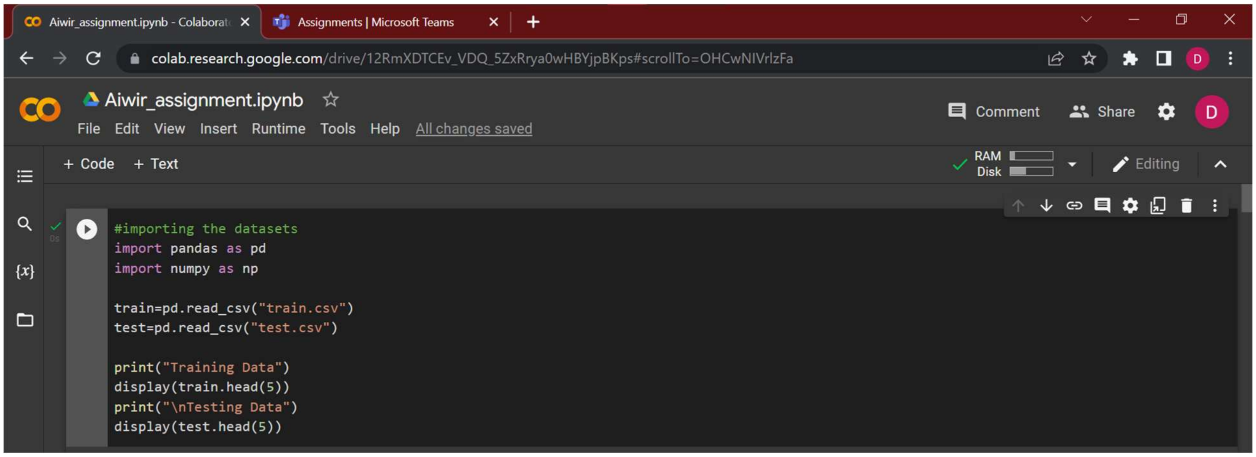
Steps:

- Analyze dataset
- Visualization of Keywords
- Cleaning data
- Wordcloud
- Tokenization
- Vectorization
- Training with a simple model
- Model Metrics (F1)
- Predictions from the test dataset.

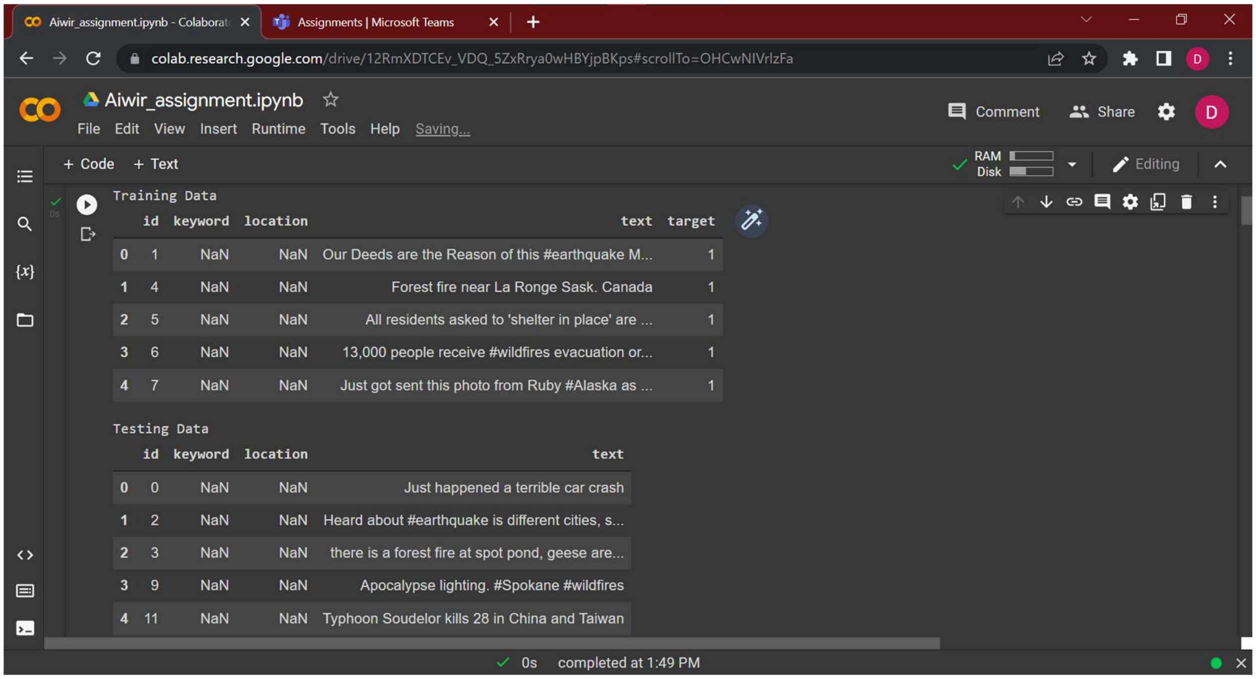
Our assignment code link:

https://colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa

Code and output screenshots:


Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
D
+ Code + Text
RAM
Disk
Editing

```
#importing the datasets
import pandas as pd
import numpy as np

train=pd.read_csv("train.csv")
test=pd.read_csv("test.csv")

print("Training Data")
display(train.head(5))
print("\nTesting Data")
display(test.head(5))
```

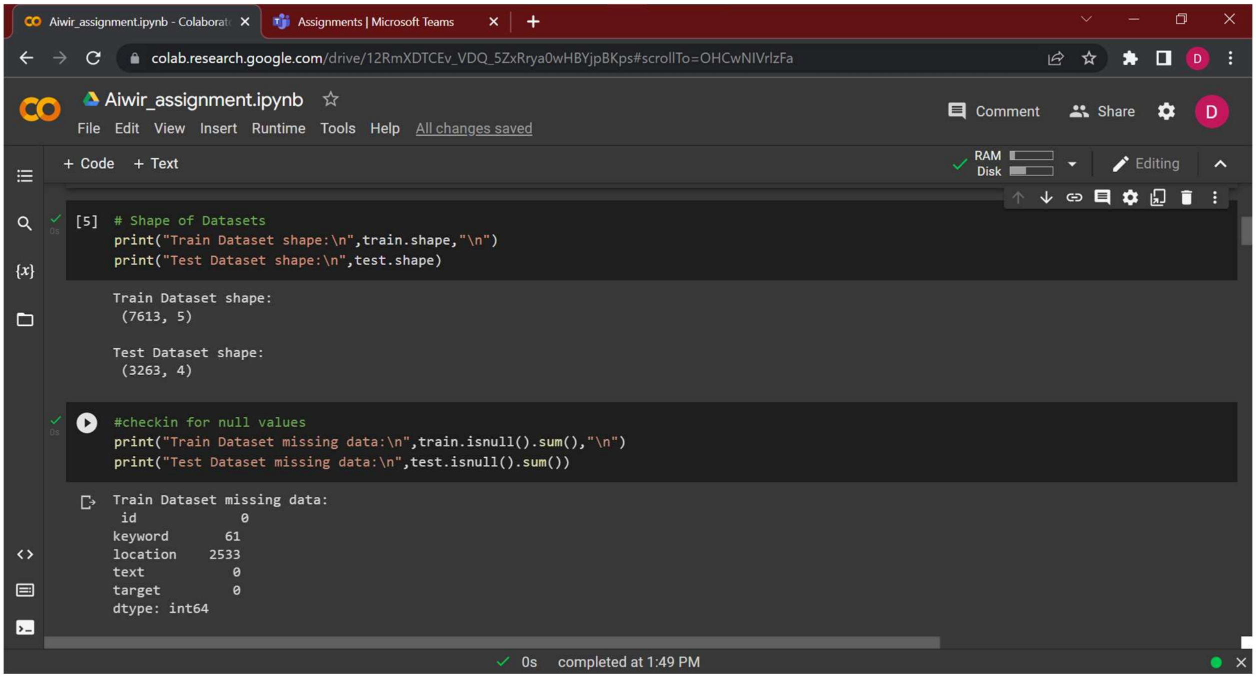

Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help Saving...
Comment
Share
+ Code + Text
RAM
Disk
Editing
0s completed at 1:49 PM

```
Training Data
```

	id	keyword	location	text	target
0	1	NaN	NaN	Our Deeds are the Reason of this #earthquake M...	1
1	4	NaN	NaN	Forest fire near La Ronge Sask. Canada	1
2	5	NaN	NaN	All residents asked to 'shelter in place' are ...	1
3	6	NaN	NaN	13,000 people receive #wildfires evacuation or...	1
4	7	NaN	NaN	Just got sent this photo from Ruby #Alaska as ...	1

```
Testing Data
```

	id	keyword	location	text
0	0	NaN	NaN	Just happened a terrible car crash
1	2	NaN	NaN	Heard about #earthquake is different cities, s...
2	3	NaN	NaN	there is a forest fire at spot pond, geese are...
3	9	NaN	NaN	Apocalypse lighting. #Spokane #wildfires
4	11	NaN	NaN	Typhoon Soudelor kills 28 in China and Taiwan

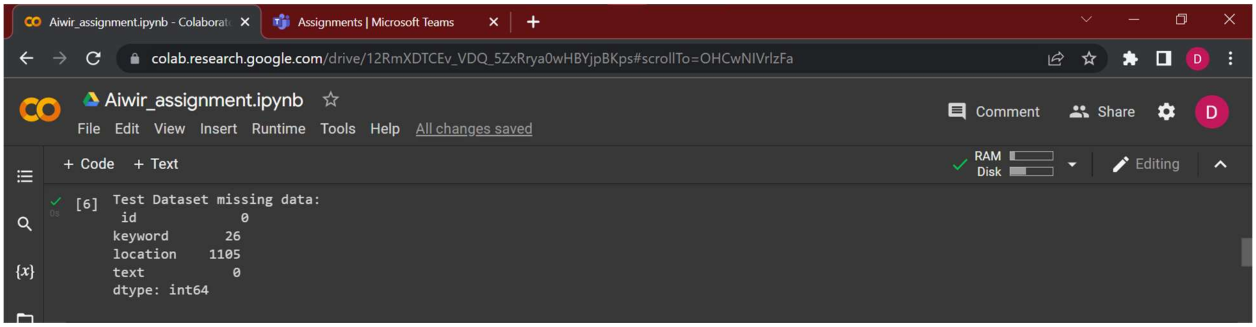

Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
RAM
Disk
Editing
0s completed at 1:49 PM

```
[5] # Shape of Datasets
    print("Train Dataset shape:\n",train.shape,"\n")
    print("Test Dataset shape:\n",test.shape)
```

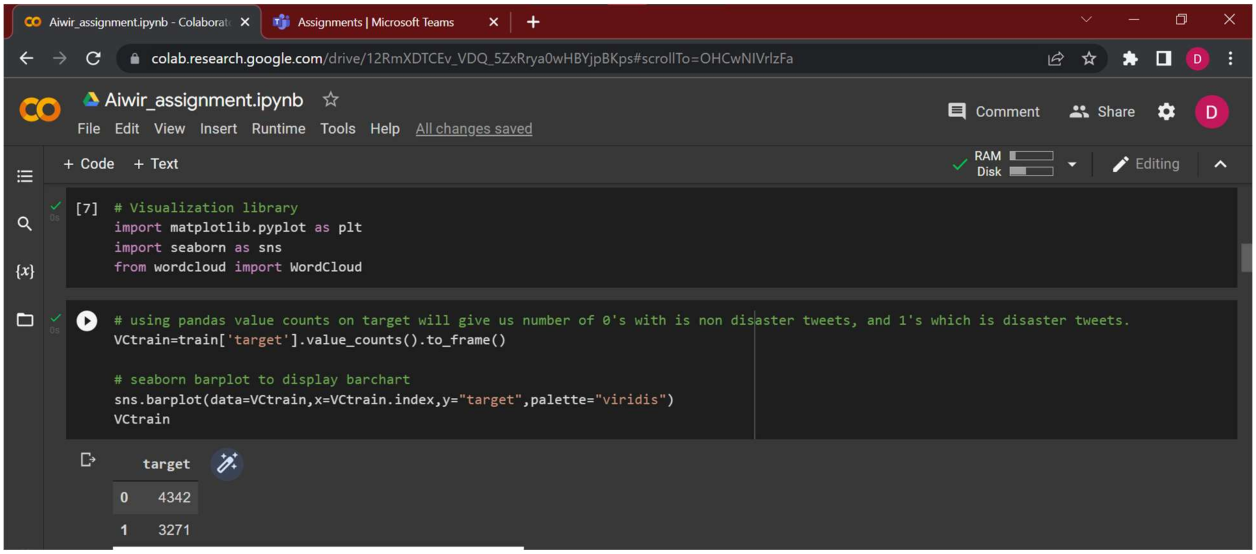
```
Train Dataset shape:
 (7613, 5)

Test Dataset shape:
 (3263, 4)
```

```
#checkin for null values
print("Train Dataset missing data:\n",train.isnull().sum(),"\n")
print("Test Dataset missing data:\n",test.isnull().sum())
```

```
Train Dataset missing data:
 id             0
keyword       61
location    2533
text           0
target         0
dtype: int64
```


Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
RAM
Disk
Editing

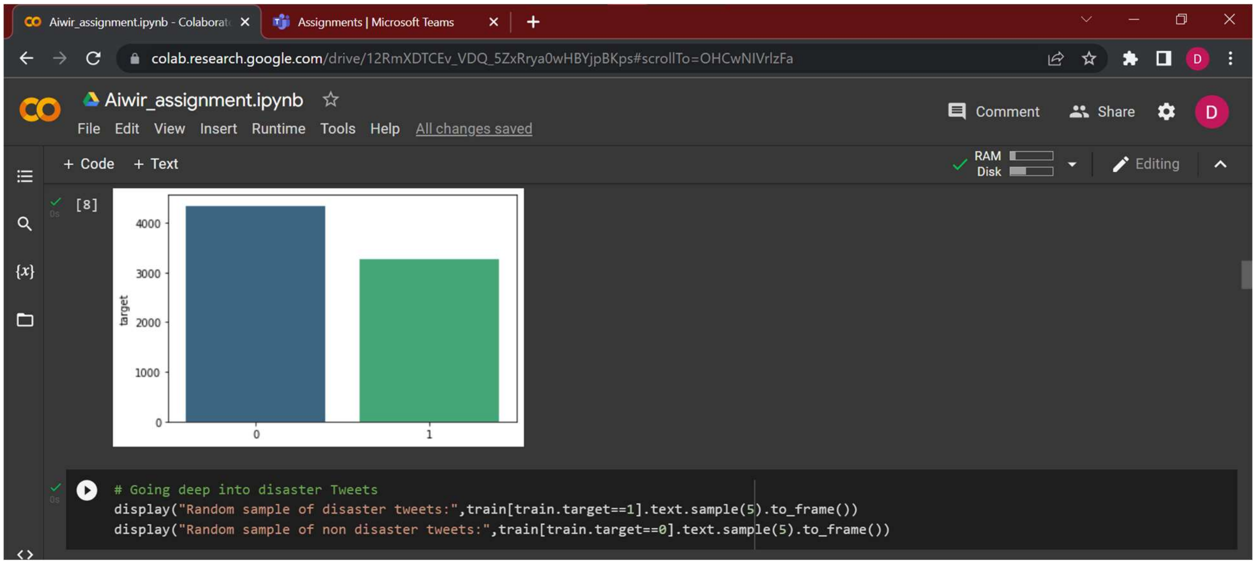
```
[6] Test Dataset missing data:
     id             0
    keyword       26
    location    1105
    text           0
    dtype: int64
```


Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
D
+ Code + Text
RAM
Disk
Editing

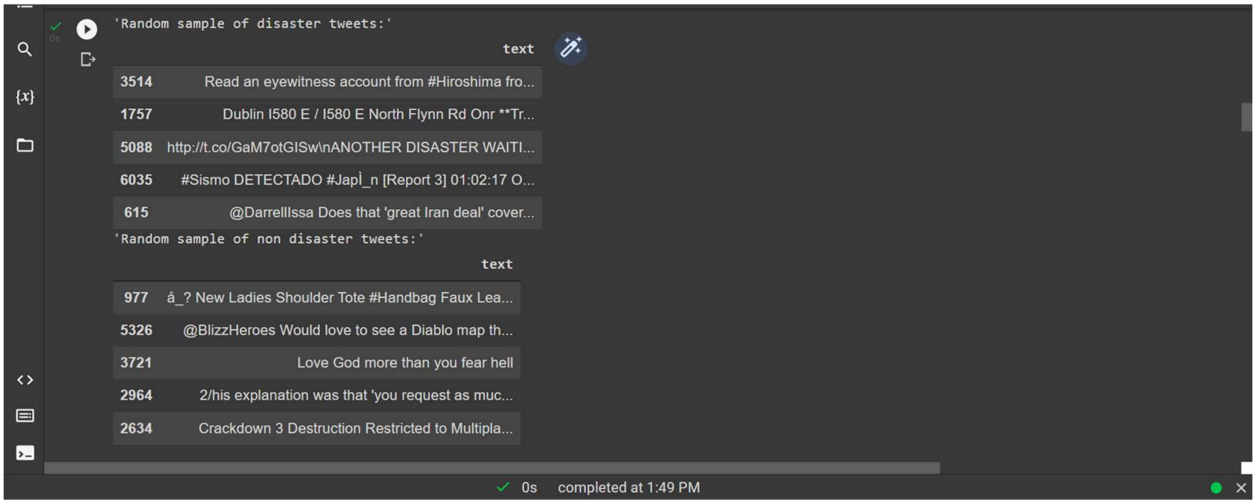
```
[7] # Visualization library
    import matplotlib.pyplot as plt
    import seaborn as sns
    from wordcloud import WordCloud
```

```
# using pandas value counts on target will give us number of 0's with is non disaster tweets, and 1's which is disaster tweets.
VCtrain=train['target'].value_counts().to_frame()

# seaborn barplot to display barchart
sns.barplot(data=VCtrain,x=VCtrain.index,y="target",palette="viridis")
VCtrain
```

	target
0	4342
1	3271


Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
D
+ Code + Text
RAM
Disk
Editing
[8]
4000
3000
2000
1000
0
target
0
1

```
# Going deep into disaster Tweets
display("Random sample of disaster tweets:",train[train.target==1].text.sample(5).to_frame())
display("Random sample of non disaster tweets:",train[train.target==0].text.sample(5).to_frame())
```

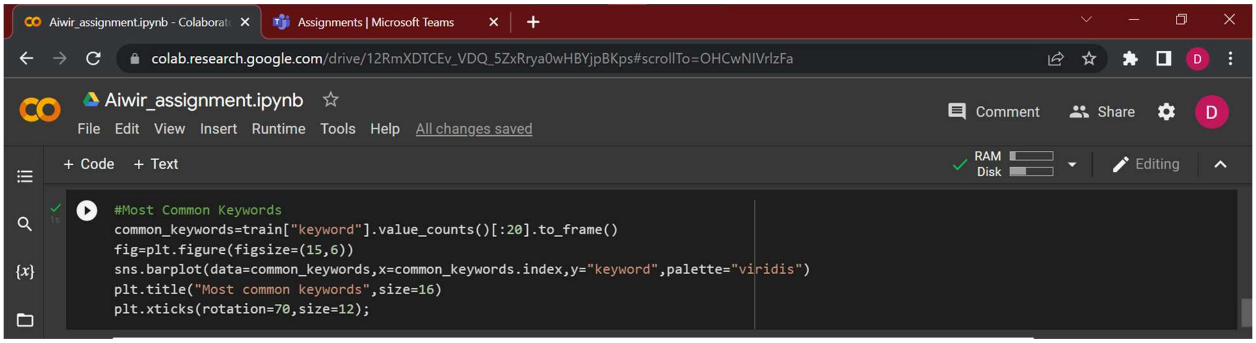


```
'Random sample of disaster tweets:'
```

	text
3514	Read an eyewitness account from #Hiroshima fro...
1757	Dublin I580 E / I580 E North Flynn Rd Onr **Tr...
5088	http://t.co/GaM7otGISw\nANOTHER DISASTER WAITI...
6035	#Sismo DETECTADO #JapÌ_n [Report 3] 01:02:17 O...
615	@DarrellIssa Does that 'great Iran deal' cover...

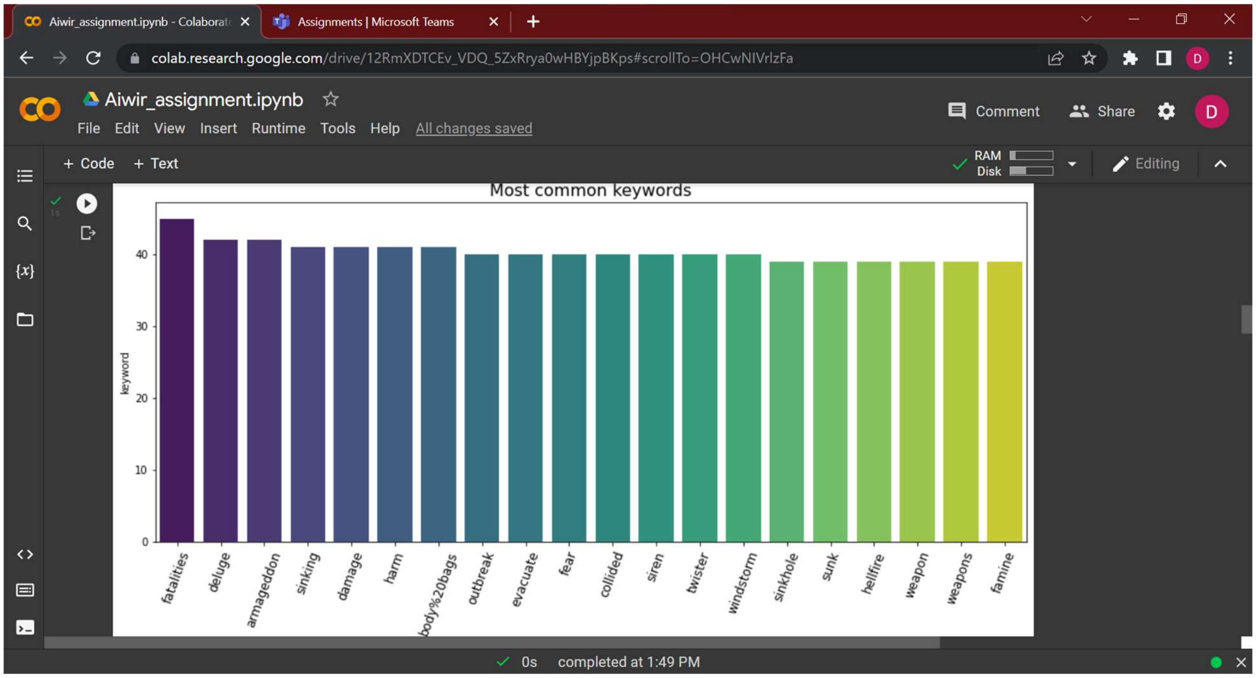
```
'Random sample of non disaster tweets:'
```

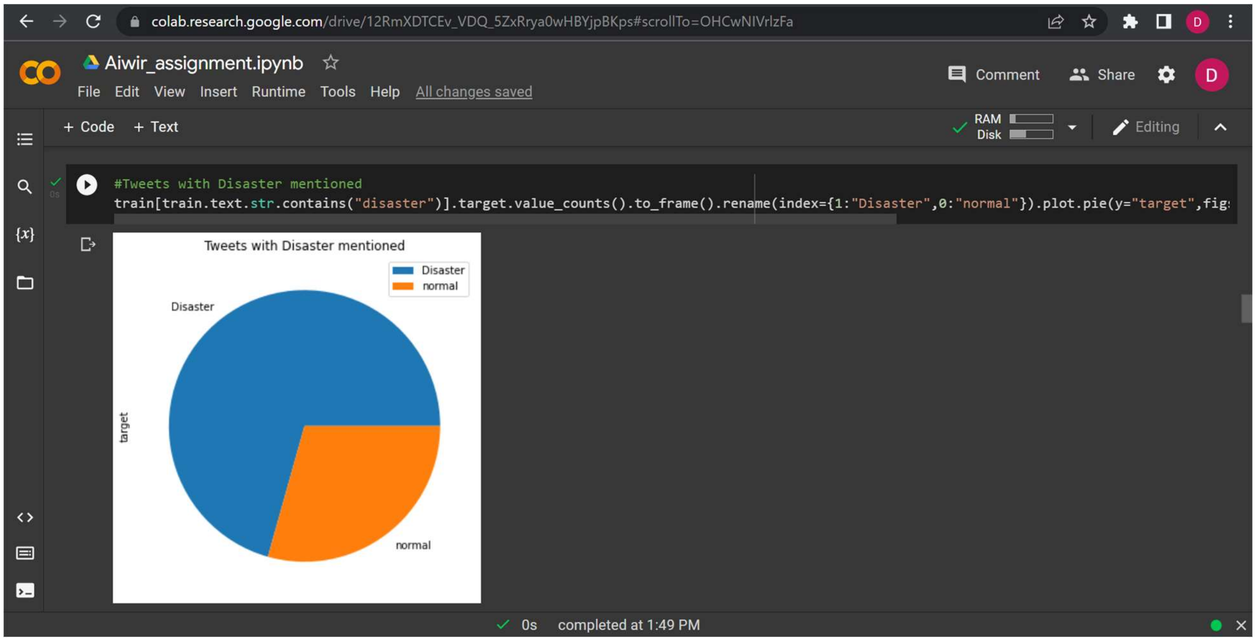
	text
977	â_? New Ladies Shoulder Tote #Handbag Faux Lea...
5326	@BlizzHeroes Would love to see a Diablo map th...
3721	Love God more than you fear hell
2964	2/his explanation was that 'you request as muc...
2634	Crackdown 3 Destruction Restricted to Multipla...



Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
RAM
Disk
Editing

```
#Most Common Keywords
common_keywords=train["keyword"].value_counts()[:20].to_frame()
fig=plt.figure(figsize=(15,6))
sns.barplot(data=common_keywords,x=common_keywords.index,y="keyword",palette="viridis")
plt.title("Most common keywords",size=16)
plt.xticks(rotation=70,size=12);
```

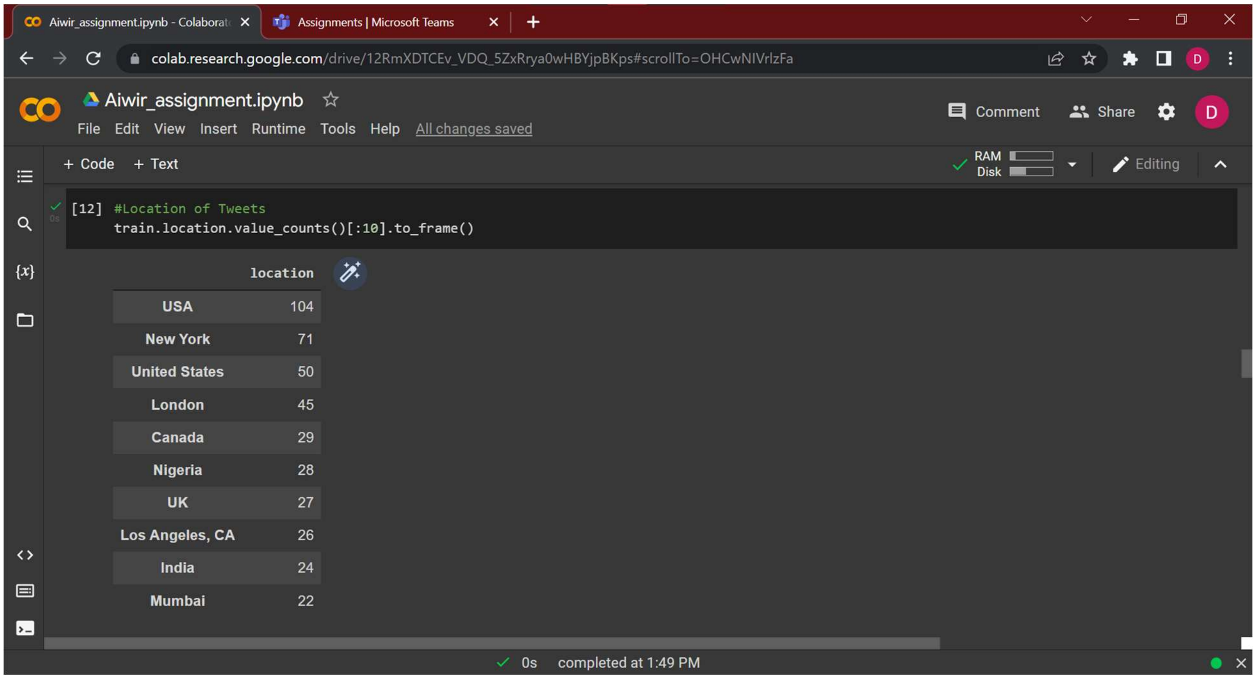




colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
RAM
Disk
Editing

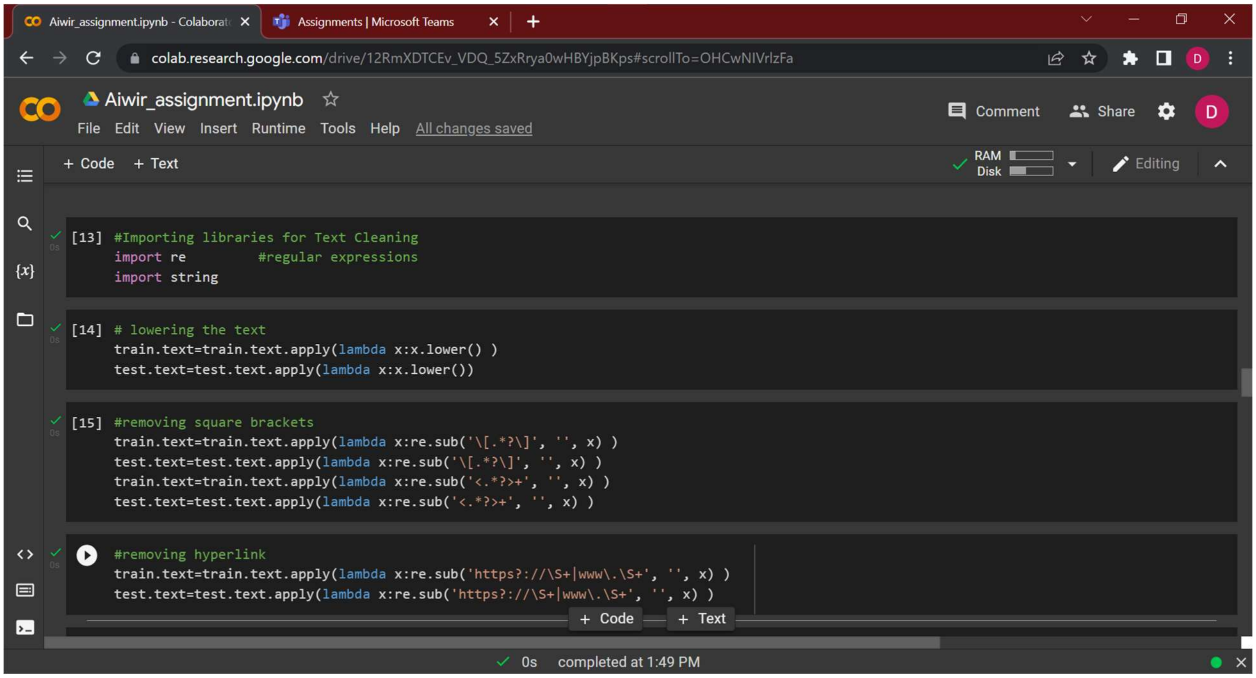
```
#Tweets with Disaster mentioned
train[train.text.str.contains("disaster")].target.value_counts().to_frame().rename(index={1:"Disaster",0:"normal"}).plot.pie(y="target",fig
```

Tweets with Disaster mentioned
Disaster
normal
Disaster
normal
target
✓ 0s completed at 1:49 PM


Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
RAM
Disk
Editing
0s completed at 1:49 PM

```
[12] #Location of Tweets
     train.location.value_counts()[:10].to_frame()
```

	location
USA	104
New York	71
United States	50
London	45
Canada	29
Nigeria	28
UK	27
Los Angeles, CA	26
India	24
Mumbai	22

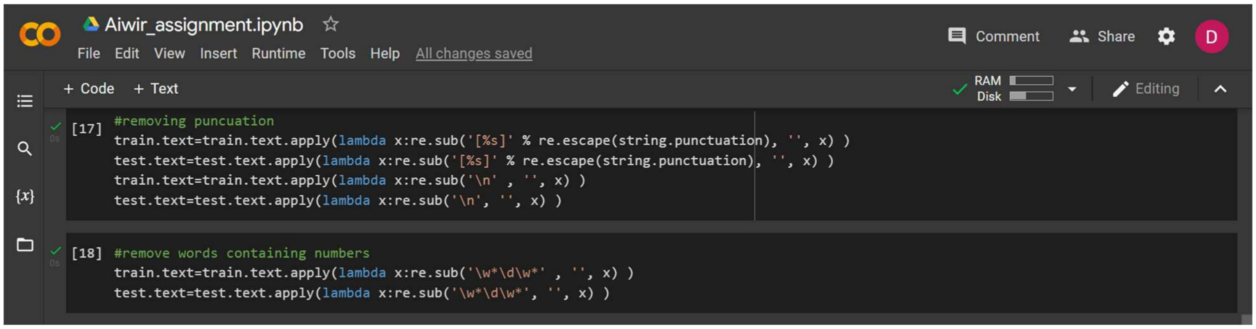

Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
RAM
Disk
Editing
0s completed at 1:49 PM

```
[13] #Importing libraries for Text Cleaning
     import re         #regular expressions
     import string
```

```
[14] # lowering the text
     train.text=train.text.apply(lambda x:x.lower() )
     test.text=test.text.apply(lambda x:x.lower())
```

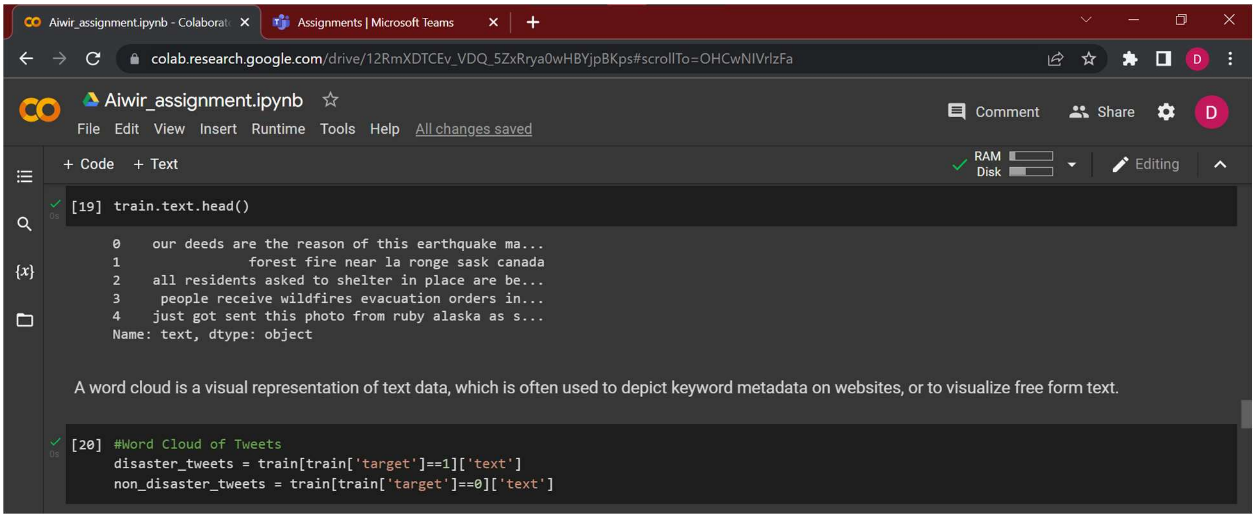
```
[15] #removing square brackets
     train.text=train.text.apply(lambda x:re.sub('\[.*?\]', '', x) )
     test.text=test.text.apply(lambda x:re.sub('\[.*?\]', '', x) )
     train.text=train.text.apply(lambda x:re.sub('<.*?>+', '', x) )
     test.text=test.text.apply(lambda x:re.sub('<.*?>+', '', x) )
```

```
     #removing hyperlink
     train.text=train.text.apply(lambda x:re.sub('https?://\S+|www\.\S+', '', x) )
     test.text=test.text.apply(lambda x:re.sub('https?://\S+|www\.\S+', '', x) )
```



```
[17] #removing puncuation
     train.text=train.text.apply(lambda x:re.sub('[%s]' % re.escape(string.punctuation), '', x) )
     test.text=test.text.apply(lambda x:re.sub('[%s]' % re.escape(string.punctuation), '', x) )
     train.text=train.text.apply(lambda x:re.sub('\n' , '', x) )
     test.text=test.text.apply(lambda x:re.sub('\n', '', x) )
```

```
[18] #remove words containing numbers
     train.text=train.text.apply(lambda x:re.sub('\w*\d\w*' , '', x) )
     test.text=test.text.apply(lambda x:re.sub('\w*\d\w*', '', x) )
```

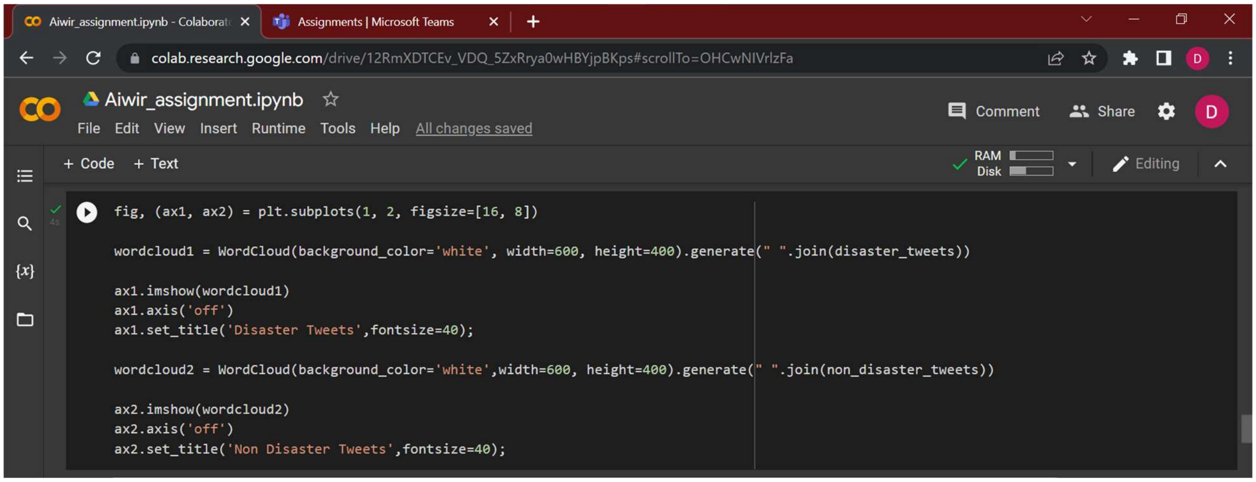

Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
RAM
Disk
Editing

```
[19] train.text.head()
```

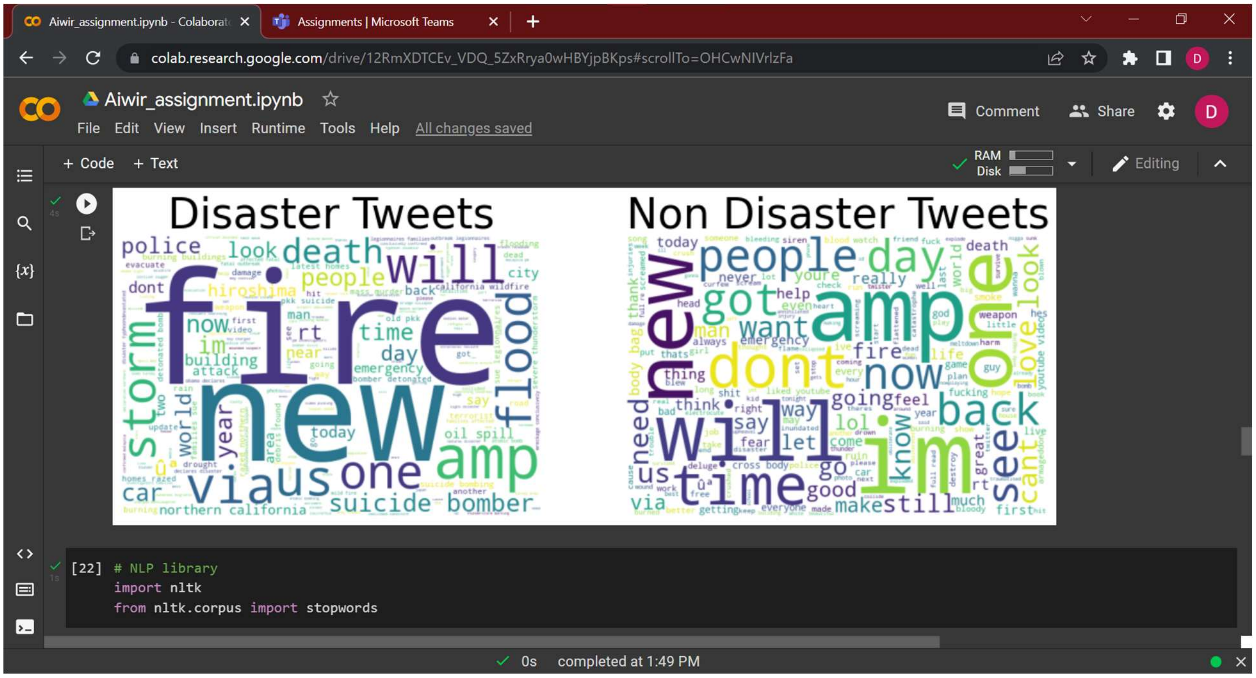
```
0    our deeds are the reason of this earthquake ma...
1               forest fire near la ronge sask canada
2    all residents asked to shelter in place are be...
3     people receive wildfires evacuation orders in...
4    just got sent this photo from ruby alaska as s...
Name: text, dtype: object
```

A word cloud is a visual representation of text data, which is often used to depict keyword metadata on websites, or to visualize free form text.

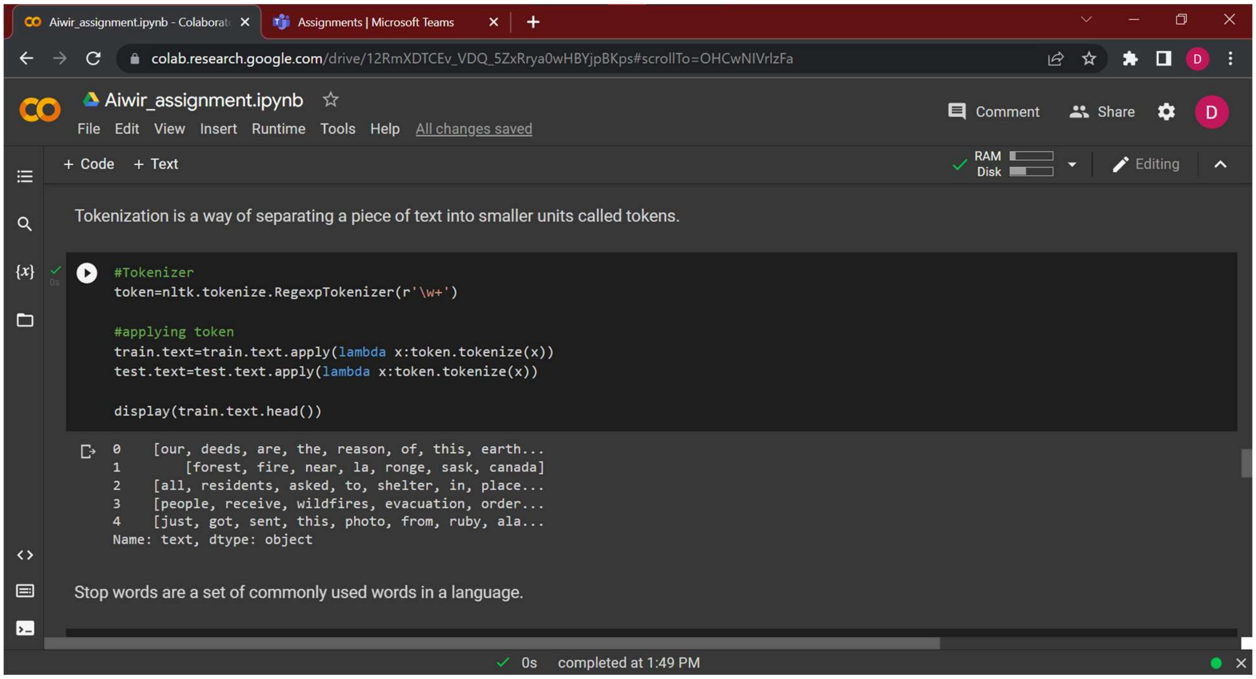
```
[20] #Word Cloud of Tweets
     disaster_tweets = train[train['target']==1]['text']
     non_disaster_tweets = train[train['target']==0]['text']
```


Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
RAM
Disk
Editing

```
fig, (ax1, ax2) = plt.subplots(1, 2, figsize=[16, 8])

wordcloud1 = WordCloud(background_color='white', width=600, height=400).generate(" ".join(disaster_tweets))

ax1.imshow(wordcloud1)
ax1.axis('off')
ax1.set_title('Disaster Tweets',fontsize=40);

wordcloud2 = WordCloud(background_color='white',width=600, height=400).generate(" ".join(non_disaster_tweets))

ax2.imshow(wordcloud2)
ax2.axis('off')
ax2.set_title('Non Disaster Tweets',fontsize=40);
```



```
[22] # NLP library
     import nltk
     from nltk.corpus import stopwords
```



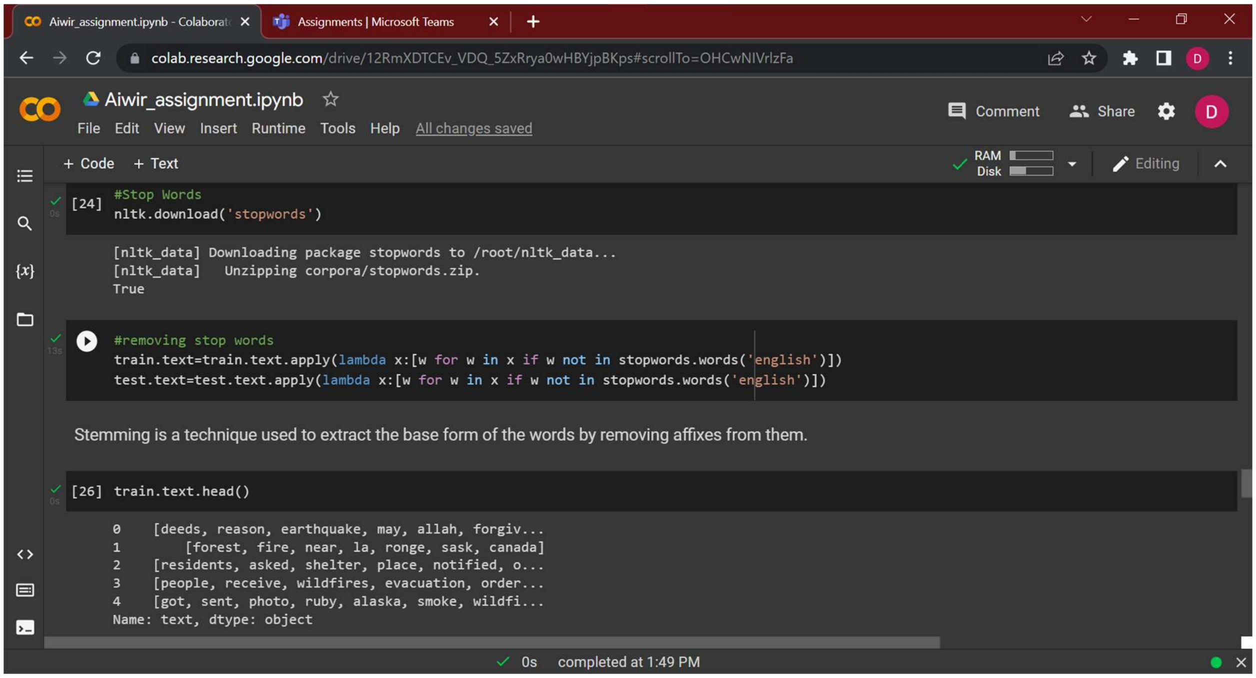
Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
RAM
Disk
Editing
0s completed at 1:49 PM

Tokenization is a way of separating a piece of text into smaller units called tokens.

```
#Tokenizer
token=nltk.tokenize.RegexpTokenizer(r'\w+')

#applying token
train.text=train.text.apply(lambda x:token.tokenize(x))
test.text=test.text.apply(lambda x:token.tokenize(x))

display(train.text.head())
```

```
0    [our, deeds, are, the, reason, of, this, earth...
1        [forest, fire, near, la, ronge, sask, canada]
2    [all, residents, asked, to, shelter, in, place...
3    [people, receive, wildfires, evacuation, order...
4    [just, got, sent, this, photo, from, ruby, ala...
Name: text, dtype: object
```

Stop words are a set of commonly used words in a language.



Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
RAM
Disk
Editing
0s completed at 1:49 PM

```
[24] #Stop Words
     nltk.download('stopwords')
```

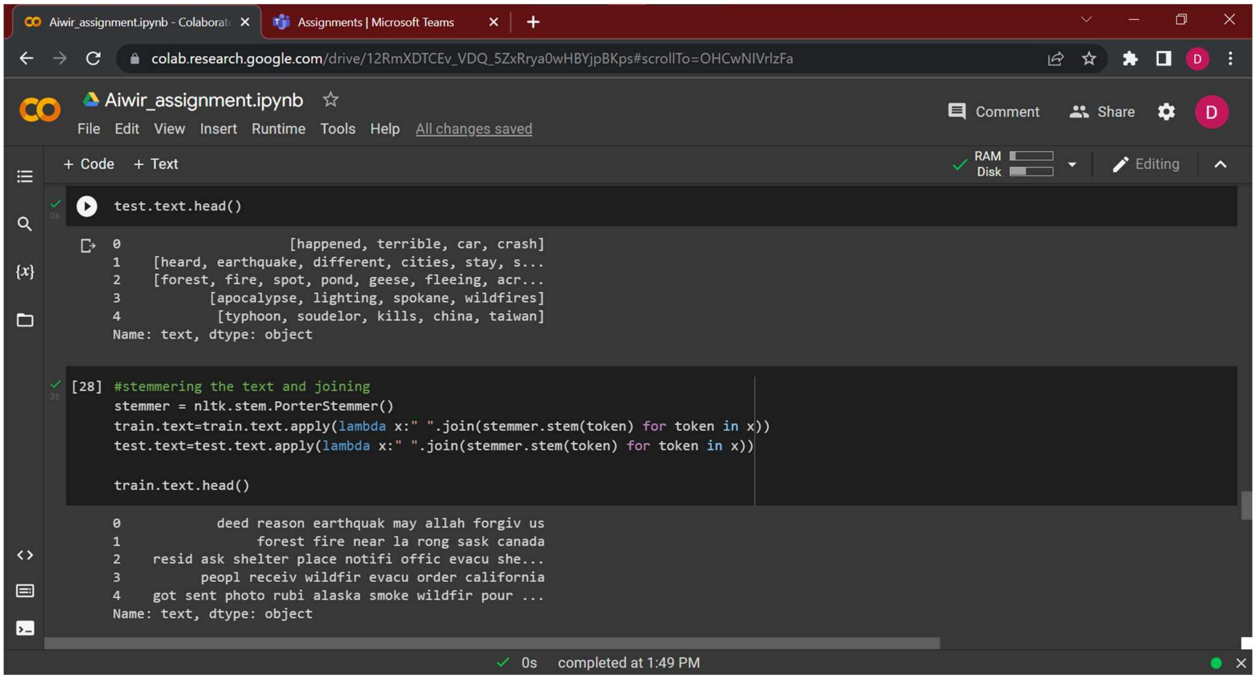
```
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Unzipping corpora/stopwords.zip.
True
```

```
#removing stop words
train.text=train.text.apply(lambda x:[w for w in x if w not in stopwords.words('english')])
test.text=test.text.apply(lambda x:[w for w in x if w not in stopwords.words('english')])
```

Stemming is a technique used to extract the base form of the words by removing affixes from them.

```
[26] train.text.head()
```

```
0    [deeds, reason, earthquake, may, allah, forgiv...
1        [forest, fire, near, la, ronge, sask, canada]
2    [residents, asked, shelter, place, notified, o...
3    [people, receive, wildfires, evacuation, order...
4    [got, sent, photo, ruby, alaska, smoke, wildfi...
Name: text, dtype: object
```

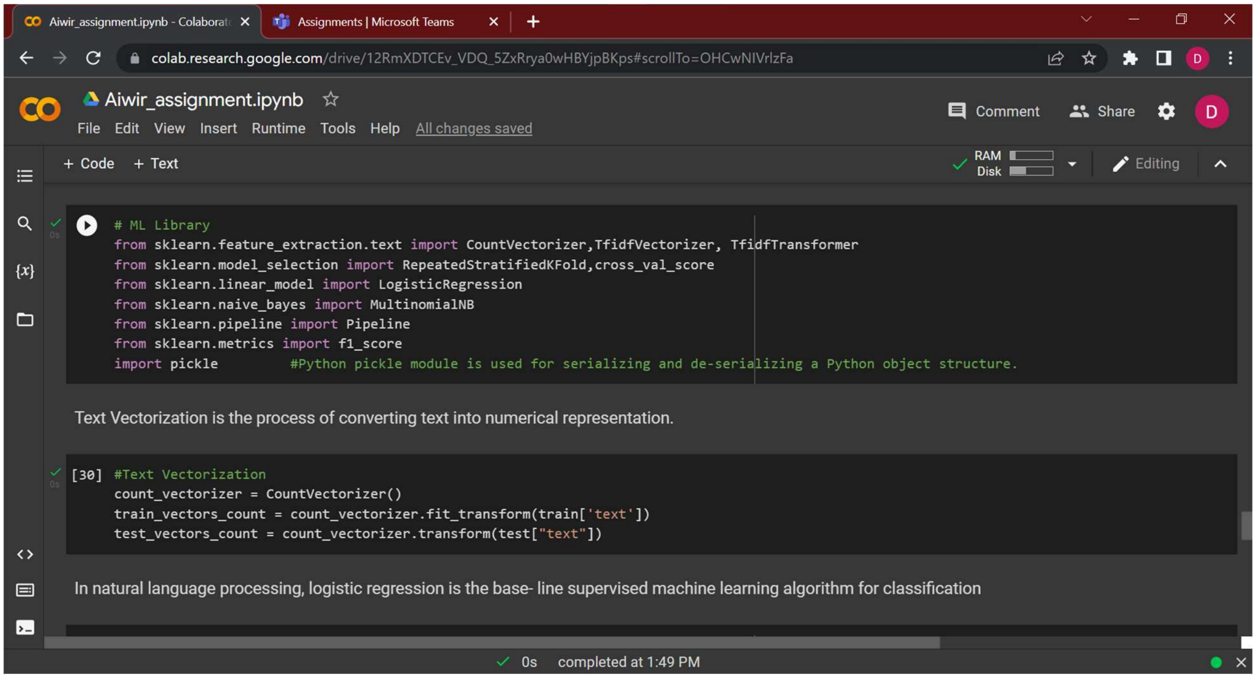

Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code
+ Text
RAM
Disk
Editing
0s completed at 1:49 PM

```
test.text.head()
```

```
0                     [happened, terrible, car, crash]
1     [heard, earthquake, different, cities, stay, s...
2     [forest, fire, spot, pond, geese, fleeing, acr...
3            [apocalypse, lighting, spokane, wildfires]
4             [typhoon, soudelor, kills, china, taiwan]
Name: text, dtype: object
```

```
[28] #stemmering the text and joining
     stemmer = nltk.stem.PorterStemmer()
     train.text=train.text.apply(lambda x:" ".join(stemmer.stem(token) for token in x))
     test.text=test.text.apply(lambda x:" ".join(stemmer.stem(token) for token in x))

     train.text.head()
```

```
0             deed reason earthquak may allah forgiv us
1                  forest fire near la rong sask canada
2     resid ask shelter place notifi offic evacu she...
3           peopl receiv wildfir evacu order california
4     got sent photo rubi alaska smoke wildfir pour ...
Name: text, dtype: object
```

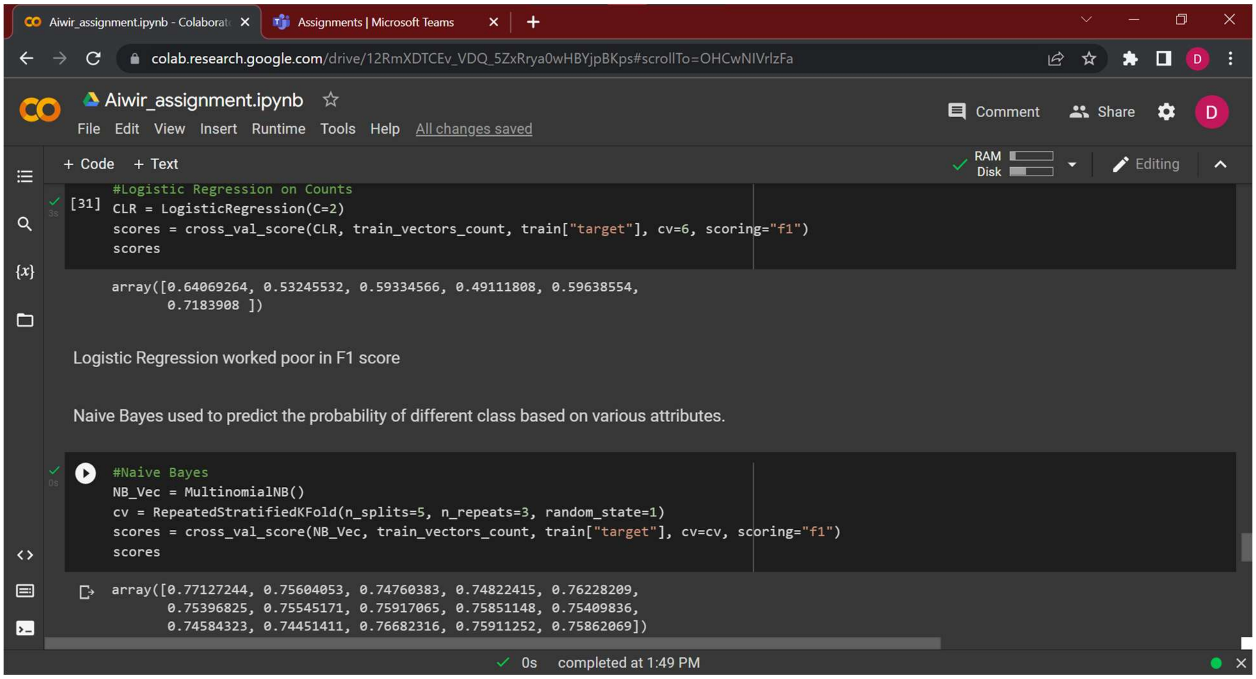

Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code
+ Text
RAM
Disk
Editing
0s completed at 1:49 PM

```
# ML Library
from sklearn.feature_extraction.text import CountVectorizer,TfidfVectorizer, TfidfTransformer
from sklearn.model_selection import RepeatedStratifiedKFold,cross_val_score
from sklearn.linear_model import LogisticRegression
from sklearn.naive_bayes import MultinomialNB
from sklearn.pipeline import Pipeline
from sklearn.metrics import f1_score
import pickle         #Python pickle module is used for serializing and de-serializing a Python object structure.
```

Text Vectorization is the process of converting text into numerical representation.

```
[30] #Text Vectorization
     count_vectorizer = CountVectorizer()
     train_vectors_count = count_vectorizer.fit_transform(train['text'])
     test_vectors_count = count_vectorizer.transform(test["text"])
```

In natural language processing, logistic regression is the base- line supervised machine learning algorithm for classification

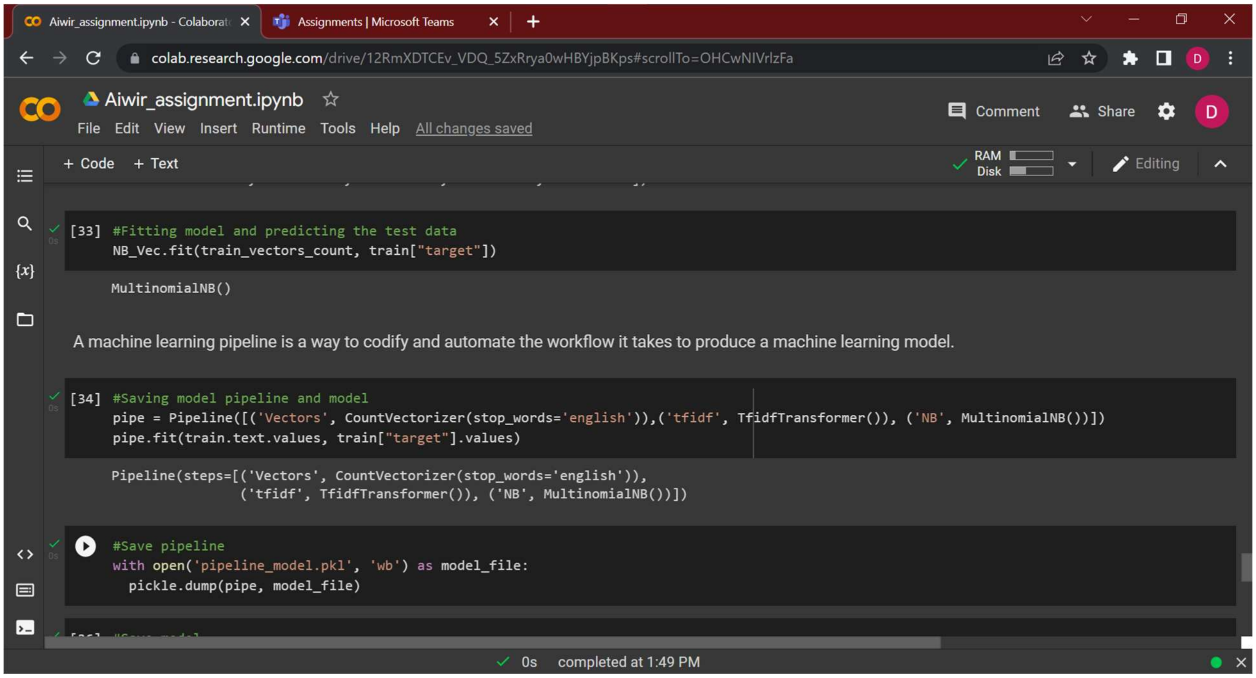

Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment Share
+ Code + Text
RAM Disk
Editing
0s completed at 1:49 PM

```
[31] #Logistic Regression on Counts
     CLR = LogisticRegression(C=2)
     scores = cross_val_score(CLR, train_vectors_count, train["target"], cv=6, scoring="f1")
     scores

     array([0.64069264, 0.53245532, 0.59334566, 0.49111808, 0.59638554,
            0.7183908 ])
```

Logistic Regression worked poor in F1 score

Naive Bayes used to predict the probability of different class based on various attributes.

```
#Naive Bayes
NB_Vec = MultinomialNB()
cv = RepeatedStratifiedKFold(n_splits=5, n_repeats=3, random_state=1)
scores = cross_val_score(NB_Vec, train_vectors_count, train["target"], cv=cv, scoring="f1")
scores

array([0.77127244, 0.75604053, 0.74760383, 0.74822415, 0.76228209,
       0.75396825, 0.75545171, 0.75917065, 0.75851148, 0.75409836,
       0.74584323, 0.74451411, 0.76682316, 0.75911252, 0.75862069])
```

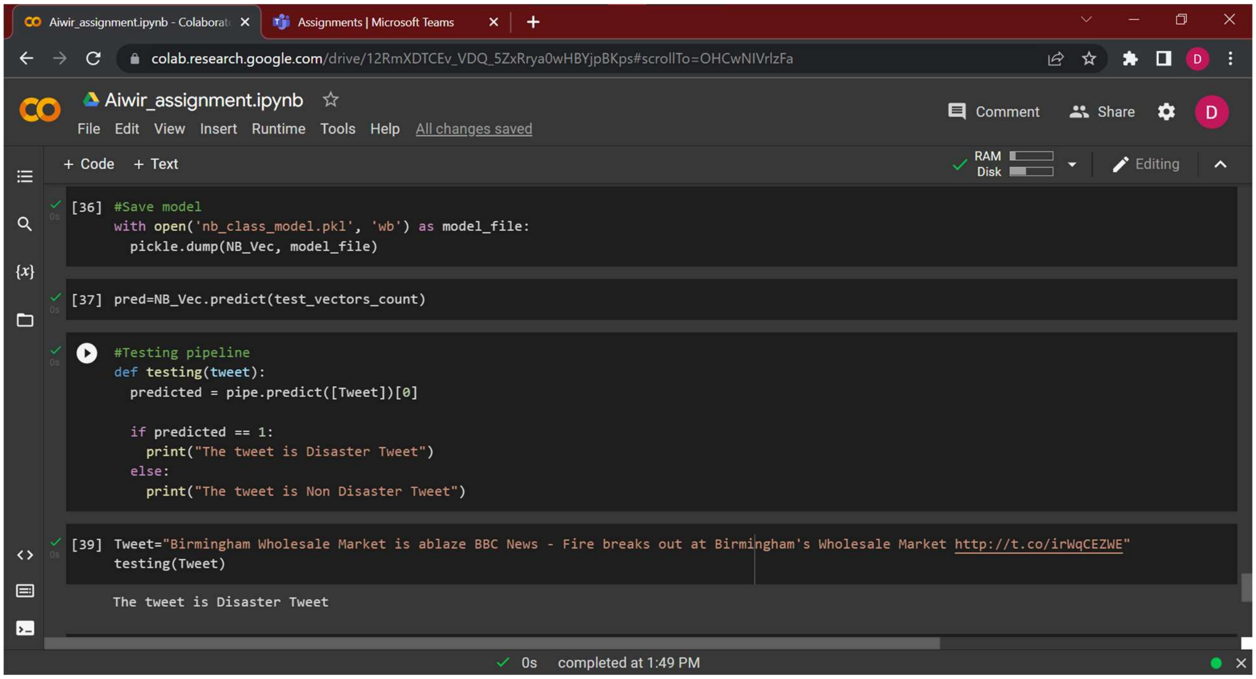

Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment Share
+ Code + Text
RAM Disk
Editing
0s completed at 1:49 PM

```
[33] #Fitting model and predicting the test data
     NB_Vec.fit(train_vectors_count, train["target"])

     MultinomialNB()
```

A machine learning pipeline is a way to codify and automate the workflow it takes to produce a machine learning model.

```
[34] #Saving model pipeline and model
     pipe = Pipeline([('Vectors', CountVectorizer(stop_words='english')),('tfidf', TfidfTransformer()), ('NB', MultinomialNB())])
     pipe.fit(train.text.values, train["target"].values)

     Pipeline(steps=[('Vectors', CountVectorizer(stop_words='english')),
                     ('tfidf', TfidfTransformer()), ('NB', MultinomialNB())])
```

```
#Save pipeline
with open('pipeline_model.pkl', 'wb') as model_file:
  pickle.dump(pipe, model_file)
```

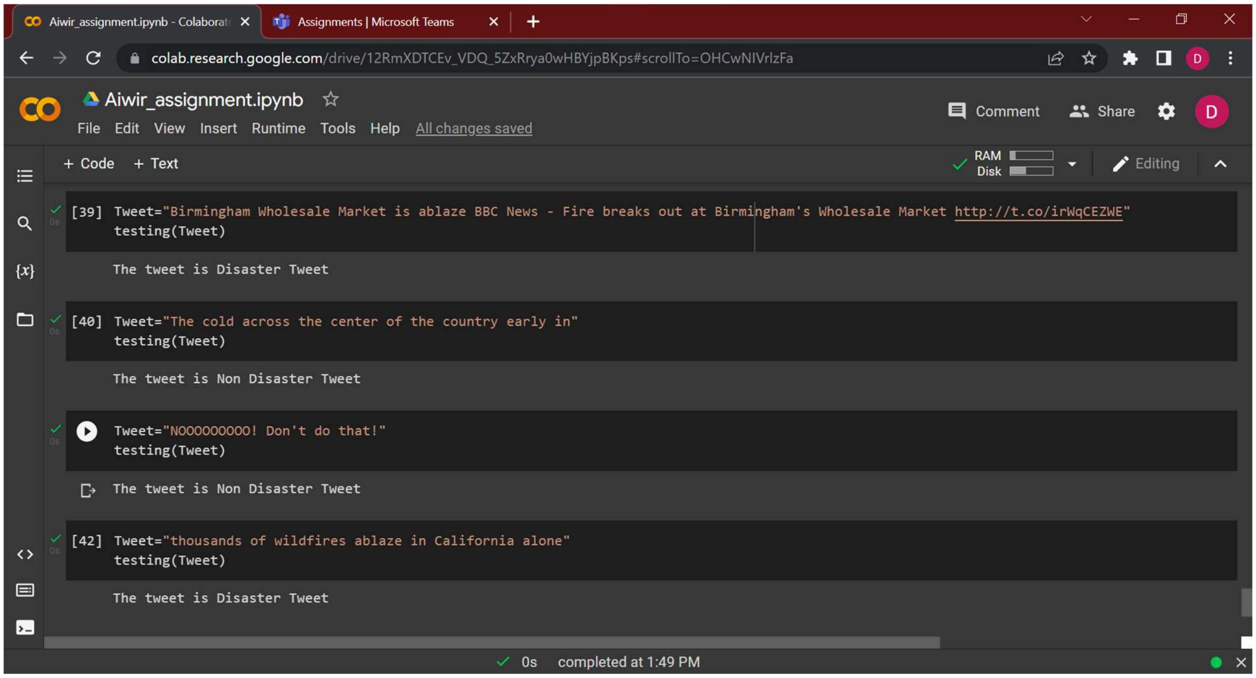

Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
D
+ Code + Text
RAM
Disk
Editing
0s completed at 1:49 PM

```
[36] #Save model
     with open('nb_class_model.pkl', 'wb') as model_file:
       pickle.dump(NB_Vec, model_file)
```

```
[37] pred=NB_Vec.predict(test_vectors_count)
```

```
     #Testing pipeline
     def testing(tweet):
       predicted = pipe.predict([Tweet])[0]

       if predicted == 1:
         print("The tweet is Disaster Tweet")
       else:
         print("The tweet is Non Disaster Tweet")
```

```
[39] Tweet="Birmingham Wholesale Market is ablaze BBC News - Fire breaks out at Birmingham's Wholesale Market http://t.co/irWqCEZWE"
     testing(Tweet)

     The tweet is Disaster Tweet
```


Aiwir_assignment.ipynb - Colaborat
Assignments | Microsoft Teams
colab.research.google.com/drive/12RmXDTCEv_VDQ_5ZxRrya0wHBYjpBKps#scrollTo=OHCwNIVrlzFa
Aiwir_assignment.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
D
+ Code + Text
RAM
Disk
Editing
0s completed at 1:49 PM

```
[39] Tweet="Birmingham Wholesale Market is ablaze BBC News - Fire breaks out at Birmingham's Wholesale Market http://t.co/irWqCEZWE"
     testing(Tweet)

     The tweet is Disaster Tweet
```

```
[40] Tweet="The cold across the center of the country early in"
     testing(Tweet)

     The tweet is Non Disaster Tweet
```

```
     Tweet="NOOOOOOOOO! Don't do that!"
     testing(Tweet)

     The tweet is Non Disaster Tweet
```

```
[42] Tweet="thousands of wildfires ablaze in California alone"
     testing(Tweet)

     The tweet is Disaster Tweet
```