In [ ]:

```
!pip install pyLDAvis
```

```
Requirement already satisfied: pyLDAvis in /usr/local/lib/python3.7/dist-packages (3.3.1)
Requirement already satisfied: scikit-learn in /usr/local/lib/python3.7/dist-packages (from pyLDAvis) (0.22.2.post1)
Requirement already satisfied: setuptools in /usr/local/lib/python3.7/dist-packages (from pyLDAvis) (57.4.0)
Requirement already satisfied: pandas>=1.2.0 in /usr/local/lib/python3.7/dist-packages (from pyLDAvis) (1.3.3)
Requirement already satisfied: gensim in /usr/local/lib/python3.7/dist-packages (from pyLDAvis) (3.6.0)
Requirement already satisfied: jinja2 in /usr/local/lib/python3.7/dist-packages (from pyLDAvis) (2.11.3)
Requirement already satisfied: scipy in /usr/local/lib/python3.7/dist-packages (from pyLDAvis) (1.4.1)
Requirement already satisfied: numpy>=1.20.0 in /usr/local/lib/python3.7/dist-packages (from pyLDAvis) (1.21.2)
Requirement already satisfied: funcy in /usr/local/lib/python3.7/dist-packages (from pyLDAvis) (1.16)
Requirement already satisfied: future in /usr/local/lib/python3.7/dist-packages (from pyLDAvis) (0.16.0)
Requirement already satisfied: sklearn in /usr/local/lib/python3.7/dist-packages (from pyLDAvis) (0.0)
Requirement already satisfied: joblib in /usr/local/lib/python3.7/dist-packages (from pyLDAvis) (1.0.1)
Requirement already satisfied: numexpr in /usr/local/lib/python3.7/dist-packages (from pyLDAvis) (2.7.3)
Requirement already satisfied: python-dateutil>=2.7.3 in /usr/local/lib/python3.7/dist-packages (from pandas>=1.2.0->pyLDAvis) (2.8.2)
Requirement already satisfied: pytz>=2017.3 in /usr/local/lib/python3.7/dist-packages (from pandas>=1.2.0->pyLDAvis) (2018.9)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-packages (from python-dateutil>=2.7.3->pandas>=1.2.0->pyLDAvis) (1.15.0)
Requirement already satisfied: smart-open>=1.2.1 in /usr/local/lib/python3.7/dist-packages (from gensim->pyLDAvis) (5.1.0)
Requirement already satisfied: MarkupSafe>=0.23 in /usr/local/lib/python3.7/dist-packages (from jinja2->pyLDAvis) (2.0.1)
```

In [ ]:

```
from google.colab import drive
drive.mount('/content/gdrive')

#changing the working directory
# %cd /content/gdrive/My Drive/Dataset(Colab)
#Check the present working directory using pwd command
```

```
Drive already mounted at /content/gdrive; to attempt to forcibly remount, call drive.mount("/content/gdrive", force_remount=True).
```

In [ ]:

```
# Importing modules
import pandas as pd
import os
# Read data into papers
papers = pd.read_csv('/content/gdrive/MyDrive/Dataset(Colab)/papers1.csv')
# Print head
papers.head()
# papers.info()
```

Out[ ]:

	id	year	title	event_type	pdf_name	abstract	paper_text
0	1	1987	Self-Organization of Associative Database and ...	NaN	1-self-organization-of-associative-database-an...	Abstract Missing	767\n\nSELF-ORGANIZATION OF ASSOCIATIVE DATABA...
1	10	1987	A Mean Field Theory of Layer IV of Visual Cort...	NaN	10-a-mean-field-theory-of-layer-iv-of-visual-c...	Abstract Missing	683\n\nA MEAN FIELD THEORY OF LAYER IV OF VISU...
2	100	1988	Storing Covariance by the Associative Long-Ter...	NaN	100-storing-covariance-by-the-associative-long...	Abstract Missing	394\n\nSTORING COVARIANCE BY THE ASSOCIATIVE\n...
3	1000	1994	Bayesian Query Construction for Neural Network...	NaN	1000-bayesian-query-construction-for-neural-ne...	Abstract Missing	Bayesian Query Construction for Neural\nNetwor...
4	1001	1994	Neural Network Ensembles, Cross Validation, an...	NaN	1001-neural-network-ensembles-cross-validation...	Abstract Missing	Neural Network Ensembles, Cross\nValidation, a...

In [ ]:

```
# Remove the columns
papers = papers.drop(columns=['id', 'event_type', 'pdf_name'], axis=1)
# Print out the first rows of papers
papers.head()
```

Out[ ]:

	year	title	abstract	paper_text
0	1987	Self-Organization of Associative Database and ...	Abstract Missing	767\n\nSELF-ORGANIZATION OF ASSOCIATIVE DATABA...
1	1987	A Mean Field Theory of Layer IV of Visual Cort...	Abstract Missing	683\n\nA MEAN FIELD THEORY OF LAYER IV OF VISU...
2	1988	Storing Covariance by the Associative Long-Ter...	Abstract Missing	394\n\nSTORING COVARIANCE BY THE ASSOCIATIVE\n...
3	1994	Bayesian Query Construction for Neural Network...	Abstract Missing	Bayesian Query Construction for Neural\nNetwor...
4	1994	Neural Network Ensembles, Cross Validation, an...	Abstract Missing	Neural Network Ensembles, Cross\nValidation, a...

In [ ]:

```
# Load the regular expression library
import re
# Remove punctuation

papers['paper_text_processed'] = \
papers['paper_text'].map(lambda x: re.sub('[,\\.!?]', '', x))

# print(papers['paper_text_processed'])


# # Convert the titles to lowercase
papers['paper_text_processed'] = \
papers['paper_text_processed'].map(lambda x: x.lower())
# # Print out the first rows of papers
papers['paper_text_processed'].head()
```

Out[ ]:

```
0    767\n\nself-organization of associative databa...
1    683\n\na mean field theory of layer iv of visu...
2    394\n\nstoring covariance by the associative\n...
3    bayesian query construction for neural\nnnetwor...
4    neural network ensembles cross\nvalidation and...
Name: paper_text_processed, dtype: object
```

In [ ]:

```
# Import the wordcloud library
from wordcloud import WordCloud
# Join the different processed titles together.
long_string = ','.join(list(papers['paper_text_processed'].values))
# print(long_string[0:30])
# Create a WordCloud object
wordcloud = WordCloud(background_color="black", max_words=200, contour_width=3, contour_color='steelblue')
# Generate a word cloud
wordcloud.generate(long_string)
# Visualize the word cloud
wordcloud.to_image()
```

Out[ ]:

In [ ]:

```
import gensim
from gensim.utils import simple_preprocess
import nltk
nltk.download('stopwords')
from nltk.corpus import stopwords
stop_words = stopwords.words('english')
stop_words.extend(['from', 'subject', 're', 'edu', 'use'])
def sent_to_words(sentences):
    for sentence in sentences:
        # deacc=True removes punctuations
        yield(gensim.utils.simple_preprocess(str(sentence), deacc=True))


def remove_stopwords(texts):
  # dirs=[]
  # for doc in texts:
  #   birs=[]
  #   for word in simple_preprocess(str(doc)):
  #     if word not in stop_words:
  #       birs.append(word)
  #   final=" ".join(birs)
  #   dirs.append(final)
  # return dirs
    return [[word for word in simple_preprocess(str(doc))
             if word not in stop_words] for doc in texts]


data = papers.paper_text_processed.values.tolist()
# print(data[1]) # contains all the rows in a list as an individual element
# print(papers['paper_text_processed'])

data_words = list(sent_to_words(data)) #it saves a sentence as a list by treating every word as an alement of t

# print((data_words[1]))
# remove stop words
# data_words = remove_stopwords(data_words)
```

```
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
```

In [ ]:

```
import gensim.corpora as corpora
# Create Dictionary
id2word = corpora.Dictionary(data_words)
print(id2word)
# Create Corpus
texts = data_words
print(texts)
# Term Document Frequency
corpus = [id2word.doc2bow(text) for text in texts]
# View
print(corpus[:1][0][:30])
```

[illegible]
s', 'the', 'ensemble', 'output', 'is', 'determined', 'by', 'weighting', 'the', 'hypotheses', 'with', 'the', 'log', 'of', 'where', 'is', 'proportional', 'to', 'the', 'weak', 'learner', 'error', 'rate', 'if', 'the', 'weak', 'learner', 'has', 'good', 'error', 'rate', 'performance', 'it', 'will', 'contribute', 'significantly', 'to', 'the', 'output', 'because', 'then', 'will', 'be', 'large', 'figure', 'shows', 'the', 'general', 'shape', 'of', 'the', 'curves', 'we', 'would', 'expect', 'say', 'we', 'have', 'constructed', 'weak', 'learners', 'where', 'is', 'large', 'number', 'right', 'hand', 'side', 'of', 'the', 'graph', 'the', 'th', 'weak', 'learner', 'top', 'curve', 'will', 'have', 'training', 'error', 'rate', 'that', 'approaches', 'because', 'it', 'is', 'trained', 'on', 'difficult', 'patterns', 'and', 'can', 'do', 'only', 'sightly', 'better', 'than', 'guessing', 'the', 'bottom', 'two', 'curves', 'show', 'the', 'test', 'and', 'training', 'error', 'rates', 'of', 'the', 'ensemble', 'using', 'all', 'weak', 'learners', 'which', 'decrease', 'as', 'weak', 'learners', 'are', 'added', 'to', 'the', 'ensemble', 'boosting', 'boosting', 'arises', 'from', 'the', 'pac', 'probably', 'approximately', 'correct', 'learning', 'model', 'which', 'has', 'as', 'one', 'of', 'its', 'primary', 'interests', 'the', 'efficiency', 'of', 'learning', 'schapire', 'was', 'the', 'first', 'one', 'to', 'show', 'that', 'series', 'of', 'weak', 'learners', 'could', 'be', 'converted', 'to', 'strong', 'learner', 'the', 'detailed', 'algorithm', 'is', 'show', 'in', 'figure', 'let', 'us', 'call', 'the', 'set', 'of', 'distinct', 'examples', 'the', 'original', 'training', 'set', 'we', 'distinguish', 'the', 'original', 'training', 'set', 'from', 'what', 'we', 'will', 'call', 'the', 'filtered', 'training', 'set', 'which', 'consists', 'of', 'examples', 'picked', 'with', 'replacement', 'from', 'the', 'original', 'training', 'set', 'basically', 'each', 'of', 'original', 'examples', 'is', 'assigned', 'weight', 'which', 'is', 'proportional', 'to', 'the', 'probability', 'that', 'the', 'example', 'will', 'appear', 'in', 'the', 'filtered', 'training', 'set', 'these', 'weights', 'have', 'nothing', 'to', 'do', 'with', 'the', 'weights', 'usually', 'associated', 'with', 'neural', 'networks', 'initially', 'all', 'examples', 'are', 'assigned', 'weight', 'of', 'unity', 'so', 'that', 'all', 'the', 'examples', 'are', 'equally', 'likely', 'to', 'show', 'up', 'in', 'the', 'initial', 'set', 'of', 'training', 'examples', 'however', 'the', 'weights', 'are', 'altered', 'at', 'each', 'state', 'of', 'boosting', 'step', 'of', 'figure', 'and', 'if', 'the', 'weights', 'are', 'high', 'we', 'may', 'have', 'multiple', 'copies', 'of', 'some', 'of', 'the', 'original', 'examples', 'appearing', 'in', 'the', 'filtered', 'training', 'set', 'in', 'step', 'three', 'of', 'this', 'algorithm', 'we', 'calculate', 'what', 'is', 'called', 'the', 'weighted', 'training', 'error', 'and', 'this', 'is', 'the', 'error', 'rate', 'over', 'all', 'the', 'original', 'training', 'examples', 'weighted', 'by', 'their', 'current', 'respective', 'probabilities', 'the', 'algorithms', 'terminates', 'if', 'this', 'error', 'rate', 'is', 'no', 'better', 'than', 'guessing', 'or', 'zero', 'then', 'the', 'weights', 'of', 'step', 'do', 'not', 'change', 'although', 'not', 'called', 'for', 'in', 'the', 'original', 'algorithm', 'we', 'also', 'have', 'an', 'original', 'set', 'of', 'pruning', 'examples', 'which', 'also', 'are', 'assigned', 'weights', 'to', 'form', 'filtered', 'pruning', 'set', 'and', 'used', 'to', 'prune', 'the', 'classification', 'trees', 'constructed', 'using', 'the', 'filtered', 'training', 'set', 'it', 'is', 'known', 'mingers', 'that', 'reducing', 'the', 'size', 'of', 'the', 'tree', 'pruning', 'improves', 'generalization', 'decision', 'trees', 'for', 'our', 'implementation', 'of', 'decision', 'trees', 'we', 'have', 'set', 'of', 'features', 'attributes', 'that', 'specifies', 'an', 'example', 'along', 'with', 'their', 'classification', 'we', 'discuss', 'the', 'two', 'class', 'problem', 'primarily', 'we', 'pick', 'feature', 'that', 'based', 'on', 'some', 'criterion', 'best', 'splits', 'the', 'examples', 'into', 'two', 'subsets', 'each', 'of', 'these', 'two', 'subsets', 'will', 'usually', 'not', 'contain', 'examples', 'of', 'just', 'one', 'class', 'so', 'we', 'recursively', 'divide', 'the', 'subsets', 'until', 'the', 'final', 'subsets', 'each', 'contain', 'examples', 'of', 'just', 'one', 'class', 'thus', 'each', 'internal', 'node', 'specifies', 'feature', 'and', 'value', 'for', 'that', 'feature', 'that', 'determines', 'whether', 'one', 'should', 'take', 'the', 'left', 'or', 'right', 'branch', 'emanating', 'from', 'that', 'node', 'at', 'terminal', 'nodes', 'we', 'make', 'the', 'final', 'decision', 'class', 'or', 'thus', 'in', 'decision', 'trees', 'one', 'starts', 'at', 'root', 'node', 'and', 'progressively', 'traverses', 'the', 'tree', 'from', 'the', 'root', 'node', 'to', 'one', 'of', 'the', 'druckerc', 'cortes', 'inputs', 'training', 'pauans', 'pruning', 'pauems', 'test', 'pauans', 'laitialize', 'the', 'weight', 'veco', 'of', 'the', 'training', 'pattems', 'wi', 'for']]
[(0, 1), (1, 8), (2, 1), (3, 1), (4, 1), (5, 2), (6, 1), (7, 6), (8, 1), (9, 1), (10, 3), (11, 1), (12, 2), (13, 2), (14, 1), (15, 1), (16, 1), (17, 1), (18, 1), (19, 6), (20, 2), (21, 4), (22, 8), (23, 5), (24, 1), (25, 1), (26, 2), (27, 2), (28, 1), (29, 1)]

In [ ]:

```
from pprint import pprint
# number of topics
num_topics = 10
# Build LDA model
lda_model = gensim.models.LdaMulticore(corpus=corpus,
                                       id2word=id2word,
                                       num_topics=num_topics)
# Print the Keyword in the 10 topics
pprint(lda_model.print_topics())
doc_lda = lda_model[corpus]
```

```
[(0,
  '0.047*"the" + 0.023*"of" + 0.020*"to" + 0.019*"in" + 0.017*"and" + '
  '0.013*"is" + 0.011*"for" + 0.007*"on" + 0.006*"this" + 0.006*"are"'),
 (1,
  '0.041*"the" + 0.030*"of" + 0.017*"and" + 0.017*"in" + 0.015*"is" + '
  '0.013*"to" + 0.012*"for" + 0.008*"be" + 0.007*"that" + 0.007*"are"'),
 (2,
  '0.087*"the" + 0.048*"of" + 0.024*"and" + 0.020*"is" + 0.019*"in" + '
  '0.018*"to" + 0.012*"for" + 0.009*"are" + 0.009*"by" + 0.007*"that"'),
 (3,
  '0.078*"the" + 0.037*"of" + 0.023*"and" + 0.022*"to" + 0.019*"in" + '
  '0.013*"for" + 0.013*"is" + 0.008*"that" + 0.007*"with" + 0.007*"be"'),
 (4,
  '0.086*"the" + 0.031*"of" + 0.026*"and" + 0.023*"to" + 0.019*"in" + '
  '0.015*"for" + 0.015*"is" + 0.009*"that" + 0.009*"we" + 0.008*"this"'),
 (5,
  '0.054*"the" + 0.040*"of" + 0.027*"is" + 0.022*"in" + 0.021*"and" + '
  '0.021*"to" + 0.008*"by" + 0.008*"as" + 0.007*"that" + 0.006*"for"'),
 (6,
  '0.062*"the" + 0.038*"of" + 0.025*"and" + 0.023*"in" + 0.019*"is" + '
  '0.017*"to" + 0.014*"for" + 0.011*"we" + 0.009*"that" + 0.008*"as"'),
 (7,
  '0.062*"the" + 0.031*"of" + 0.024*"and" + 0.014*"in" + 0.013*"to" + '
  '0.011*"is" + 0.008*"that" + 0.007*"for" + 0.006*"we" + 0.006*"by"'),
 (8,
  '0.052*"the" + 0.036*"of" + 0.025*"to" + 0.021*"in" + 0.021*"and" + '
  '0.019*"is" + 0.013*"for" + 0.008*"by" + 0.008*"as" + 0.008*"that"'),
 (9,
  '0.072*"the" + 0.038*"of" + 0.029*"in" + 0.023*"and" + 0.022*"is" + '
  '0.020*"to" + 0.011*"for" + 0.008*"that" + 0.007*"with" + 0.007*"by"')]
```

In [ ]:

```
import pyLDAvis
import pickle
import pyLDAvis.gensim_models
pyLDAvis.enable_notebook()
vis=pyLDAvis.gensim_models.prepare(lda_model, corpus, id2word, mds="mmds", R=30)
vis
```

```
/usr/local/lib/python3.7/dist-packages/past/types/oldstr.py:5: DeprecationWarning: Using or importing the ABCs from 'collections' instead of from 'collections.abc' is deprecated since Python 3.3,and in 3.9 it will stop working
  from collections import Iterable
/usr/local/lib/python3.7/dist-packages/sklearn/decomposition/_lda.py:29: DeprecationWarning: `np.float` is a deprecated alias for the builtin `float`. To silence this warning, use `float` by itself. Doing this will not modify any behavior and is safe. If you specifically wanted the numpy scalar type, use `np.float64` here.
Deprecated in NumPy 1.20; for more details and guidance: https://numpy.org/devdocs/release/1.20.0-notes.html#deprecations
  EPS = np.finfo(np.float).eps
/usr/local/lib/python3.7/dist-packages/pyLDAvis/_prepare.py:247: FutureWarning: In a future version of pandas all arguments of DataFrame.drop except for the argument 'labels' will be keyword-only
  by='saliency', ascending=False).head(R).drop('saliency', 1)
/usr/local/lib/python3.7/dist-packages/sklearn/metrics/pairwise.py:56: DeprecationWarning: `np.float` is a deprecated alias for the builtin `float`. To silence this warning, use `float` by itself. Doing this will not modify any behavior and is safe. If you specifically wanted the numpy scalar type, use `np.float64` here.
Deprecated in NumPy 1.20; for more details and guidance: https://numpy.org/devdocs/release/1.20.0-notes.html#deprecations
  dtype = np.float
/usr/local/lib/python3.7/dist-packages/sklearn/metrics/pairwise.py:56: DeprecationWarning: `np.float` is a deprecated alias for the builtin `float`. To silence this warning, use `float` by itself. Doing this will not modify any behavior and is safe. If you specifically wanted the numpy scalar type, use `np.float64` here.
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Out[ ]:

In [ ]:

```
# !pip install stopwordsiso
# import stopwordsiso as stopwords
# stop_words = stopwords.stopwords("ur")
# print(stop_words)
```