CS 6375
ASSIGNMENT 2

Names of students in your group:
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Number of free late days used: 0

Note: You are allowed a **total** of 4 free late days for the **entire semester**. You can use at most 2 for each assignment. After that, there will be a penalty of 10% for each late day.

Please list clearly all the sources/references that you have used in this assignment.

Report:
Solution: 6375_Assignment_1_NN

1. Data File Used

From the given data, we are using "gdnhealthcare.txt" file. The file has *2997* samples.
Format of file: <id>|<date time information>|<tweet>
The tweets contain URLs, hashtags, and user ids.
Note: any other data file can be used in the same code via command line argument.

2. Pre-Processing

For pre-processing the data we have used simple string functions like replace(), split() and strip(), as well as regular expressions for removing URLs and other symbols.

i. Remove the tweet id and timestamp.

```
20          delim = lines[i].split("|")[2:]
21          lines[i] = " | ".join(delim)
```

ii. Remove any word that starts with the symbol @ e.g. @AnnaMedaris.

```
24          lines[i] = " ".join(filter(lambda x: x[0] != '@', lines[i].split()))
```

iii. Remove any hashtag symbols e.g. convert #depression to depression.

```
27          lines[i] = lines[i].replace('#', '')
```

iv. Remove any URL.

```
30          lines[i] = re.sub(r"http\S+", "", lines[i])
31          lines[i] = re.sub(r"www\S+", "", lines[i])
32          lines[i] = lines[i].strip()
```

v. Convert every word to lowercase.

```
35          lines[i] = lines[i].lower()
```

vi. Removed all punctuations and other symbols.

```
38          lines[i] = re.sub('[^A-Za-z0-9 ]+', '', lines[i])
39          lines[i] = " ".join(lines[i].split())
```

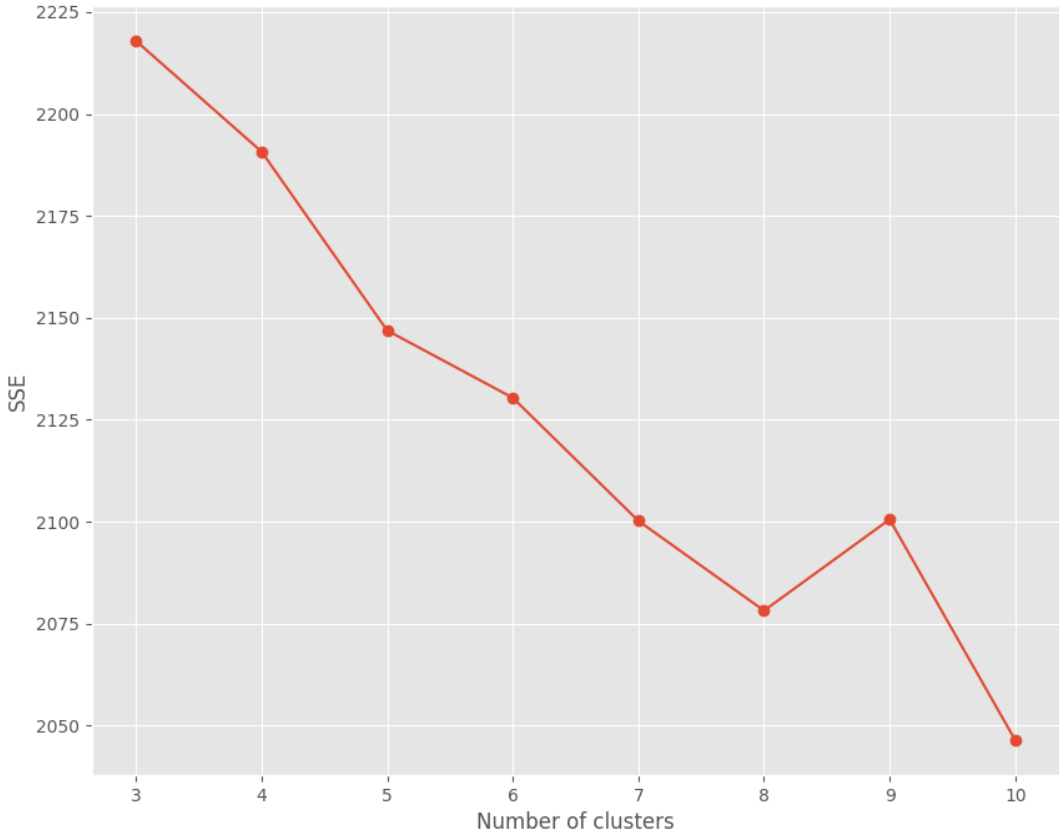
3. Results

The results are generated on a single file.

Jaccard distance is used to calculate distance between two sentences:

```
72    def jaccard_distance(t1, t2):
73          return 1 - (len(set(t1).intersection(t2)) /
74                      len(set().union(t1, t2)))
```

For experiments, we have set value of k from 3 to 10. The SSE and cluster distribution is noted below:



k	SSE	Clusters
3	2217.93	Cluster 0 Length: 1048 Cluster 1 Length: 1489 Cluster 2 Length: 303
4	2190.75	Cluster 0 Length: 1708 Cluster 1 Length: 594 Cluster 2 Length: 82 Cluster 3 Length: 456
5	2146.89	Cluster 0 Length: 136 Cluster 1 Length: 553 Cluster 2 Length: 300 Cluster 3 Length: 1271 Cluster 4 Length: 580
6	2130.37	Cluster 0 Length: 623 Cluster 1 Length: 474 Cluster 2 Length: 331 Cluster 3 Length: 271 Cluster 4 Length: 840 Cluster 5 Length: 301
7	2100.19	Cluster 0 Length: 76 Cluster 1 Length: 508 Cluster 2 Length: 367 Cluster 3 Length: 343 Cluster 4 Length: 692 Cluster 5 Length: 162 Cluster 6 Length: 692
8	2078.18	Cluster 0 Length: 504 Cluster 1 Length: 258 Cluster 2 Length: 363 Cluster 3 Length: 459 Cluster 4 Length: 596 Cluster 5 Length: 289 Cluster 6 Length: 53 Cluster 7 Length: 318
9	2100.56	Cluster 0 Length: 417 Cluster 1 Length: 355 Cluster 2 Length: 274 Cluster 3 Length: 527 Cluster 4 Length: 237 Cluster 5 Length: 802 Cluster 6 Length: 50 Cluster 7 Length: 93 Cluster 8 Length: 85
10	2046.42	Cluster 0 Length: 174 Cluster 1 Length: 283 Cluster 2 Length: 371 Cluster 3 Length: 666 Cluster 4 Length: 282

4. Execution Instructions:

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- Execution:

```
python main.py main.py --file file_path --max_k max_k
```

```
optional arguments:
  --file path to the txt file (default: data/gdnhealthcare.txt)
  --max_k maximum number of clusters to use: results will be generated from k=3 to max_k (default: 10)
```

- All necessary packages are listed in requirements.txt

File Structure:

- ReadME.md
- data: directory for datasets
- main.py : main file
- k_means_clustering.py : file containing K means cluster class
- Assignment2-CS6375.pdf : assignment description
- results : directory for storing output
    - all: directory for graphs and results of all datasets
    - k_means_elbow_gdnhealthcare.png: plot of K vs SSE for data/k_means_elbow_gdnhealthcare.txt
    - k_means_elbow_gdnhealthcare.csv: CSV contaning K, SSE and cluster distribution for data/k_means_elbow_gdnhealthcare.txt
- CS6375_Assignment2_report : report for the assignment