Name: Shubham Lad

Class: MSc Computer Science (Part 1)

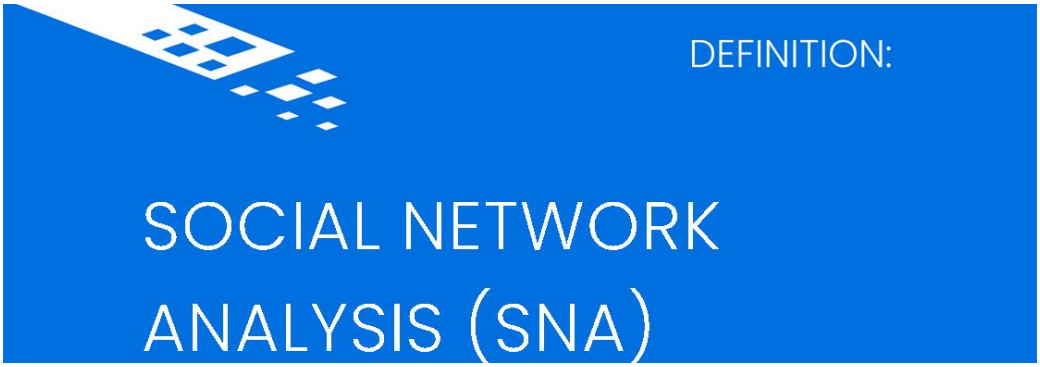
Roll No: 512

Semester: II

Subject: Social Network Analysis

Topic: Sentiment Analysis

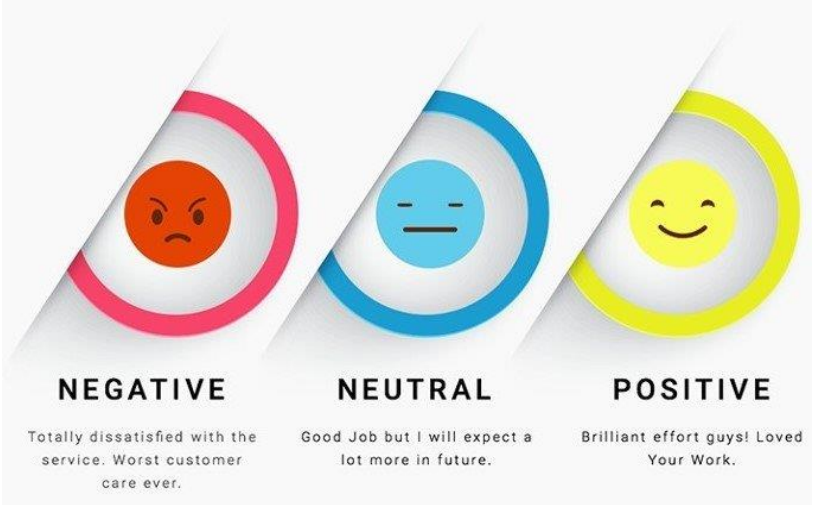
Social Network Analysis



The practise of quantitative and qualitatively analysing a social network is called social network analysis (SNA). Between entities that contain information, SNA tracks and maps the flow of relationships and relationship modifications. Sites on the internet, computers, animals, people, groups, organisations, and nations are examples of simple and complex things.

Humans are examples of node entities in the SNA structure, while relationships are examples of ties. Modern cognition and computers enabled the notion of social networking to gradually evolve into extremely sophisticated, graph-based networks with a wide variety of nodes and linkages. These networks are essential to processes and projects including administration, operations, and issue solving.

Sentiment Analysis



The method of determining whether a block of text is good, negative, or neutral is known as sentiment analysis. Sentiment analysis is the contextual mining of words that reveals the social sentiment of a brand and aids businesses in determining whether or not the product they are producing will find a market. Sentiment analysis's objective is to examine public sentiment in a way that will support corporate growth. It emphasises emotions as well as polarity (positive, negative, and neutral) (happy, sad, angry, etc.). Rule-based, automatic, and hybrid natural language processing methods are used.

Why perform Sentiment Analysis?

80% of the data in the globe is unstructured, according to the report. Regardless matter whether the data is in the form of emails, messages, papers, articles, or anything else, it has to be analysed and organised.

- Sentiment analysis is necessary since it saves data effectively and affordably.
- Sentiment analysis can assist you in resolving any real-world problems and situations.

Source Code (Jupyter Notebook)

```
# 512 Shubham Lad
```

1. Install and Import Dependencies

```
!pip install torch==1.8.1+cu111 torchvision==0.9.1+cu111 torchaudio===0.8.1 -f
https://download.pytorch.org/whl/torch_stable.html

!pip install transformers requests beautifulsoup4 pandas numpy

from transformers import AutoTokenizer, AutoModelForSequenceClassification

import torch

import requests
```

```
from bs4 import BeautifulSoup

import re
```

2. Instantiate Model

```
tokenizer = AutoTokenizer.from_pretrained('nlptown/bert-base-multilingual-uncased-sentiment')

model = AutoModelForSequenceClassification.from_pretrained('nlptown/bert-base-multilingual-uncased-sentiment')
```

3. Encode and Calculate Sentiment

```
tokens = tokenizer.encode('It was good but couldve been better. Great', return_tensors='pt')

result = model(tokens)

result.logits

int(torch.argmax(result.logits))+1
```

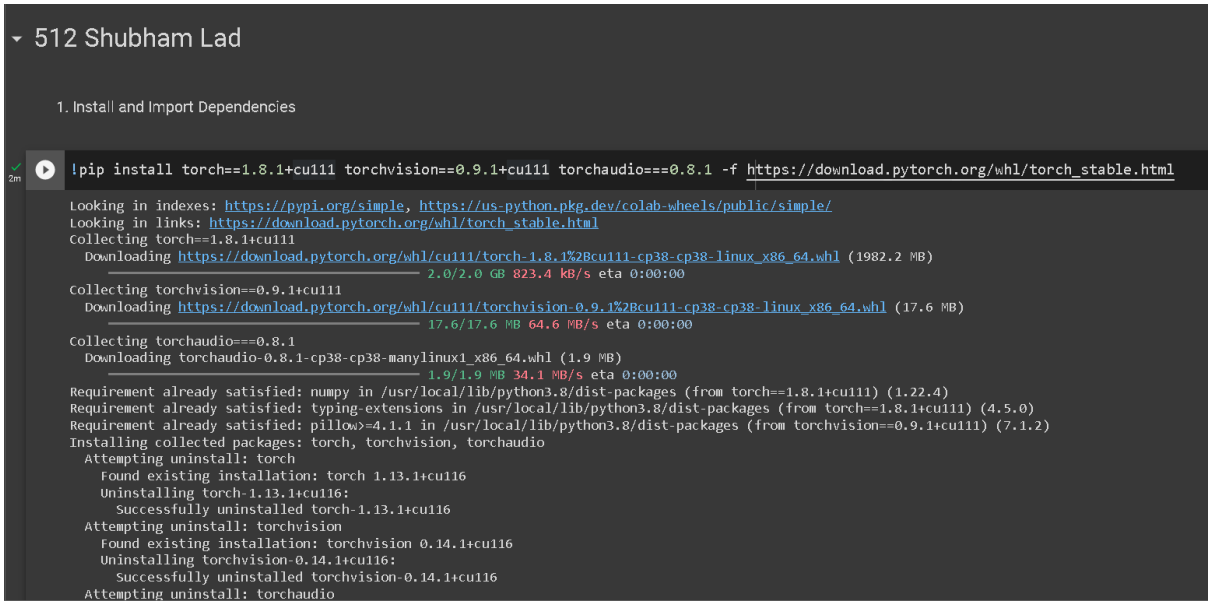
4. Collect Reviews

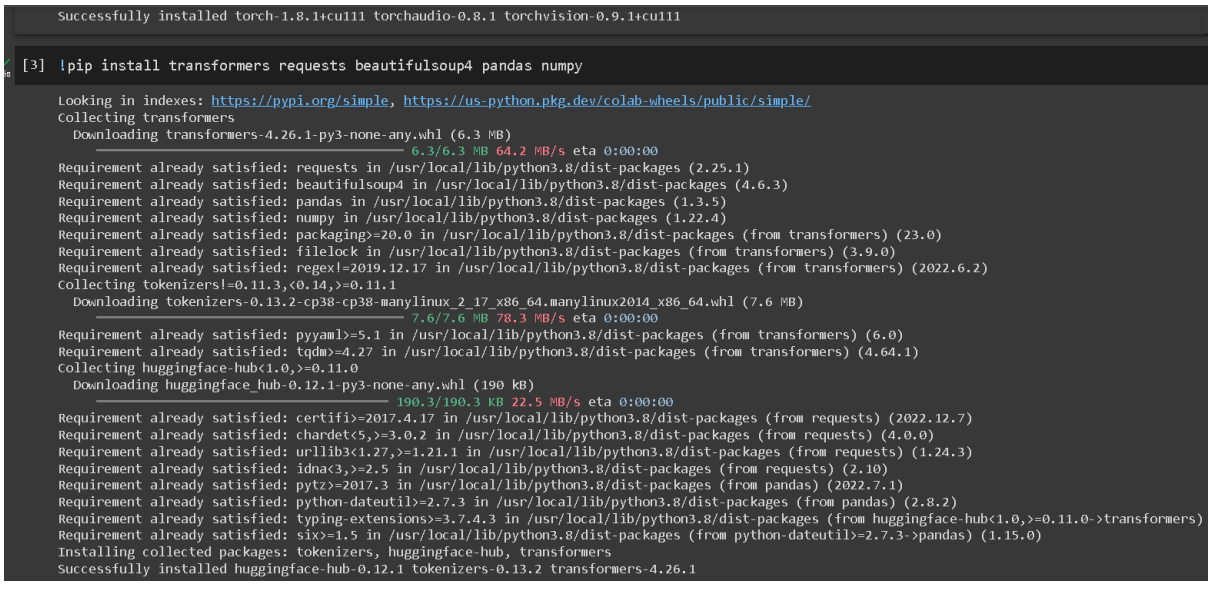
```
r = requests.get('https://www.yelp.com/biz/social-brew-cafe-pyrmont')

soup = BeautifulSoup(r.text, 'html.parser')

regex = re.compile('.*comment.*')

results = soup.find_all('p', {'class':regex})

reviews = [result.text for result in results]

reviews
```

5. Load Reviews into DataFrame and Score

```
import numpy as np

import pandas as pd

df = pd.DataFrame(np.array(reviews), columns=['review'])

df['review'].iloc[0]

def sentiment_score(review):
```

```
    tokens = tokenizer.encode(review, return_tensors='pt')
    result = model(tokens)
    return int(torch.argmax(result.logits))+1
sentiment_score(df['review'].iloc[1])
df['sentiment'] = df['review'].apply(lambda x: sentiment_score(x[:512]))
df
df['review'].iloc[3]
```





```
[3] !pip install transformers requests beautifulsoup4 pandas numpy

Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Collecting transformers
  Downloading transformers-4.26.1-py3-none-any.whl (6.3 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 6.3/6.3 MB 64.2 MB/s eta 0:00:00
Requirement already satisfied: requests in /usr/local/lib/python3.8/dist-packages (2.25.1)
Requirement already satisfied: beautifulsoup4 in /usr/local/lib/python3.8/dist-packages (4.6.3)
Requirement already satisfied: pandas in /usr/local/lib/python3.8/dist-packages (1.3.5)
Requirement already satisfied: numpy in /usr/local/lib/python3.8/dist-packages (1.22.4)
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.8/dist-packages (from transformers) (23.0)
Requirement already satisfied: filelock in /usr/local/lib/python3.8/dist-packages (from transformers) (3.9.0)
Requirement already satisfied: regex!=2019.12.17 in /usr/local/lib/python3.8/dist-packages (from transformers) (2022.6.2)
Collecting tokenizers!=0.11.3,<0.14,>=0.11.1
  Downloading tokenizers-0.13.2-cp38-cp38-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (7.6 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 7.6/7.6 MB 78.3 MB/s eta 0:00:00
Requirement already satisfied: pyyaml>=5.1 in /usr/local/lib/python3.8/dist-packages (from transformers) (6.0)
Requirement already satisfied: tqdm>=4.27 in /usr/local/lib/python3.8/dist-packages (from transformers) (4.64.1)
Collecting huggingface-hub<1.0,>=0.11.0
  Downloading huggingface_hub-0.12.1-py3-none-any.whl (190 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 190.3/190.3 KB 22.5 MB/s eta 0:00:00
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.8/dist-packages (from requests) (2022.12.7)
Requirement already satisfied: chardet<5,>=3.0.2 in /usr/local/lib/python3.8/dist-packages (from requests) (4.0.0)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in /usr/local/lib/python3.8/dist-packages (from requests) (1.24.3)
Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.8/dist-packages (from requests) (2.10)
Requirement already satisfied: pytz>=2017.3 in /usr/local/lib/python3.8/dist-packages (from pandas) (2022.7.1)
Requirement already satisfied: python-dateutil>=2.7.3 in /usr/local/lib/python3.8/dist-packages (from pandas) (2.8.2)
Requirement already satisfied: typing-extensions>=3.7.4.3 in /usr/local/lib/python3.8/dist-packages (from huggingface-hub<1.0,>=0.11.0->transformers)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.8/dist-packages (from python-dateutil>=2.7.3->pandas) (1.15.0)
Installing collected packages: tokenizers, huggingface-hub, transformers
Successfully installed huggingface-hub-0.12.1 tokenizers-0.13.2 transformers-4.26.1
```

```
[4] from transformers import AutoTokenizer, AutoModelForSequenceClassification
    import torch
    import requests
    from bs4 import BeautifulSoup
    import re
```

2. Instantiate Model

```
[5] tokenizer = AutoTokenizer.from_pretrained('nlptown/bert-base-multilingual-uncased-sentiment')

    model = AutoModelForSequenceClassification.from_pretrained('nlptown/bert-base-multilingual-uncased-sentiment')

Downloading (…)okenizer_config.json: 100% 39.0/39.0 [00:00<00:00, 420B/s]
Downloading (…)lve/main/config.json: 100% 953/953 [00:00<00:00, 14.9kB/s]
Downloading (…)solve/main/vocab.txt: 100% 872k/872k [00:00<00:00, 2.50MB/s]
Downloading (…)cial_tokens_map.json: 100% 112/112 [00:00<00:00, 4.08kB/s]
Downloading (…)"pytorch_model.bin";: 100% 669M/669M [00:29<00:00, 42.0MB/s]
```

3. Encode and Calculate Sentiment

```
[6] tokens = tokenizer.encode('It was good but couldve been better. Great', return_tensors='pt')

[7] result = model(tokens)

[8] result.logits

    tensor([[-2.7768, -1.2353,  1.4419,  1.9804,  0.4584]],
           grad_fn=<AddmmBackward>)

[9] int(torch.argmax(result.logits))+1

    4
```

4. Collect Reviews

```
[10] r = requests.get('https://www.yelp.com/biz/social-brew-cafe-pyrmont')
     soup = BeautifulSoup(r.text, 'html.parser')
     regex = re.compile('.*comment.*')
     results = soup.find_all('p', {'class':regex})
     reviews = [result.text for result in results]
```

```
[11] reviews
```

```
['Great food amazing coffee and tea. Short walk from the harbor. Staff was very friendly',
 "It was ok. Had coffee with my friends. I'm new in the area, still need to discover new places.",
 'Great staff and food. \xa0Must try is the pan fried Gnocchi! \xa0The staff were really friendly and the coffee was good as well',
 "Ricotta hot cakes! These were so yummy. I ate them pretty fast and didn't share with anyone because they were that good ;). I ordered a green smoothie to balance it all out. Smoothie was a nice way to end my brekkie at this restaurant. Others with me ordered the salmon Benedict and the smoked salmon flatbread. They were all delicious and all plates were empty. Cheers!",
 'I came to Social brew cafe for brunch while exploring the city and on my way to the aquarium. I sat outside. The service was great and the food was good too!I ordered smoked salmon, truffle fries, black coffee and beer.',
 "It was ok. The coffee wasn't the best but it was fine. The relish on the breakfast roll was yum which did make it sing. So perhaps I just got a bad coffee but the food was good on my visit.",
 "We came for brunch twice in our week-long visit to Sydney. Everything on the menu not only sounds delicious, but is really tasty. It really gave us a sour taste of how bad breaky is in America with what's so readily available in Sydney! \xa0Both days we went were Saturdays and there was a bit of a wait to be seated, the cafe is extremely busy for both dine-in and take-away. Service is fairly quick and servers are all friendly. The location is in Surrey Hills a couple blocks away from the bustling touristy Darling Harbor.The green smoothie is very tasty and refreshing. We tried the smoked salmon salad, the soft shell crab tacos, ricotta hotcakes, and the breaky sandwich. All were delicious, well seasoned, and a solid amount of food for the price. A definite recommend for anyone's trip into Sydney!",
 'I went here a little while ago- a beautiful morning,a lovely little brew house on a quaint street corner- perfection.I went to this cafe with my step-daughter Lucille.She was always raving about how great it was to her mother, so I thought it would be a nice idea to go here with her for her birthday... boy was I wrong.She announced her hatred for me while I was waiting for my extra large iced frappé. It felt like hours of awkward silence once she said those four words; "you\'re a low-life."Was it in my mind, or was my drink taking ages to arrive? The hands on the clock didn\'t budge from the last time I glanced at them- 7:43AM, where the fuck is my drink?"Why do you always feel you have to be my friend? You\'re not my dad!" She fired.I could only sit there, my head facing down towards the floral tablecloth that lay beneath my quivering arms. The bullet lodged in
```

5. Load Reviews into DataFrame and Score

```
[12] import numpy as np
     import pandas as pd
```

```
[13] df = pd.DataFrame(np.array(reviews), columns=['review'])
```

```
[14] df['review'].iloc[0]
```

```
'Great food amazing coffee and tea. Short walk from the harbor. Staff was very friendly'
```

```
[15] def sentiment_score(review):
         tokens = tokenizer.encode(review, return_tensors='pt')
         result = model(tokens)
         return int(torch.argmax(result.logits))+1
```

```
[16] sentiment_score(df['review'].iloc[1])
```

```
3
```

```
[17] df['sentiment'] = df['review'].apply(lambda x: sentiment_score(x[:512]))
```

```
[17] df['sentiment'] = df['review'].apply(lambda x: sentiment_score(x[:512]))
```

```
[18] df
```

	review	sentiment
0	Great food amazing coffee and tea. Short walk ...	5
1	It was ok. Had coffee with my friends. I'm new...	3
2	Great staff and food. Must try is the pan fri...	5
3	Ricotta hot cakes! These were so yummy. I ate ...	5
4	I came to Social brew cafe for brunch while ex...	5
5	It was ok. The coffee wasn't the best but it w...	3
6	We came for brunch twice in our week-long visi...	4
7	I went here a little while ago- a beautiful mo...	2
8	Great coffee and vibe. That's all you need. C...	5
9	Great coffee and vibe. That's all you need. C...	4
10	Good coffee and toasts. Straight up and down -...	5

```
[19] df['review'].iloc[3]
```

```
'Ricotta hot cakes! These were so yummy. I ate them pretty fast and didn't share with anyone because they were that good ;). I ordered a green smoothie to balance it all out. Smoothie was a nice way to end my brekkie at this restaurant. Others with me ordered the salmon Benedict and the smoked salmon flatbread. They were all delicious and all plates were empty. Cheers!'
```