

DATA VISUALIZATION

MIS 6380.001

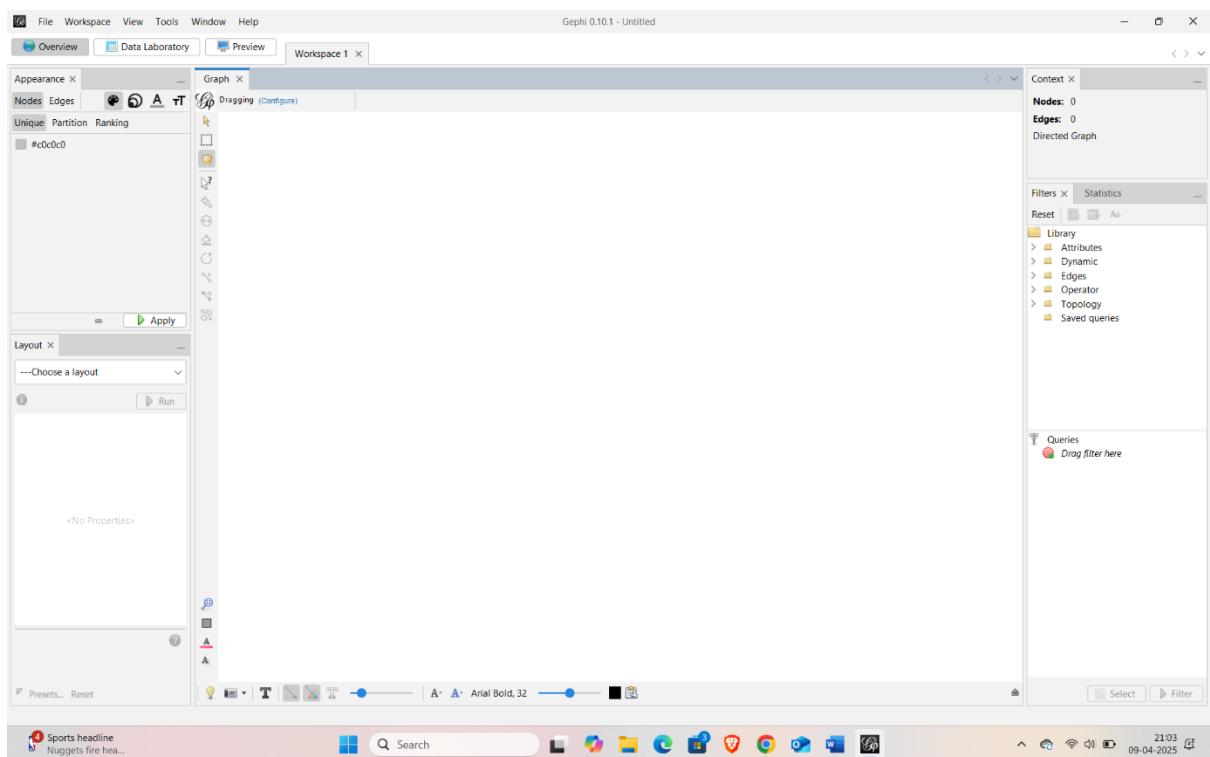
Prof: Judd Bradbury

Assignment - 8

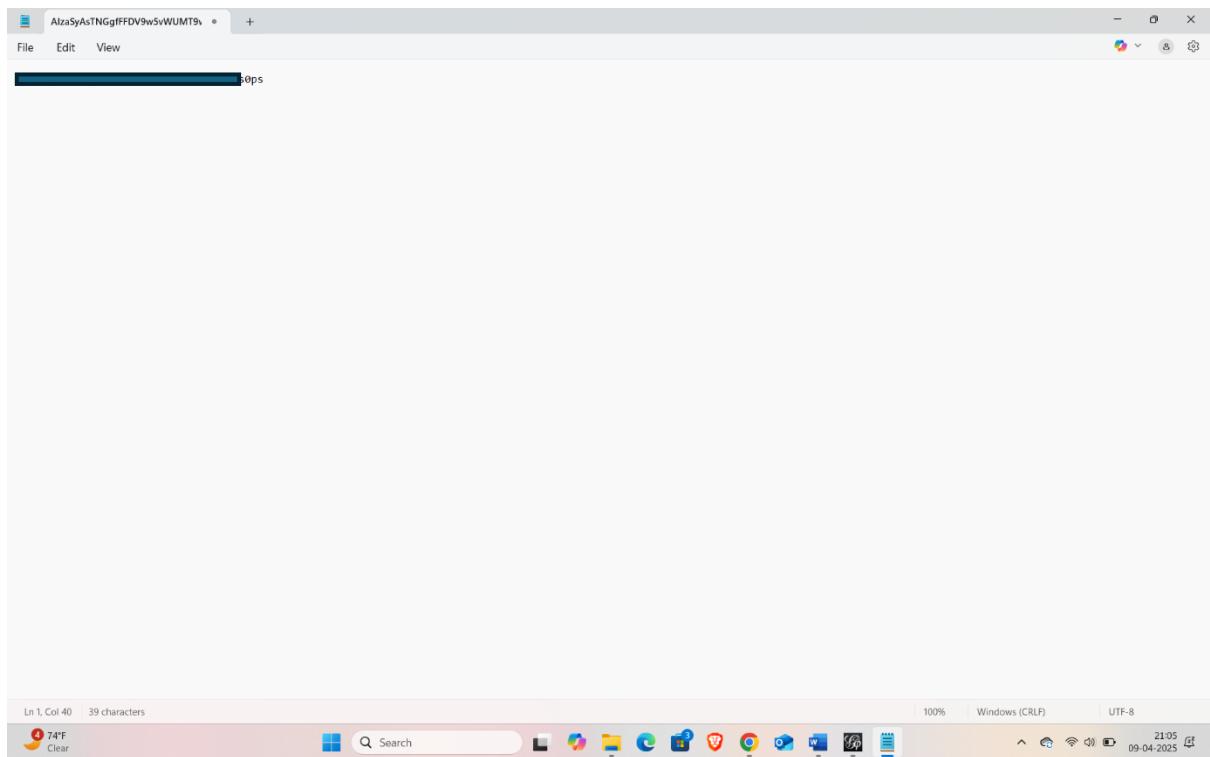
Name: Sri Vamsi Kota

Net ID: skk240001

Q1.)



Q2.)



Q3.)

The screenshot shows a Jupyter Notebook interface running on a local host. The title bar indicates the notebook is titled "Network_Visualization_SriVamsi_Kota.ipynb". The menu bar includes File, Edit, View, Run, Kernel, Settings, Help, and a Trusted status indicator. Below the menu is a toolbar with various icons. The main area displays two code cells. Cell [1] contains Python commands to install several libraries, including Langchain, Langchain-core, Langchain-community, google-generativeai, and gephistreamer. The output of this cell shows the installation process, including dependency resolution and wheel building. Cell [2] contains a single command to list top tech leaders from Wikipedia, resulting in a URL being printed to the console.

```
[1]: #! pip install Langchain  
#! pip install Langchain-core  
#! pip install Langchain-community  
#! pip install google-generativeai  
#! pip install gephistreamer  
  
ephistreamer) (3.4.1)  
Requirement already satisfied: idna<4,>=2.5 in c:\users\sriva\appdata\local\programs\python\python313\lib\site-packages (from requests->gephistreamer) (3.10)  
Requirement already satisfied: urllib3<3,>=1.21.1 in c:\users\sriva\appdata\local\programs\python\python313\lib\site-packages (from requests->gephistreamer) (2.3.0)  
Requirement already satisfied: certifi>=2017.4.17 in c:\users\sriva\appdata\local\programs\python\python313\lib\site-packages (from requests->gephistreamer) (2020.1.13)  
Downloading enum34-1.1.10-py3-none-any.whl (11 kB)  
Downloading ws4py-0.6.0-py3-none-any.whl (45 kB)  
Building wheels for collected packages: gephistreamer  
  Building wheel for gephistreamer (pyproject.toml): started  
  Building wheel for gephistreamer (pyproject.toml): finished with status 'done'  
  Created wheel for gephistreamer: filename=gephistreamer-2.0.3-py3-none-any.whl size=4853 sha256=4fff44c9affa93424c6e2f1f9f8c39864b02dd41aa8bd331d9af655391aeaded  
  Stored in directory: c:\users\sriva\appdata\local\pip\cache\wheels\7a\61\c0\f2a2a5f09d6f798f1104f0eede55d9993abe6db52683d518cf6  
Successfully built gephistreamer  
Installing collected packages: ws4py, enum34, gephistreamer  
Successfully installed enum34-1.1.10 gephistreamer-2.0.3 ws4py-0.6.0  
  
[2]: # List of top Tech Leaders  
url_list=[  
    "https://en.wikipedia.org/wiki/Elon_Musk"]
```

Q4.)

He co-founded Oracle Corporation.

Q5.)

Google- generativeai helps us capture unwanted characters.

Q6.)

The screenshot shows a Jupyter Notebook interface with the following details:

- Title:** Network_Visualization_SriVamsi_Kota.ipynb
- Kernel:** Python 3 (ipykernel)
- Code Cell 1:** Contains Python code for cleaning text. It uses regular expressions to remove HTML tags, URLs, and special characters, and replaces multiple spaces with a single space.
- Code Cell 2:** Contains Python code using the Langchain framework to extract data from URLs. It imports RecursiveCharacterTextSplitter, Document, and WebBaseLoader. The `extract_data_from_URL` function loads a URL, processes the content, splits it into smaller documents, and prints the length of each document.

Q7.)

Content Download Get API key Go Home Network_Visualization_SriVamsi_Kota.ipynb LinkedIn COURSERA Prime Video LMS | Miles Education FRM Part 1 - Googl... Business News Toda... Entourage of 7 Sun... Power Bi Community | Glassd... Financial Markets a... All Bookmarks

jupyter Network_Visualization_SriVamsi_Kota Last Checkpoint: 28 minutes ago

File Edit View Run Kernel Settings Help Trusted JupyterLab Python 3 (ipykernel)

```
[6]: import google.generativeai as genai
import os

#system_instruction
system_prompt=''
Answer the question in JSON format and nothing else,Do not use code block formatting.
...
# test connection for gemini
genai.configure(api_key='AtzaSyAsTNGgFFFDV9w5vWUHT9wLc66e0lls0ps')
client = genai GenerativeModel(model_name="gemini-1.5-flash", system_instruction=system_prompt)
response = client.generate_content("Write a story about how Texas can become a tech hub in the future.")
print(response.text)
```

{"story": "The year is 2042. A revitalized Texas, fueled by a confluence of bold initiatives and unexpected partnerships, has firmly cemented its place as a global tech powerhouse. It began with a paradigm shift in education. Recognizing the need for a highly skilled workforce, the state invested massively in STEM education, creating specialized coding academies in every major city, and partnering with universities to offer cutting-edge tech degrees at significantly reduced costs. This created a pipeline of talented young Texans, ready to fuel the innovation engine. Simultaneously, a concerted effort to attract and retain top tech talent from across the globe was undertaken. Tax incentives, streamlined visa processes, and a vibrant, diverse cultural landscape made Texas an attractive destination. Austin, already a burgeoning tech center, exploded with growth, but other cities like Dallas, Houston, and San Antonio also experienced a tech boom, each developing its own niche: Dallas focused on fintech and AI, Houston on aerospace and biotech, and San Antonio on cybersecurity and renewable energy. The state government, eschewing traditional red tape, actively fostered collaboration between universities, corporations, and startups, establishing numerous innovation hubs and collaborative workspaces. One particularly successful initiative was the 'Texas Tech Bridge,' a network of high-speed data connections linking research institutions, businesses, and government agencies, facilitating rapid technology transfer and development. The state also pursued sustainable practices, positioning Texas as a leader in green tech. Renewable energy initiatives not only spurred economic growth but also fostered a forward-thinking image, attracting environmentally conscious companies and talent. The final piece of the puzzle was a focus on entrepreneurship. A robust network of angel investors and venture capitalists poured money into Texas startups, leading to the creation of numerous unicorns and global tech giants. By 2042, the image of Texas had undergone a complete transformation. It was no longer just the land of cowboys and oil; it was a vibrant, innovative hub of technological advancement, attracting talent and investment from around the world, a testament to bold vision and strategic collaboration."}

Q8.)

The screenshot shows a Jupyter Notebook interface with the title "jupyter Network_Visualization_SriVamsi_Kota Last Checkpoint: 30 minutes ago". The code cell contains the following JSON data:

```
[{"node_1": "Elon Musk", "node_2": "SpaceX", "edge": "Elon Musk founded SpaceX to revolutionize space exploration."}, {"node_1": "Steve Jobs", "node_2": "Apple Inc.", "edge": "Steve Jobs co-founded Apple Inc., a leading tech company."}, {"node_1": "Mark Zuckerberg", "node_2": "Sheryl Sandberg", "edge": "Sheryl Sandberg worked closely with Mark Zuckerberg as COO of Facebook."}, {"node_1": "Jeff Bezos", "node_2": "Blue Origin", "edge": "Jeff Bezos founded Blue Origin to focus on space exploration."}]
```

Below the JSON data, there are instructions:

Important Note:
- Always respond exclusively in JSON format. Any deviation from the JSON structure or inclusion of additional text will not be accepted.
- Do not use code block formatting like ' ` ' .
- Output must be a valid JSON array of objects without any surrounding text.

Please provide the context containing information about entrepreneurs and their relationships for analysis.

...
[]:

Q9.)

The screenshot shows a Jupyter Notebook interface with the title "jupyter Network_Visualization_SriVamsi_Kota Last Checkpoint: 2 minutes ago". The code cell contains the following Python script:

```
end_time = datetime.now()
print(f'extracted information in {end_time - start_time}')
print(f'total results: {len(results)}')
```

The output window shows the following error messages:

```
56
('You exceeded your current quota, please check your plan and billing details. For more information on this error, head to: https://ai.google.dev/gemini/api/docs/rate-limits.')
Rate limit hit for model: gemini-1.5-pro
Switching to next model: gemini-1.5-flash
32
('You exceeded your current quota, please check your plan and billing details. For more information on this error, head to: https://ai.google.dev/gemini/api/docs/rate-limits.')
Rate limit hit for model: gemini-1.5-flash
Switching to next model: gemini-1.5-flash-8b
('You exceeded your current quota, please check your plan and billing details. For more information on this error, head to: https://ai.google.dev/gemini/api/docs/rate-limits.')
Rate limit hit for model: gemini-1.5-pro
Switching to next model: gemini-1.5-pro
47
44
47
14
20
27
12
11
extracted information in 0:23:17.101645
total results: 234
```

[]:

Q10.)

The screenshot shows a Jupyter Notebook running in a browser window. The title bar indicates the notebook is titled "Network_Visualization_SriVamsi_Kota.ipynb". The code cell [7] contains Python code for saving network results to a JSON file. The output cell shows the execution log and a warning message about extra data in the JSON dump.

```
Rate limit hit for model: gemini-1.5-pro
Switching to next model: gemini-1.5-flash
47
44
47
16
20
27
12
11
extracted information in 0:23:17.101645
total results: 234

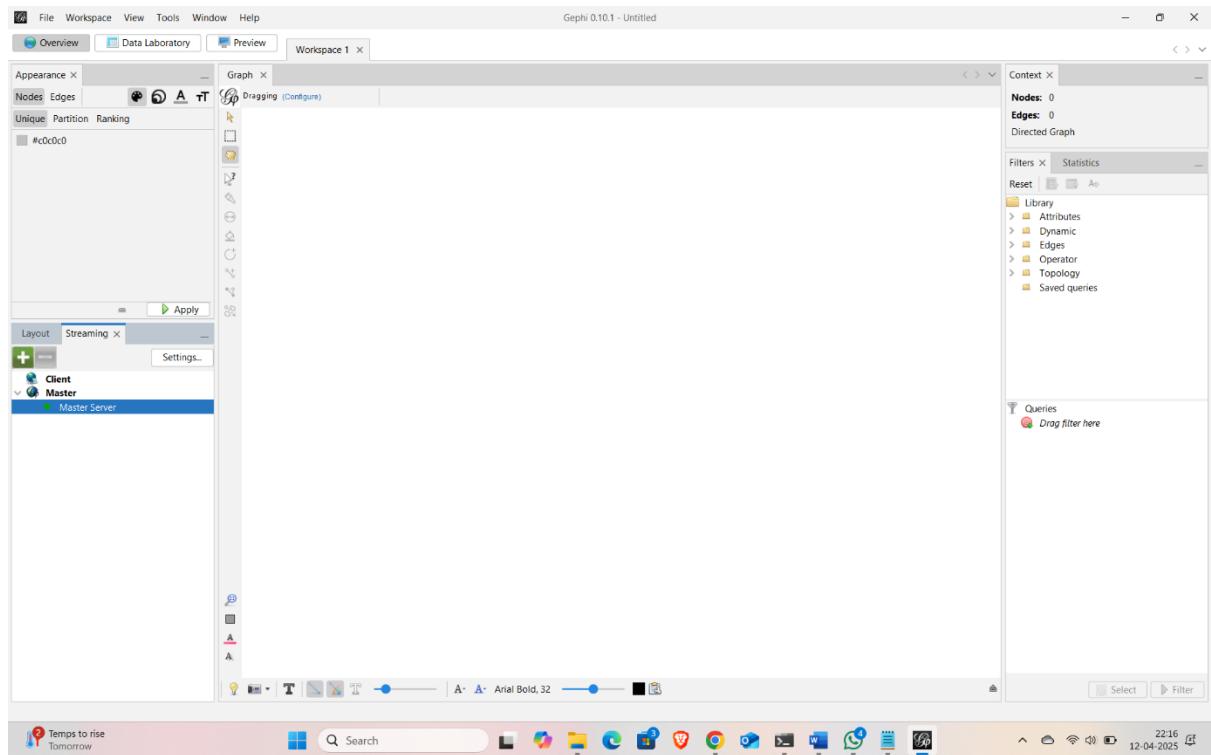
Save the result to JSON file

[7]: import json
# print(results)
combined_nodes_and_edges=[]
for res in results:
    try:
        combined_nodes_and_edges.extend(json.loads(res)) #convert the string result from LLM to JSON
    except Exception as e:
        print('buggy JSON object', e)

with open('Nodes_and_edges.json','w') as file:
    json.dump(combined_nodes_and_edges,file,indent=1)

buggy JSON object Extra data: line 1 column 142 (char 141)
```

Q11.)



Q12.)

The screenshot shows a Jupyter Notebook interface with the title "Send JSON data to Gephi". The code cell contains the following Python script:

```
[8]: from gephistreamer import graph
from gephistreamer import streamer
# connect to gephi server
# create a stream
stream = streamer.Streamer(streamer.GephiWS(hostname="localhost", port=8080, workspace="workspace1"))

[9]: # Load the nodes and edges from the json file
with open('Nodes_and_edges.json','r') as file:
    resultsjson.load(file)

[10]: # Loop through the list of json result and send to Gephi
for res in results:
    try:
        node_a = graph.Node(res['node_1'],custom_property=1)
        node_b = graph.Node(res['node_2'],custom_property=2)
        stream.add_node(node_a,node_b)
        edge_ab = graph.Edge(node_a,node_b,custom_property=res['edge'])
        stream.add_edge(edge_ab)

    except Exception as e:
        print('buggy JSON object', e,res)

buggy JSON object 'edge' {'node_1': 'Elon Musk', 'node_2': 'rebranded Twitter to X in 2023'}
buggy JSON object 'node_2' {'node_1': 'Larry Ellison', 'node': 'Mark Hurd', 'edge': 'Larry Ellison appointed Mark Hurd as CEO of Oracle'}
```

Q13.)

The screenshot shows the Gephi Data Laboratory interface with the title "Gephi 0.10.1 - Untitled". The "Data Table" tab is selected, showing a table with columns: Id, Label, Interval, and custom_property. The table contains the following data:

Id	Label	Interval	custom_property
Elon Musk	Elon Musk	1	
Zip2	Zip2	2	
X.com	X.com	2	
PayPal	PayPal	2	
SpaceX	SpaceX	2	
Starlink	Starlink	2	
Tesla	Tesla	2	
SolarCity	SolarCity	2	
Tesla Energy	Tesla Energy	2	
Neuralink	Neuralink	2	
The Boring Company	The Boring Company	2	
X Corp	X Corp	2	
Hyperloop	Hyperloop	2	
OpenAI	OpenAI	2	
xAI	xAI	2	
Donald Trump	Donald Trump	2	
University of Pennsylvania	University of Pennsylvania	2	
X (formerly Twitter)	X (formerly Twitter)	2	
Department of Government Efficiency (DOGE)	Department of Government Efficiency (DOGE)	2	
Musk Foundation	Musk Foundation	2	
Reusable Rockets and Commercial Spaceflight	Reusable Rockets and Commercial Spaceflight	2	
Electric Vehicles	Electric Vehicles	2	
Social Network	Social Network	2	
rebranded Twitter to X in 2023	rebranded Twitter to X in 2023	2	
DOGE	DOGE	2	
2024 US presidential election	Far-right figures, causes, and political parties	2	
Far-right figures, causes, and political parties	Maye Musk	2	
Maye Musk	Errol Musk	2	
Errol Musk	Kimbal Musk	2	
Kimbal Musk	Tosca Musk	2	
Tosca Musk	Emerald Mine	2	
Emerald Mine	Pretoria City Council	2	
Pretoria City Council	Anglican Church	2	
Anglican Church	Apartheid	2	

Below the table are various data manipulation tools: Add column, Merge columns, Delete column, Clear column, Copy data to other column, Fill column with a value, Duplicate column, Create a boolean column from regex match, Create column with list of regex matching groups, Negate boolean values, and Convert column to dynamic.

Q14.)

Gephi 0.10.1 - Untitled

Overview Data Laboratory Preview Workspace 1

Data Table

Source	Target	Type	Id	Label	Interval	Weight	custom_property	kind
Elon Musk	Zip2	Directed	Elon Musk-->Zip2			1.0	Elon Musk co-founded Zip2.	
Elon Musk	X.com	Directed	Elon Musk-->X.com			1.0	Elon Musk founded X.com, which ..	
Elon Musk	PayPal	Directed	Elon Musk-->PayPal			1.0	Elon Musk was involved with Pay..	
Elon Musk	SpaceX	Directed	Elon Musk-->SpaceX			1.0	Elon Musk founded SpaceX.	
SpaceX	Starlink	Directed	SpaceX-->Starlink			1.0	Starlink is a project by SpaceX.	
Elon Musk	Tesla	Directed	Elon Musk-->Tesla			1.0	Elon Musk is associated with Tes..	
Tesla	SolarCity	Directed	Tesla-->SolarCity			1.0	SolarCity is mentioned in relat..	
Tesla	Tesla Energy	Directed	Tesla-->Tesla Energy			1.0	Tesla Energy is mentioned in relat..	
Elon Musk	Neuralink	Directed	Elon Musk-->Neuralink			1.0	Elon Musk founded Neuralink.	
Elon Musk	The Boring Company	Directed	Elon Musk-->The Boring Co..			1.0	Elon Musk founded The Boring Co..	
Elon Musk	X Corp	Directed	Elon Musk-->X Corp			1.0	Elon Musk is CEO and co-founder..	
Elon Musk	Hyperloop	Directed	Elon Musk-->Hyperloop			1.0	Elon Musk proposed the Hyperlo..	
Elon Musk	OpenAI	Directed	Elon Musk-->OpenAI			1.0	Elon Musk co-founded OpenAI.	
Elon Musk	xAI	Directed	Elon Musk-->xAI			1.0	Elon Musk is CEO and co-founder..	
Elon Musk	Donald Trump	Directed	Elon Musk-->Donald Trump			1.0	Elon Musk served as a senior adv..	
Elon Musk	University of Pennsylvania	Directed	Elon Musk-->University of Pe..			1.0	Elon Musk attended the Universit..	
Elon Musk	X (formerly Twitter)	Directed	Elon Musk-->X (formerly Twit..)			1.0	Elon Musk acquired and rebrande..	
Elon Musk	Department of Government E...	Directed	Elon Musk-->Department of ..			1.0	Elon Musk is the de facto head of ..	
Elon Musk	Musk Foundation	Directed	Elon Musk-->Musk Foundation			1.0	Elon Musk is the president of the ..	
SpaceX	Reusable Rockets and Comm...	Directed	SpaceX-->Reusable Rockets ..			1.0	SpaceX, led by Elon Musk, has led..	
Tesla	Electric Vehicles	Directed	Tesla-->Electric Vehicles			1.0	Tesla, led by Elon Musk, has beco..	
X (formerly Twitter)	Social Network	Directed	X (formerly Twitter)-->Social ..			1.0	X, formerly Twitter, is a social net..	
Elon Musk	Doge	Directed	Elon Musk-->Doge			1.0	Appointed head of Trump's newly..	
Elon Musk	2024 US presidential election	Directed	Elon Musk-->2024 US preside..			1.0	Largest donor in the 2024 US pres..	
Elon Musk	Far-right figures, causes, and ..	Directed	Elon Musk-->Far-right figures..			1.0	Supporter of global far-right figu..	
Elon Musk	Maye Musk	Directed	Elon Musk-->Maye Musk			1.0	Son of Maye Musk.	
Elon Musk	Erol Musk	Directed	Elon Musk-->Erol Musk			1.0	Son of Erol Musk.	
Elon Musk	Kimbal Musk	Directed	Elon Musk-->Kimbal Musk			1.0	Brother of Kimbal Musk.	
Elon Musk	Tosca Musk	Directed	Elon Musk-->Tosca Musk			1.0	Brother of Tosca Musk.	
Erol Musk	Emerald Mine	Directed	Erol Musk-->Emerald Mine			1.0	Partly owned a rental lodge at Ti..	
Elon Musk	Pretoria City Council	Directed	Elon Musk-->Pretoria City Co..			1.0	Erol Musk elected to Pretoria Ci..	
Elon Musk	Anglican Church	Directed	Elon Musk-->Anglican Church			1.0	Raised and baptized in Anglican ..	
Elon Musk	Apartheid	Directed	Elon Musk-->Apartheid			1.0	Dislikes Apartheid.	
Elon Musk	Wilderness School	Directed	Elon Musk-->Wilderness Sch..			1.0	Attended Wilderness School and ..	
Elon Musk	Blastar	Directed	Elon Musk-->Blastar			1.0	Elon Musk created and sold the B..	

Add column Merge columns Delete column Clear column Copy data to other column Fill column with a value Duplicate column Create a boolean column from regex match Create column with list of regex matching groups Negate boolean values Convert column to dynamic

74°F Clear 22:21 12-04-2025

Q15.)

Gephi 0.10.1 - Untitled

Overview Data Laboratory Preview Workspace 1

Graph

Nodes: 2367
Edges: 2820
Directed Graph

Context

Threads number: 15
Performance: Tolerance (speed): 1.0
Approximate Repulsion:
Approximation: 1.2
Scaling: 2.0
Stronger Gravity:
Gravity: 1.0
Behavior Alternatives: Dissuade Hubs:
LinkLog mode:
Prevent Overlap:

Layout

Streaming
ForceAtlas 2

Threads number: 15
Performance: Tolerance (speed): 1.0
Approximate Repulsion:
Approximation: 1.2
Scaling: 2.0
Stronger Gravity:
Gravity: 1.0
Behavior Alternatives: Dissuade Hubs:
LinkLog mode:
Prevent Overlap:

Run

Presets... Reset

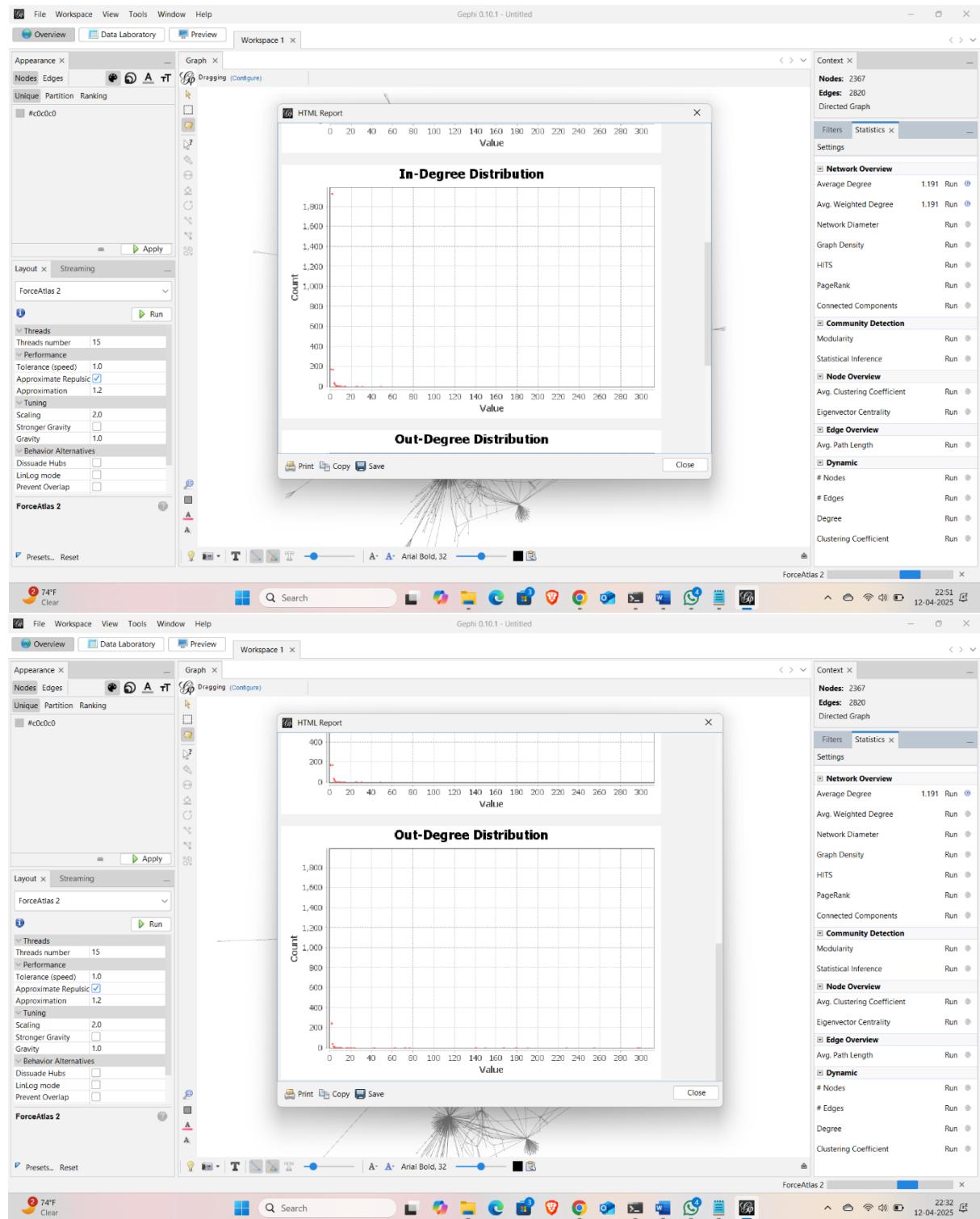
Font: Arial Bold, 32

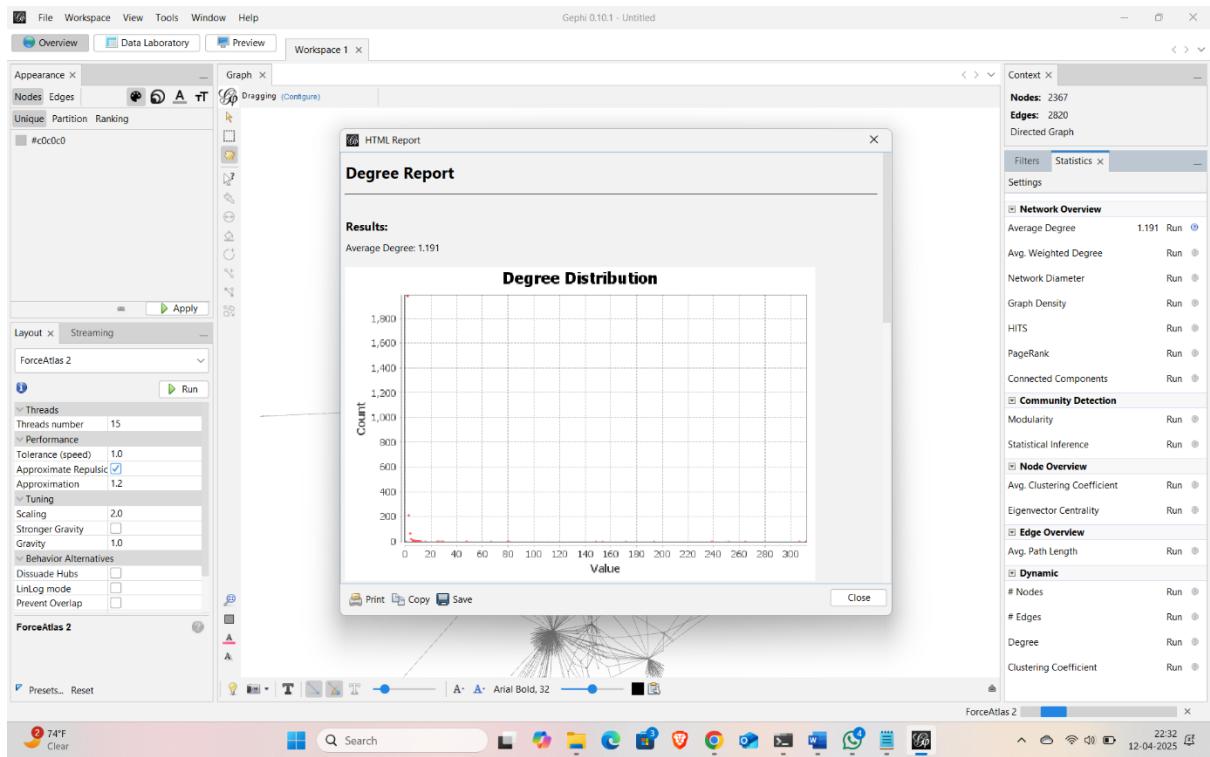
Queries Drag filter here

Library Attributes Dynamic Edges Operator Topology Saved queries

22:30 12-04-2025

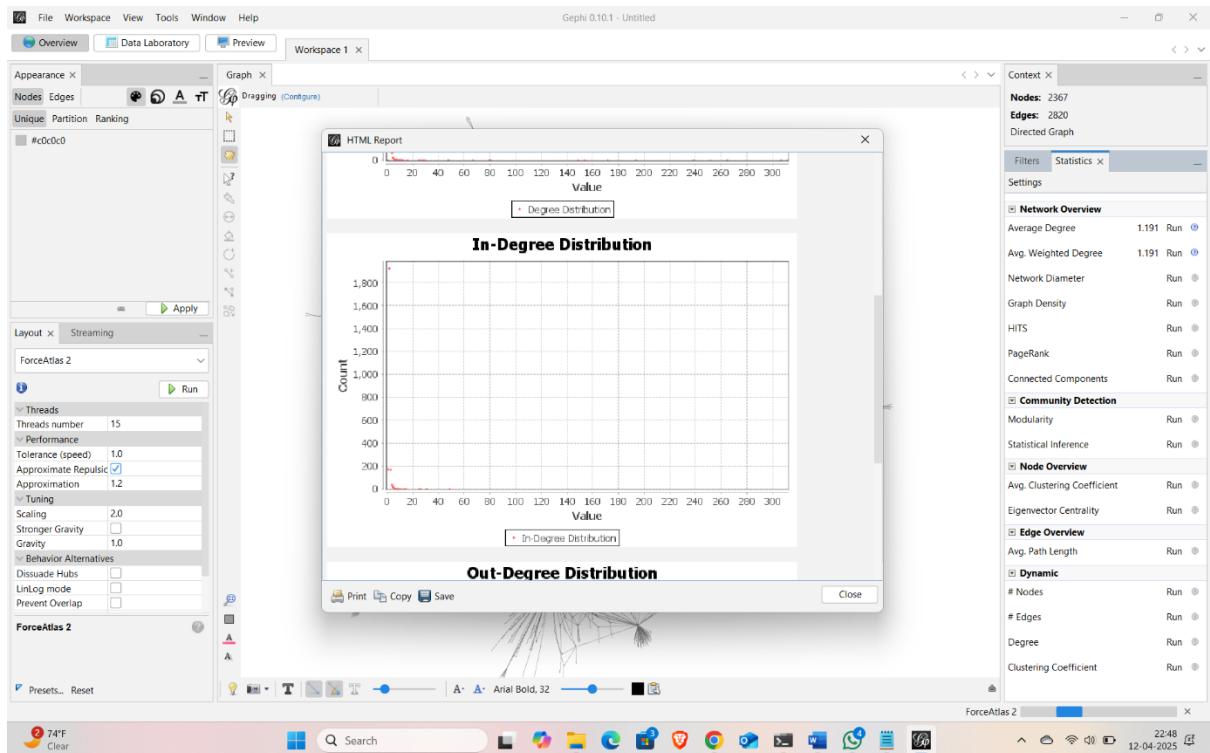
Q16.)

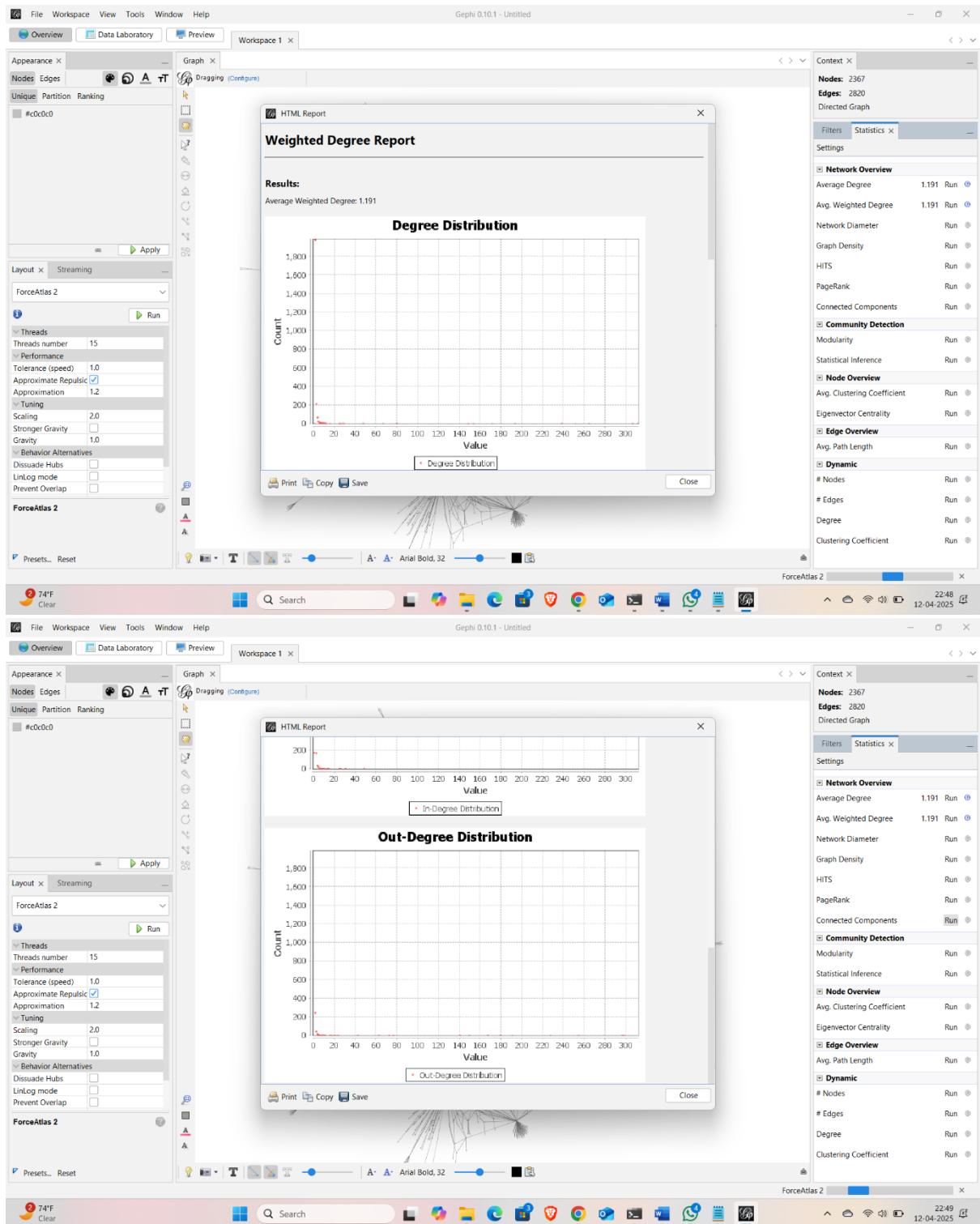




Average Degree: 1.191.

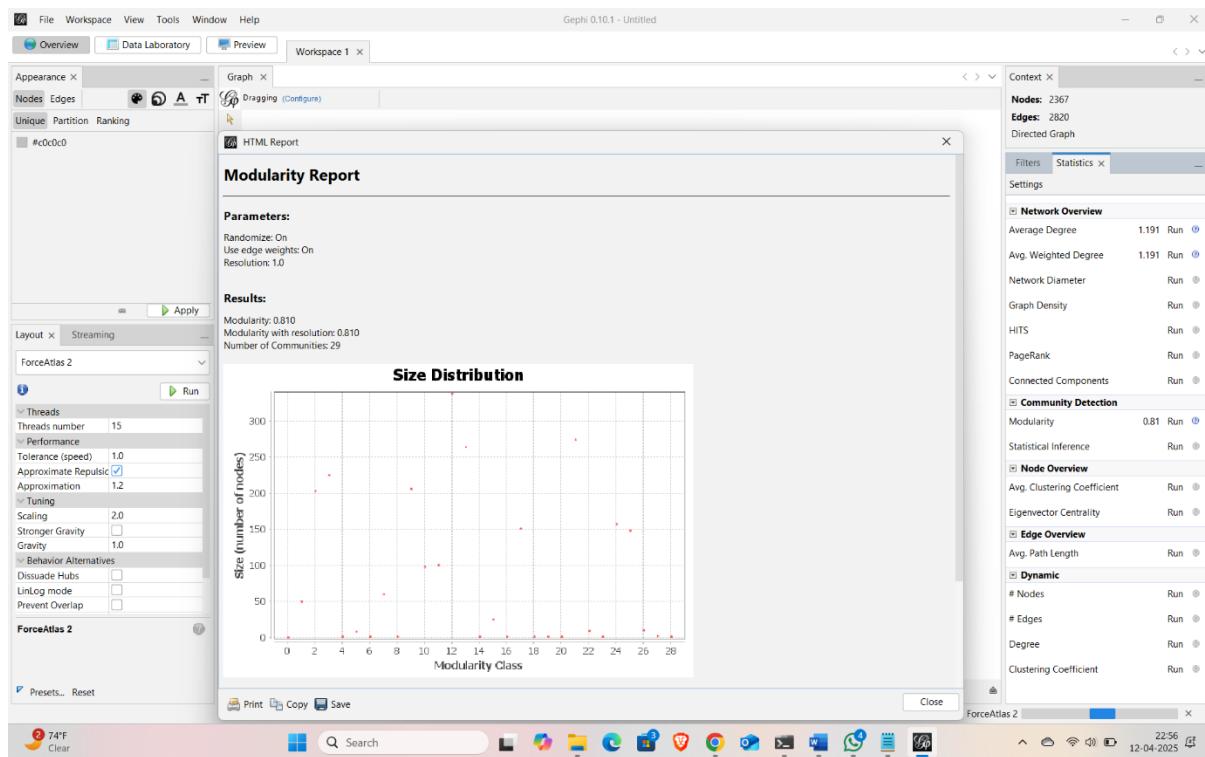
Q17.)





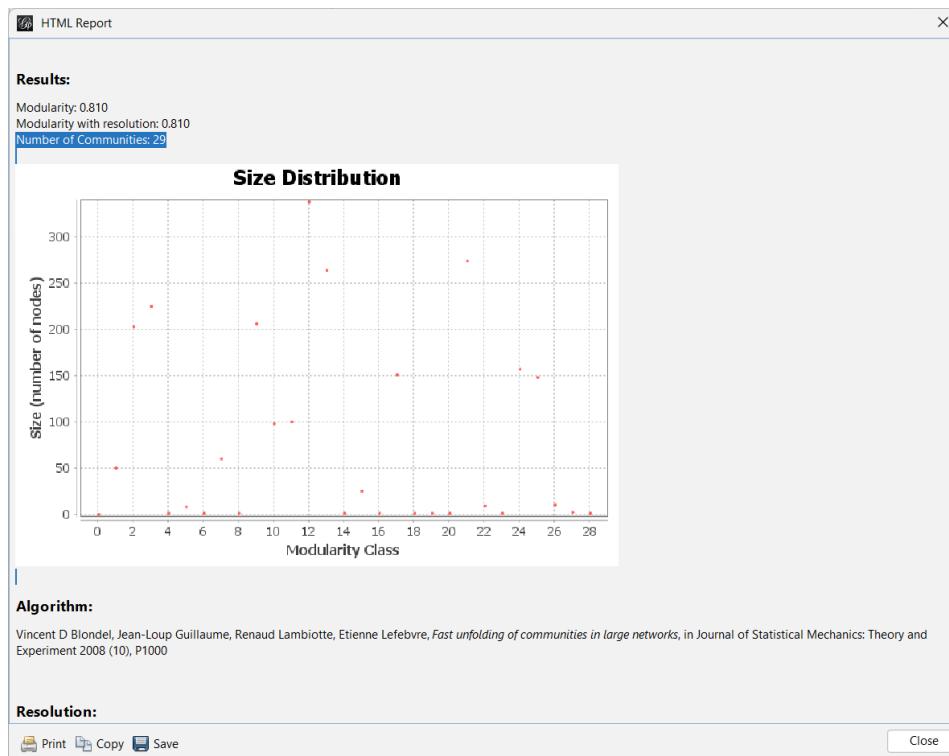
Average Weighted Degree: 1.191.

Q18.)

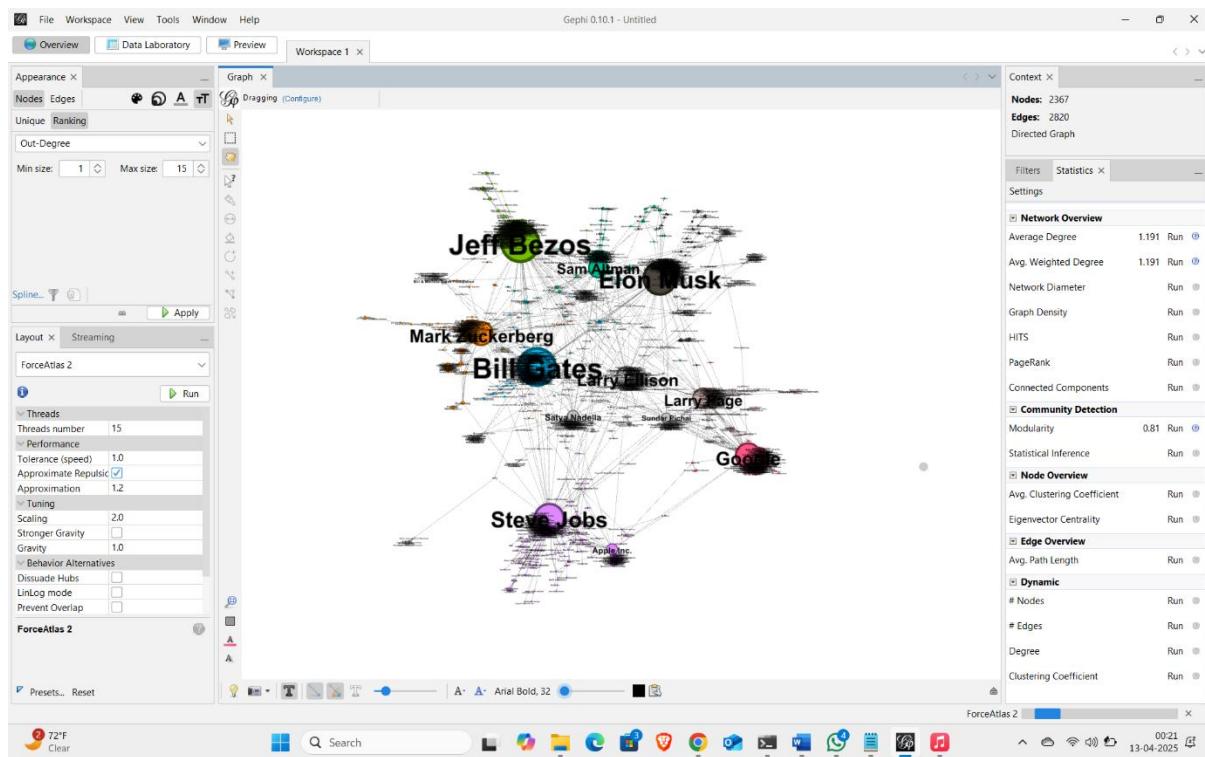


Q19.)

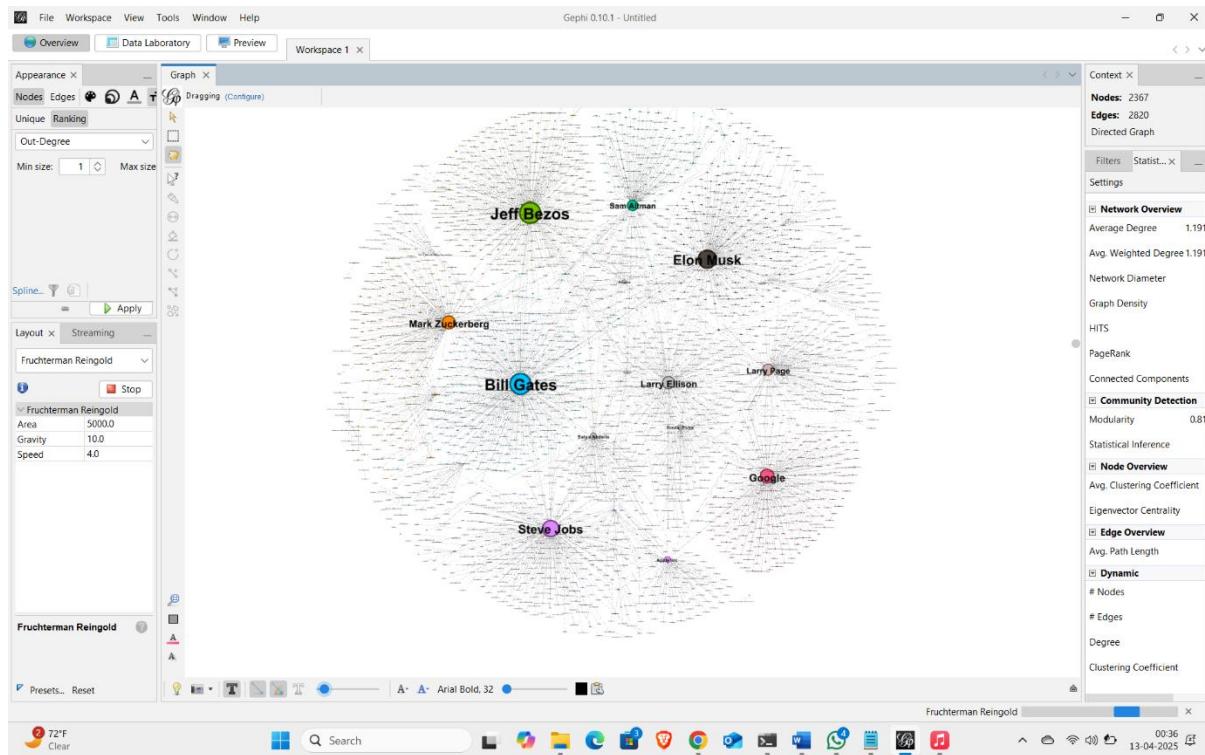
There are 29 communities created in the dataset.



Q20.)



Q21.)

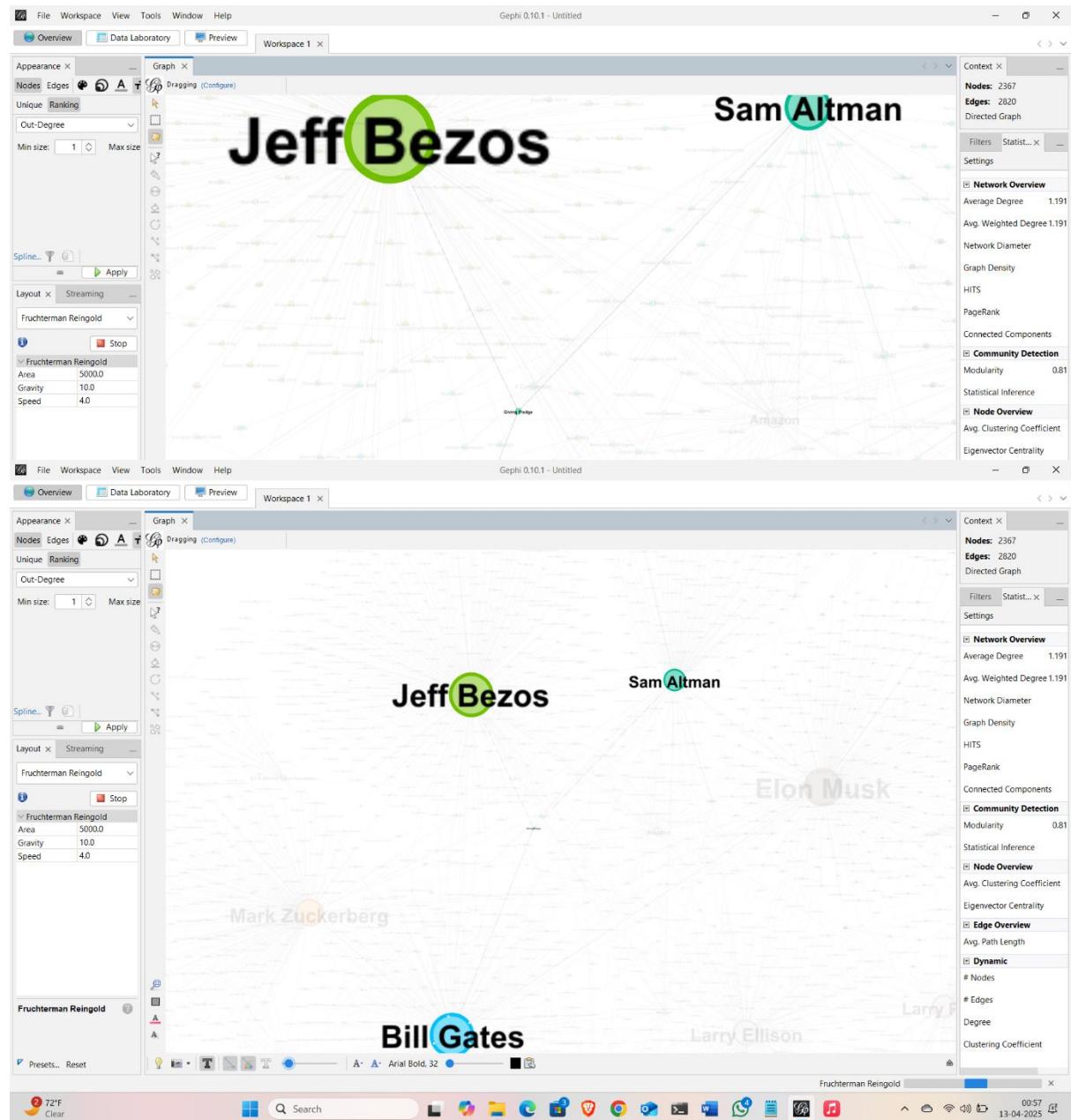


Q22.)

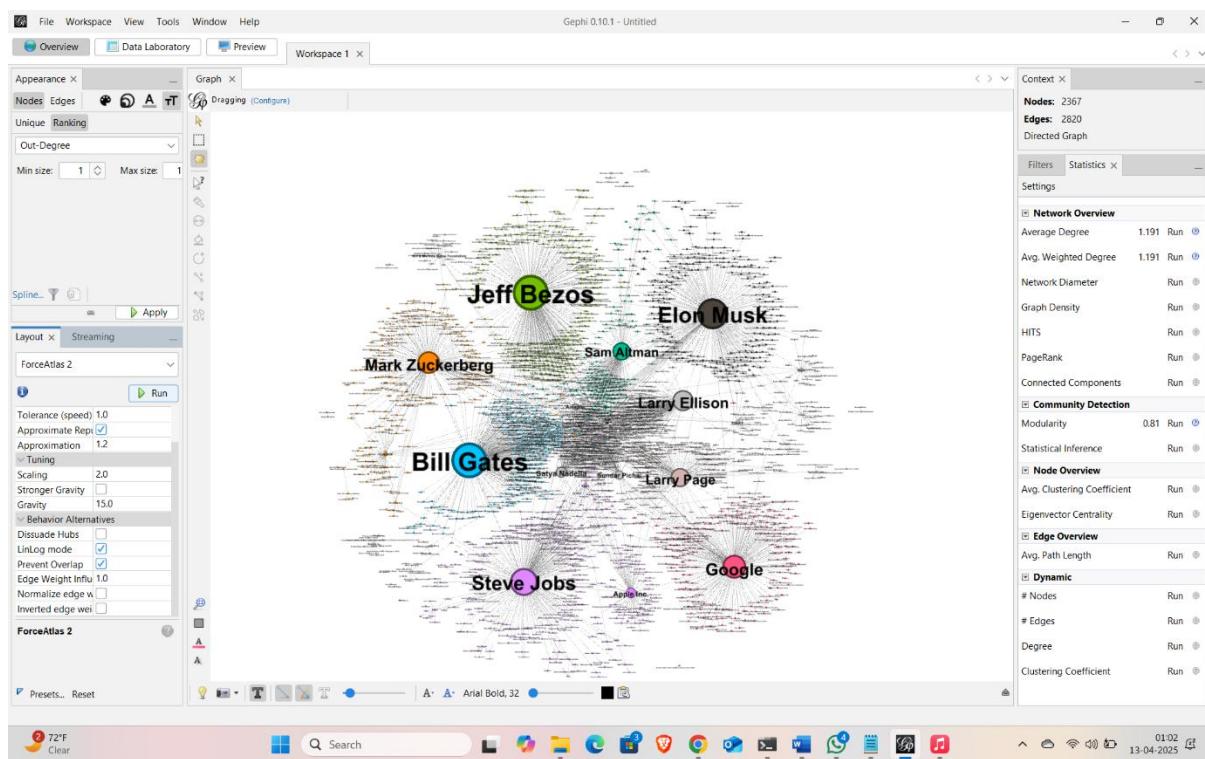
Bill Gates have the most connections in the network. (In comparison, the node associated with bill gates is the biggest of all.)

Q23.)

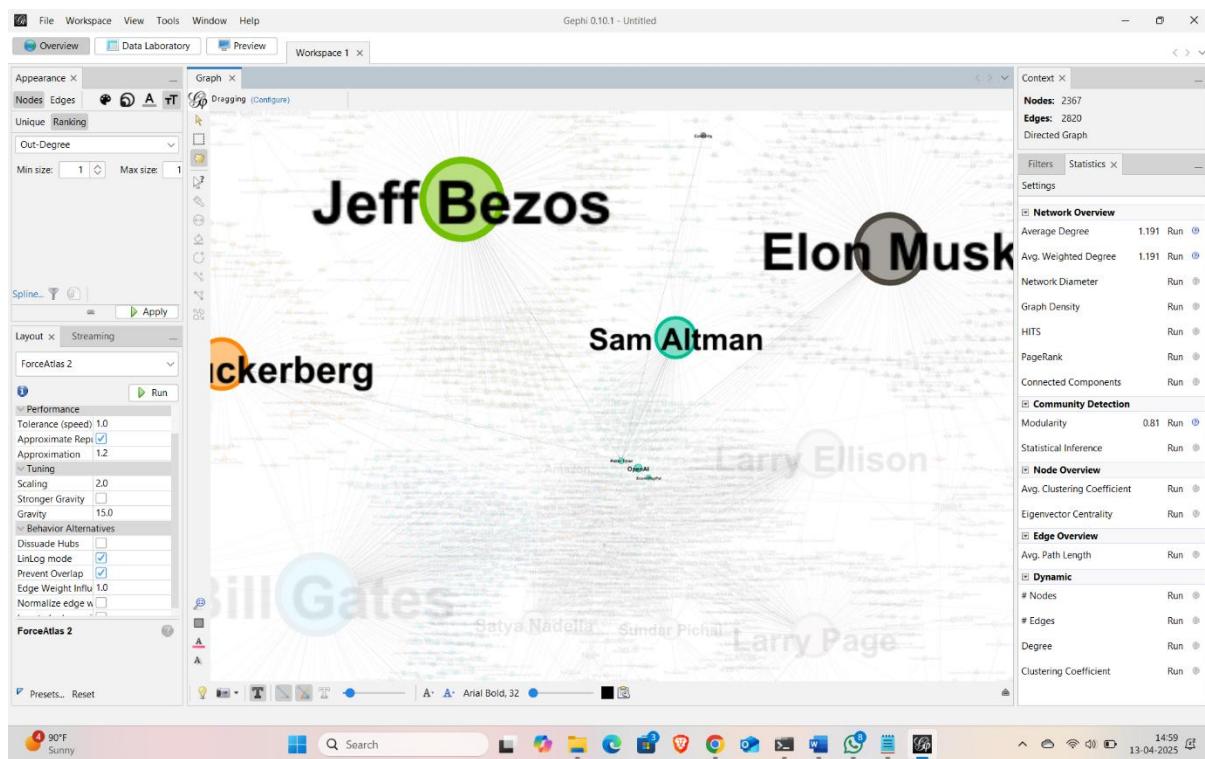
Giving pledge is connected to Jeff Bezos and Sam Altman.

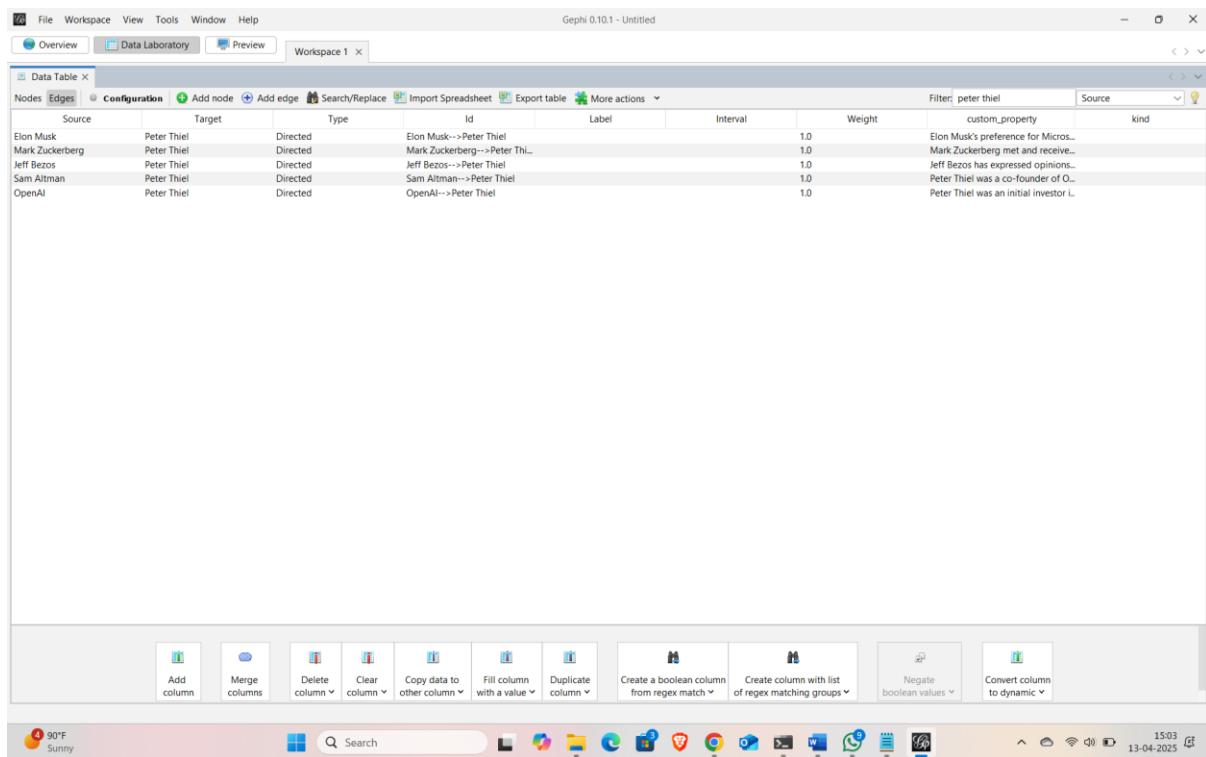


Q24.)



Q25.)





- Peter Thiel is a central architect of Silicon Valley's elite power structure, with deep and deliberate ties to **Elon Musk, Sam Altman, Mark Zuckerberg, Jeff Bezos, and OpenAI**.
- He **co-founded PayPal with Elon Musk**, and after a dramatic **power struggle that led to Musk's ousting**, both became founding members of the "**PayPal Mafia**," setting the stage for decades of tech dominance.
- In **2004**, Thiel became the **first outside investor in Facebook**, injecting \$500,000 and **mentoring Mark Zuckerberg** while serving on the board for **17 years**, before stepping down in **2022** to pivot toward political influence.
- Thiel later co-founded **Palantir Technologies**, which directly **competed with Jeff Bezos's AWS** for critical **U.S. government contracts**, notably in defence and intelligence. He and Bezos also clashed over ideology—**Thiel championed nationalist, security-focused tech**, while **Bezos embodied global commercialism**.
- Thiel's influence extended to artificial intelligence, where he was an **early supporter of OpenAI**, aligning philosophically with **Sam Altman and Elon Musk** on the **existential risks of centralized AI**. As OpenAI gained global traction with **GPT-3 and ChatGPT**, Thiel remained a **sceptical observer**, warning against AI monopolies.

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