CS101 PROJECT-2 Q3

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We are provided with a **Social Impression Network**. We should plot the graph and study its various properties.

We are expected to plot a directed graph. To create the graph, firstly, I manually made changes in the file since all the entries were not in the same format (some were in the form of email ID while some were in the form name+entry no.). Each entry was converted in the form of an entry number. Doing so, it became easier to plot the graph. I have attached that file in the project submissions. If A is impressed by B, we will add a directed edge from A to B. In this way, a graph is plotted where nodes are the entry numbers of students while edges represent the impressions.

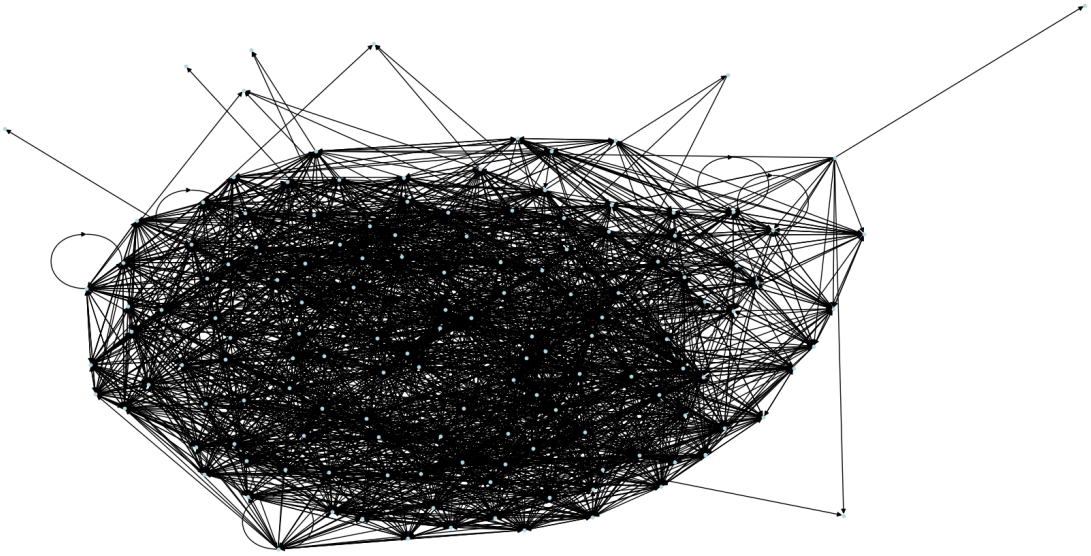


Figure 1: PLOTTED GRAPH

QUESTION III -

Comparing Myopic Search and Optimal Search

Problem Statement : Propose a brand new problem based on this dataset and provide a solution for the same. Be as creative as possible.

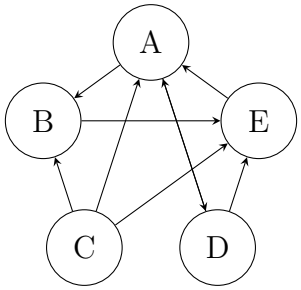
Question asked : Compare the efficiency between Myopic Search and Optimal search

Introduction : Search algorithms are fundamental tools used in various computational tasks, particularly in directed graphs. In a directed graph, nodes are connected by directed edges that indicate the direction of the relationship between nodes. Search algorithms in directed graphs are essential for tasks such as finding paths, determining connectivity, and analyzing network structures.

Myopic Search :
Definition and Characteristics: Myopic search is a local exploration strategy where decisions are made based on immediate neighboring nodes without considering long-term consequences. It selects neighbors randomly.
Advantages and Limitations: The advantages of myopic search include simplicity, low computational cost, and effectiveness in real-time decision-making. However, myopic search may find suboptimal paths in complex graphs and lacks guarantees of global optimality, making it suitable for tasks where immediate decisions are more critical than optimal solutions

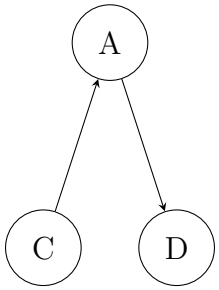
Optimal Search :
Definition and Characteristics: Optimal search algorithms aim to find the shortest path in graph traversal. These algorithms systematically explore the search space to find the optimal solution.
Prominent optimal search algorithms include Dijkstra's algorithm, A* search, and breadth-first search (BFS). Advantages of Optimal Search: Optimal search algorithms offer advantages such as global optimality guarantees, efficiency in finding the best path, and applicability to various problem domains requiring optimal solutions.

Searching in a Random Graph (Explaination)



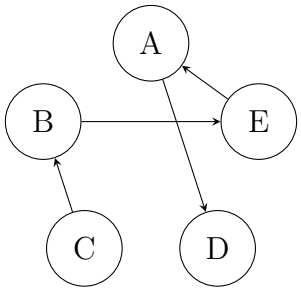
This is a simple random graph with 5 nodes and some edges connecting them.

Let's say we have to go from Node C to Node D. i) By optimal search, the path we obtain is C $->$ A $->$ D.



Optimal search

ii) By myopic search, we can find a path like C $->$ B $->$ E $->$ A $->$ D.



Myopic search

Code explainantion :
In my code, I simulated myopic search and optimal search on random 100 pair of nodes from the graph. A graph is plotted representing the path lengths found as a result of both the searches. If no path was found, path length is noted as 0.
Following graph was observed :

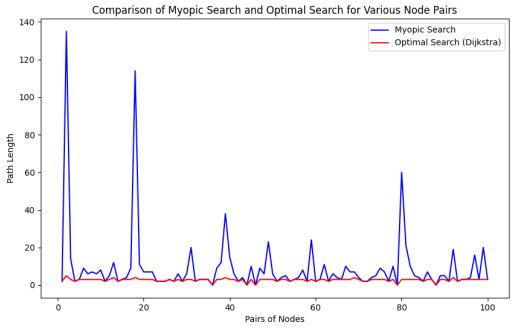


Figure 2: Myopic vs Optimal

We can jump to following conclusions :
1. Path Optimality: Myopic search may find suboptimal paths due to its local exploration strategy, while optimal search algorithms guarantee finding the shortest path or optimal solution.
2. Computational Complexity: Myopic search often has lower computational complexity, making it efficient for local exploration, while optimal search algorithms may have higher computational costs.
3. Scalability: Myopic search may scale better in certain scenarios due to its local nature and lower computational overhead, whereas optimal search algorithms may face challenges with scalability in highly interconnected or large graphs.

Application Domains :
Myopic search is suitable for real-time decision-making, dynamic environments, and tasks where immediate decisions are crucial.
Optimal search algorithms are preferable for critical tasks requiring global optimality, such as navigation systems and network analysis.

Conclusion :
I learnt about a new type of searching algorithm. Though myopic search is less effi-

cient sometimes it saves the efforts of traversing through full graph before concluding our path.