

# ANALYSIS OF COMPUTER

**ALGORITHMS**

## -- PROJECT PLANNING REPORT-- BREADTH FIRST SEARCH

**BY:**

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### MOTIVATION:

Social and physical networks have played a crucial role in driving progress and insights in fields as diverse as data science and data analytics, visual analytics, high-performance computing, and machine learning**.** As we observe, these networks form and evolve, as each person joins the network and forms synapse connections directly or indirectly through friendship networks. Due to the sheer amount of this data, it is hard to perform iterative analysis through the naked eye. To uncover insights from complex network systems, graphical analysis method such as the breadth-first search algorithm is the essence of analyzing these connections. This approach encourages to development of innovative solutions and the derived data can enable us to discover the relationship between the events that unfold as they occur in the field.

### BACKGROUND:

Breadth First Search Algorithm allows for the development of high-quality solutions while also ensuring the minimum nodes are visited. Exploring the network to answer questions like, how many connections does each person have? who is the influencer in the network? are there relations of tightly connected people and loosely connected people? the players that connect multiple networks, the saga of interconnected people, and further essentially recognize patterns of how people interact.

### IMPLEMENTATION and EVALUATION:

Empirical evaluation will be done, and theoretical model will be formulated. The C++ programming is used for implementation of algorithm and code will be assessed on Linux. To reduce the time complexity of the method, a bottom-up approach can be employed. Evaluation will be performed through different benchmarks and self-constructed test cases. A variety of graphs with varied sizes will be used for evaluation, to make metrics of the possible approach used.

### OPTIMIZATION PLAN:

Using bidirectional Breadth First Search We could optimize the performance of the Dataset. Evaluation will be performed through different benchmarks and Self constructed test cases. Evaluation will be done on graphs that vary in size.

* **Major Milestones:**

Through this Graph Analysis we understand social structures and the use of networks and how information is spread between networks.

1.)"To reduce the time complexity of the method, a bottom-up approach can be employed." -- What is the time complexity of a "bottom-up" approach? How about the traditional one?

-The Time complexity approach of the bottom-up approach is O(n^2) where n could be number of occurrences.

-The Time complexity of the top-down approach is in the worst case also O(n^2).

-Asymptotically both the bottom up and top down give us the same complexity.

-At run time the bottom-up approach out spaces the top-down approach by some constant factors.

-Which could be because we at the bottom-up approach investigate the tables for results of the sub problems while in top down we call recursion which returns more CPU cycles.

-Also, with the use of the bottom up approach we could break the problem into smaller chunks and solve them individually and then integrate them.

-It is also better for reusability and testing.

2.) The recommended paper is not cited, thus not sure if you have read it or not.

* Papers and other References :
* <https://ieeexplore.ieee.org/document/6468458>
* <https://scottbeamer.net/pubs/beamer-sc2012.pdf>

To understand the difference and comparison we used :

* <https://www.geeksforgeeks.org/difference-between-bottom-up-model-and-top-down-model/>

## Nth Level search of Connections for a User in a Social Network using

## BREADTH FIRST SEARCH and Neo4j