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Importance of Graph Data Structures

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Data structures are very useful especially in real-world complex situations where there is a need to use algorithms. Algorithms are known for being used in network analysis, transportation, and social networking. Traversal and shortest path algorithms are very popular graph algorithms used to solve difficult real-world problems. Learning about these algorithms is a great way to create useful, robust algorithms. This paper is going to go into different applications of these graphing algorithms, tree traversal techniques, and shortest path algorithms.

Graph data structures are very useful and have many real-world applications. Graphs are data structures that use nodes and connect them together with edges that can be directed or undirected. Graph data structures are used in different industries including Google maps and Facebook. Graphs are used in Google maps to build transportation. Facebook uses graphs and assigns users as nodes and friends of those users are connected to them with edges.

Tree traversal techniques are very useful. They have many different ways to look and examine every node in a tree. There are different tree traversal techniques that are used, which are inorder traversal, preorder traversal, level order traversal, breadth first search, and postorder traversal. Inorder traversal is useful in providing the ability to examine arithmetic expressions by looking at the nodes in either non-decreasing or non-increasing order. Preorder traversal is useful in allowing for the copy of a tree and to get the prefix expressions that are in a given expression tree. Postorder traversal is useful in obtaining the postfix expression of a given expression tree and for deleting trees. This is great for garbage collection algorithms. Level order traversal is great to use when processing nodes through going level by level. These traversals are very

useful at achieving results for different problems and each traversal has their own use. Shortest path algorithms are great at efficiently finding nodes.

Something else used for graphs are shortest path algorithms. These are used for solving problems. Three of the most popular shortest path algorithms are depth-first search, breadth-first search, and Dijkstra's algorithm. Depth-first search gives the ability to explore nodes recursively until there are no more recursive calls. Breadth-first search gives the ability to find a node following the fewest edges possible. Dijkstra's algorithm gives the ability to find the shortest distance to a node using greedy optimization. These are some of the most popular shortest path algorithms, and rightfully so, as they specialize in finding nodes by following the shortest paths. Greedy algorithms are very useful when it comes to investing and financial algorithms.

The goal of this paper is to explore and examine in depth applications of graphing algorithms, tree traversal techniques, and shortest path algorithms. These are important subjects when it comes to creating and utilizing powerful algorithms. Traversal and shortest path algorithms are great, which leads them to be used very frequently. The fields of network analysis, transportation, and social networking frequently use algorithms. This is a great research paper for learning more in-depth concepts associated with data structures.

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