Analysis of Algorithms

In computer science, experts strive their level best to create algorithms that can, in the end, help to solve various problems. Some of the problems that happen in the real world may require the use of complex computer algorithms to resolve. The subset sum problem plays a considerable role in the cryptographic as well as complexity theoretical studies. There exist various ways in which one can formulate the subset sum problem. One of the ways in which one can formulate the subset sum problems revolves around looking at the ones that add up to 0 (zero). For instance, to demonstrate such a problem formulation, one may consider the following subset which comprises for instance (10, -2, and -8). In this example, one can check to see if the sum of the presented numbers adds up to zero or not.

A spanning tree refers to a graph that has all the edges of a tree. A single graph may contain multiple spanning trees. On the other hand, a minimum spanning tree refers to a graph which includes all the edges or vertices of an undirected graph. Experts can use the minimum spanning tree concept to approach multiple problems. Some of the issues that the minimum spanning tree concept can solve handwriting recognition, cluster analysis as well as in the segmentation of images (Kamousi, Chan & Suri, 2011). Other areas of application may include resolving the traveling salesman problem among other areas of interest (Rego, Gamboa, Glover & Osterman, 2011).

Based on the given knowledge, one can then conclude that there exist numerous algorithms that can help to resolve the problems presented by the concepts provided. In the case of trying to look at and identify the minimum cost of a spanning tree, one can use techniques such as the randomized algorithm, the Kruskal`s Algorithm and also but not limited to the Prim`s Algorithm. Other commonly used techniques may include the hybrid and Boruvka`s algorithms. The former acts as a combination of two or more algorithms that can help to resolve a given problem efficiently as compared to a situation when one uses a single technique. For example, in trying to address the traveling salesman problem, one can opt to use the approximation algorithm. In this case, the primary objective revolves around the determination of the shortest path that a salesperson should follow in relation to visiting the maximum cities or areas. From a heuristic approach, one can use the Greedy algorithm to resolve the traveling salesman problem. For instance, the salesman, in this case, desires to visit a number of cities. However, the salesman must only traverse a given city once when going to the other one. Therefore, the problem revolves around determining the shortest possible distance that the salesman should follow when traversing the maximum cities. The Greedy algorithm seeks to gather information about the closest city after selecting the starting point for the salesman. The process continues until the salesman finds the shortest path possible to traverse if possible, all the cities.

In the case of the subset sum problem, one can use a number of techniques and algorithms to resolve the issues. One of the most commonly presented issue revolves around the Knapsack Problem. In simple terms, the Knapsack problem tries to assist in considering the most valuable items amongst a given collection of items that have different weights and values (Puchinger, Raidl & Pferschy, 2010). In a layman`s language, this problem can be likened to an individual who contains a fixed size carrier bag and seeks to fill it with the most valuable items. The Greedy approximation algorithm stands out as one of the heuristic approaches that one can take to resolve the problem.

References

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