

Graph theory



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Graph Theory Introduction Graph theory refers to a branch of Mathematics that deals with a network of points that are connected by lines (Biggs 122). The concept of graph theory begun in problems pertained to recreational Mathematics. However, as noted by Biggs (122), it has developed into an essential area of mathematical research with several applications in physical, biological, and natural sciences. Importantly computer science essentially depends on concepts of graph theory. The historical development of graph theory can traced back to the year 1735, when Leonhard Euler a Swiss Mathematician developed a solution to an old puzzle related to the possibility of establishing a path across every one of the seven bridges that span a forked river flowing past (Biggs 140). From a conceptual perspective, a graph is formed by vertices and edges linking the vertices. From a formal perspective however, a graph refers to a pair of sets (V, E) , where V is a set of vertices and E is a set of edges. Based on these fundamental concepts underpinning graph theory, this paper seeks to explain the importance and application of the theory's theoretical concepts in various fields (Biggs 124). The concept of graph theory is important because graphs allow for a simplification of complex concepts, eliminating the irrelevant details without forfeiting much information necessary for the task. As asserted by Biggs (148), the assumptions made by the graph theory match the real world conditions and are therefore not comparable to any other model. Among the fundamental uses of the graph theory entail; giving a unified formalism for diverse looking real life problems. This has been the sufficient basis upon which algorithms have been presented in this common formalism.

The theoretical concepts underpinning graph theory are widely used in the studying and modeling of various applications, in diverse fields. These

include; construction of bonds in chemistry, study of molecules, and the study of atoms. Graph theory is widely used in Sociology for instance to measure the prestige of actors or in exploring the mechanisms of diffusion (Biggs 150). Besides, the conservation efforts made in biological sciences essentially apply the concepts of graph theory where a vertex represent regions where certain species exist and the edges are used to represent paths of migration or movement from one region to another (Biggs 152). Such information is important more so when examining the breeding patterns or tracking the spread of parasites, diseases and in the study of the consequences of migration that affect other species. Theoretical concepts of graph theory are widely used in the field of operations research. For instance, the common travelling salesman problem, the short spanning tree in a weighted graph, obtaining the favorable match of jobs and men and establishing the shortest path between two vertices in a graph. The network activity which primarily employs concepts of graph theory is used in solving complex numbers of combinatorial problems. The most successful and common application is the planning and scheduling of large complex projects. In such a project, edges represent the moves and vertices represent the positions.

Conclusion Concisely, it is not possible to estimate the necessity of concepts of graph theory in contemporary Mathematics. Elegant and deep in itself, graph theory entail a considerable number of wonderful results and ideas that are essential in various fields of Mathematics. As illustrated in this paper, the theoretical underpinnings of the graph theory provide the theoretical basis for developing important concepts in applied fields such as; operations research, computer science, management science, mechanical

and electrical engineering.

Work Cited:

Biggs, Wilson. Graph Theory. New York: Clarendon Press, 1986. Print.