Review article on application of Graph Theory

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Abstract

The present paper investigated about the application point of the graph theory in the different filed such as in computer science, mathematics, physics, chemistry and operation research etc. This paper also discussed about the use of graphs in real life.

Key words

Graph, path, Eulerian graph.

1. Introduction

Graph theory is a branch of mathematics, but it also deals with many other branches of science. Graph has many real-life applications such as traffic signals, road maps, railway traffic maps, weather forecast, seating arrangement, ranking hyperlinks, google maps, communication network, flights schedule etc. In many branches of science, we use this theory such as computer science, physics, chemistry, operation research and mathematics. Many researchers have worked on this and wrote many books on the graph theory ([1]. [2]). Basics terminology of graph theory are very useful to understand about the depth knowledge of graph theory.

2. Preliminaries

The basics terminology of graph theory is discussed in this section.

Definition 2.1 A graph $G = (V, E)$ is defined where G contains set of vertices V and number of edges E, it assumed to be finite set of vertices and edges.

Definition 2.2 For a graph, where an edge is drawn to itself from the vertex is called Loop.

Definition 2.3 If a graph does not contain any loop and multiple edges, that graph is called Simple graph.

Definition 2.4 A walk in graph is an alternating sequence of vertices and edges but beginning and ending of sequence should be with vertices.

Definition 2.5 A trail is a walk in which all edges are distinct.

Definition 2.6 A path is a walk whose first and last vertices are not same (open walk) meaning no vertex appears twice or more.

Definition 2.7 If a graph does not contain loops but have multiple edges is called Multigraph.

Definition 2.8 A Euler path is a simple path in a graph which visits every edge of the graph exactly once.

Definition 2.9 A graph which contains loop and multiple edges is called pseudograph.
Definition 2.10 A circuit is a path whose starting and ending vertices are same.

Definition 2.11 A graph which contains either Euler path or Euler circuit is called Eulerian graph.

Definition 2.12 A Hamilton path which contains each vertex of graph exactly once.

Definition 2.13 A circuit that includes exactly one vertex of each graph except for the first and last vertex is called Hamiltonian graph.

Definition 2.14 f

Definition 2.15 h

3. Applications of Graph theory

In many areas we use graph theory in real life for instance, if we observe the communication network between two different states. Then, the states are vertices and network that connected two states are represented by edges.

3.1 Internet and google map - Graph is used in the concept of internet. Provides services to users of different countries in which users are represented as vertices and network are represented as edges and provide connection to users. Similarly, in google map to find the path between two places or to find the shortest path. Then, the places are considered as vertices and the routes are considered as edges.

3.2 Physics and chemistry – In chemistry to know about the chemical bonds, we also use graph theory. In chemical bond, atoms are represented by vertices and bond between them is represented by edge. In physics, graphs used in electric circuits. In electric circuit, switches are represented by vertices and wires are represented by edges and in the circuits if we show the direction of current that in which direction current is flowing that showing directed graph.

3.3 Computer science – Graph is the most important topic for computer science. To find shortest path we use spanning tree and to find the minimum spanning tress. For algorithm for adjacency matrix.

3.4 Operation Research – Graphs plays a vital role in operation research. In transportation problem, to find maximum profit with minimum cost we Dijkstra’s algorithm which is an important topic of graph theory.

4. Conclusion

This paper investigated that how we use graph theory in daily life. It’s a branch of mathematics but graph theory used in computer science, physics, chemistry, google map, internet and operation research.

5. References
