

Lecture 25

Interval Graph

Pramod Kumar Gupta (MT19AIE282)

In this lecture we have discussed interval graph solving algorithm, and planarity checking algorithms for any arbitrary graph.

1. Interval Graph:

In graph theory, an interval graph is an undirected graph formed from a set of intervals on the real line, with a vertex for each interval and an edge between vertices whose intervals intersect. It is the intersection graph of the intervals. Interval graphs are chordal graphs and perfect graphs. *[Wikipedia]*

- Interval graph is used to solve the problem of different time intervals intersection problem
- Interval graphs can be used in testimony of crime investigations, genes analysis etc.

1.1 Solution to Interval Graph Problem:

Interval Graph Problem can be solved by two ways:

- Earliest Finish Time Algorithm
- Earliest Start Time Algorithm

EFT algorithm used to solve interval scheduling problems and identify how many events can be organized in one single room. It's a heuristic-based algorithm. However, EST is an algorithm to identify how many minimum rooms are required to complete all activities. EST is a greedy algorithm guaranteed to give optimal chromatic number.

As we know greedy algorithm usually does not guarantee optimal solution because it depends on the choice of viable activities options. Hence, the solution is not fixed, but it gives optimal solution with heuristic like EST.

2. Planar Graph:

To check the planarity of a simple graph is a trivial task e.g. K_1 , K_2 , K_3 , and K_4 are planar graphs. But how can we check the planarity of any arbitrary complex graph. There is a element reduction technique which reduces graph G to simple graph H which can be easily observed if it's a planar graph or not.

Elementary Reduction Algorithm:

Step 1: Remove all self-loops

Step 2: Remove all parallel edges

Step 2: Remove vertex having degree 2 and merge the edges incident on that vertex