ANCC SHIVALIK 2023

WEEK-6

From : 25-Dec-23 Monday.
To : 31-Dec-23 Sunday.

Introduction

Graphs are very often used in CP, they are many types and have may properties and algorithms related to them. Though topics not related to graphs are not completed yet,but we have given a fair idea of what its like already. As this is the last week we get this winter, we don't want to keep the graphs introduction pending. We will continue other topics as per the semester schedules.

What are we going to learn this week

1. Introduction to graphs and their types.
2. Graph traversals (DFS and BFS).
3. Dijkstra's algorithm.
4. Distances in trees
5. Minimum spanning tree (Kruskal's and prims)

What and from where to do this things

Note: We are not doing all the algorithms related to a specific topic, we are doing things on surface level to get an idea of them, So try completing this first before you start exploring other ways to solve the problems.

1. What is a graph and how to represent.
    1. Basics of graphs page 109 to 116 CP Hand book
    2. Different types of graphs (see only their structure, search online for definitions as needed).
        1. trees
        2. simple graphs
        3. directed graphs
        4. DAG (Directed Acyclic Graphs)
2. Graph traversals using DFS and BFS.
    1. Graph traversal page 117 of CP Hand book.
    2. For binary tree, pre order, in order and post order traversals.
3. find the shortest path to all nodes in a graph from a starting point using Dijkstra's algorithm.
    1. CP Hand book page 126.
4. Tree algorithms from CP Hand book page 133 complete.
5. Spanning trees form CP Hand book page 141 complete.
6. Problems: Refer CSES tree algorithms and search for basic graph problems online, practice sheet is out with only a few problems, we will progressively add a few more.

Note: If you are stuck at a concept in any of the above mentioned topic, they are extensively covered in may YouTube videos, just search the name of the topic, you can find very good explanations. If still confused just post in group.