

Indian Statistical Institute

Applied Statistics Unit

SEMINAR NOTICE

(Pre-Submission Seminar)

Speaker: Diptendu Chatterjee

Title: Hardness and Approximation of Some Graph Theoretic Problems

Date: 05 April, 2022

Time: 16:15 hours

Online Platform: Google Meet (meet.google.com/iym-zvpx-tem)

Abstract:

We encounter many problems that can be modeled as graph theoretic problems. This modeling gives a concrete view of the constraints and objectives regarding that problem where we can apply some well-known techniques to deal with it. Some of these problems do not have their computational complexity settled and some others have been proved to be NP-hard and should be approximated.

This work focuses on these aspects of some graph theoretic problems. The Traveling Tournament Problem is one of the interests of this work. A constrained Traveling Tournament Problem (TTP-k) asks for a schedule of a double round-robin tournament with an upper bound(k) on maximum length of home stand and away trips of the teams where the total travel distance is minimum. The hardness of the problem varies with the upper bound. This work attempts an approximation algorithm for TTP-2 which is assumed to be NP-Hard. Then this work conducts a study on the complexity and hardness of TTP-k where k is a natural number greater than 3.

The Firefighter problem is also an important graph theoretic problem which has a practical application specially in recent scenario. Firefighter problem asks for a solution to save vertices in a graph by placing firefighter on some of its vertices where a fire broke out in some vertex and spreading through the network with time. This work considers the Firefighter Problem on Unit Disk graphs. In this wireless era most of the networks can be modeled as Unit Disk Graphs. The hardness of the problem and an approximation algorithm for the same are attempted in this work. Then this work considers a special version of firefighter problem i.e. the Firebreak Problem where the firefighters can be placed on the vertices only at the initial time instance when the fire breaks out. An approximation algorithm for Firebreak Problem on Split Graphs is attempted in this work which has already been proven to be NP-Hard.

All are invited to attend.