



Module PMRF-ISSS049/III/2024

Approximation Algorithms

Name of the PMRF student

Rameesh Paul

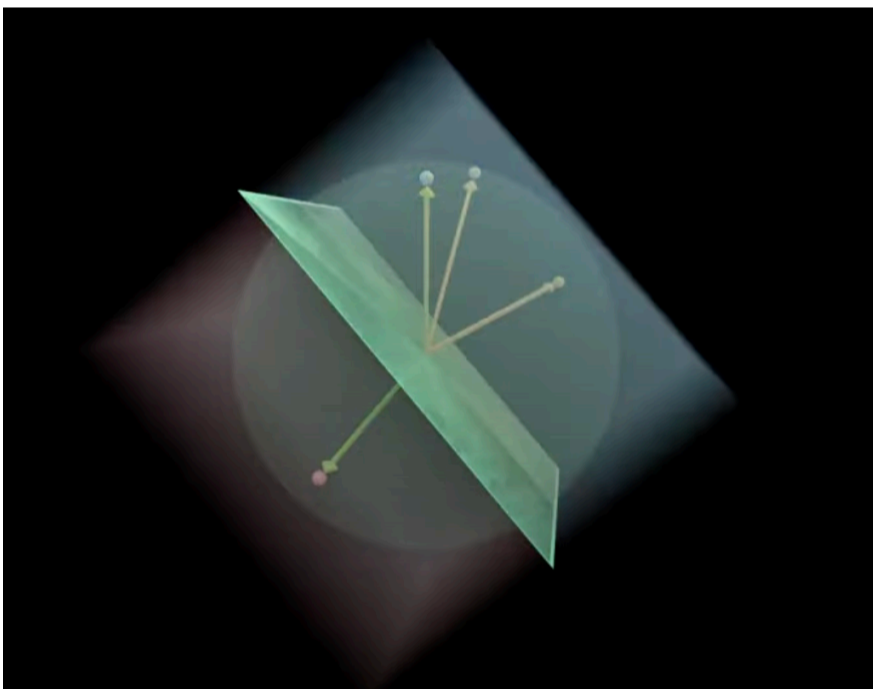
Required background of the students taught

Knowledge of High School Maths and Undergraduate level Probability, Linear Algebra

Mathematical Maturity to grasp abstract ideas and concepts

Online session coordinator

Will be chosen from the list of registrants



Details of the content of the module

The course will cover techniques to design approximate algorithms for graph networks.

The focus of the course is on recent techniques for algorithm design in this area. These includes techniques which uses ideas from linear algebra, high dimensional probability, and convex optimization.

A key tool we will learn in this course is of Semidefinite Programming (SDPs) and how they can be used for efficient algorithm design.

We will broadly cover the following topics,

1. Cut Problems and Graph Partitioning, LP Relaxations, Graph Embeddings, Spectral Tools
2. SDP Relaxations, Applications: MAX-CUT, Maximum Eigenvalue, Lovasz Theta Function, Graph Coloring, Sparse Cuts and Variants
3. Higher Order SDPs aka SoS Hierarchy, SoS Applications in ML, Correlation Rounding, Low Rank Graphs, Low Degree Polynomial Method
4. SDPs for CSP and Unique Games, Orthogonal Separator, Optimal Rounding Algorithms

Schedule of the module

Course starts on: 15th March, 2024

Course ends on: 27th December, 2024

Classes on : Friday, Saturday (if required)

Timings: 16:45 – 18:15 hrs

Class duration is 75 mins and last 15 mins (or more if required) will be devoted purely for discussion.

Meeting link : <https://shorturl.at/auMP4>

Contact email ID: issforum@gmail.com

Registration link:

<https://forms.gle/zEr1HUWDXayoQwC19>