



Module PMRF-ISSS003/2023

Algorithm Design Using Linear Algebra

Name of the PMRF student

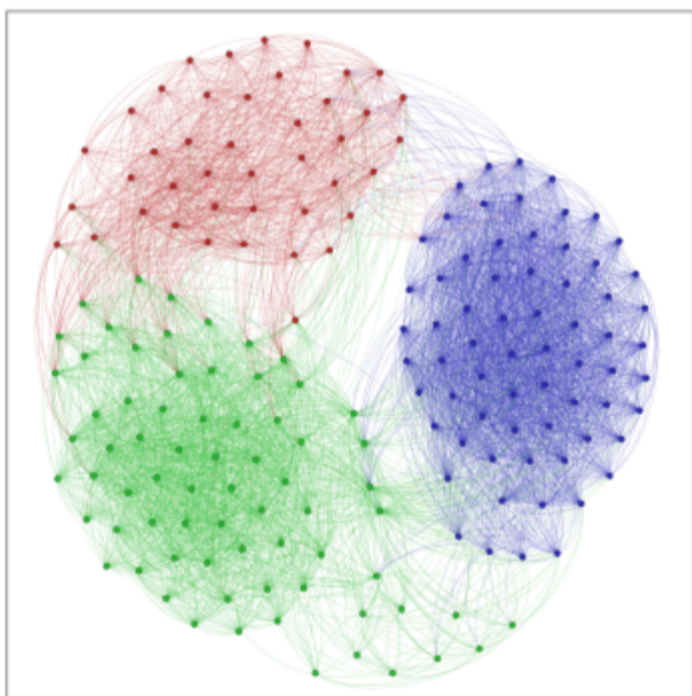
Rameesh Paul

Required background of the students taught

Knowledge of Basic Probability and Graphs, Exposure to Linear Algebra will be helpful but relevant parts will be reviewed.

Online session coordinator

Will be chosen from the list of registrants



Details of the content of the module

The course will discuss how ideas from linear algebraic concepts can be used to design algorithms for many interesting problems on graphs, that often show up in real-world. We will cover following topics:

1. Review of Linear Algebra.
2. Graphs through the lens of Linear Algebra: Graph Properties via Eigenvalues, Graph Drawing using Eigenvectors.
3. Graph Partitioning: Spectral Clustering Algorithm, Expanders aka Magical Graphs.
4. Low Rank Matrix Approximation: Basic Setup, Applications- a) Finding Hidden Communities and b) Max Cut on Sparse Graphs.
5. Random Walks: Basic Setup, Applications- a) Google's Page Rank Algorithm and b) Random Sampling in Social Network Graphs.
6. Extensions of Linear Algebraic Ideas to Hypergraphs.

Schedule of the module

Course starts on: 17th April, 2023

Course ends on: 28th April, 2023

Classes on : Monday, Wednesday and Friday

Timings: 16:00 – 18:15 hrs

Last 15 mins of each class (or more if required) will be for discussions.

Meeting link : Will be shared later

Contact email ID: issforum@gmail.com

Registration link:

<https://forms.gle/F7gtn5ZKUkkJcuAS8>