PMRF-ISSS Teaching Programme

Prime Minister Research Fellowship students' teaching requirement facilitated by the Institute of Smart Structures and Systems

Module PMRF-PMRF-ISSS064 II

Algorithm Design In Uncertainty: Part I

Name of the PMRF student

Rameesh Paul

Required background of the students taught

Knowledge of High School Maths and Undergraduate level Probability

Online session coordinator

Will be chosen from the list of registrants

Details of the content of the module

The course will discuss techniques to design algorithms for decision making in the uncertain real-world setting. There are three broad approaches in this area, a) online algorithms, b) stochastic uncertainty and c) online learning. In this Part I of the course we will focus on (a) and (b). There will be a Part II to this course in 2024 where we will focus on online learning. We will cover the following topics:

1. Review of Probability, Useful Inequalities

2. Online Algorithms and Competitive Analysis

3. Case Studies: Buy vs Rent, Online Matching, Online Paging, Online Bidding, Online Scheduling, Set Cover, Steiner Tree etc

4. Techniques: Greedy Algorithms, Linear Programming (LP), Markov Decision Process (MDP), Online Algorithm Design via LP and MDP, Optimality via Yao's Minimax Lemma

5. Probabilistic Models: Known Distribution Setting, Random Order Model, Optimal Stopping aka Secretary Problem, Prophet Inequalities

Schedule of the module

Course starts on: 10th November, 2023
Course ends on: 29th December, 2023
Classes on : Friday
Timings: 17:00 – 18:30 hrs

Meeting link :https://rb.gy/thk66

Contact email ID: isss.forum@gmail.com

Registration link: https://forms.gle/Ph9w8AdKGMHLmMQ56