



Government of India
Ministry of Human Resource
Development

MINISTRY OF HUMAN RESOURCE DEVELOPMENT
PANDIT MADAN MOHAN MALAVIYA NATIONAL MISSION ON
TEACHERS AND TEACHING

TEACHING LEARNING CENTRE

Ramanujan College

&

Department of Computer Science
(University of Delhi)



Faculty Development Programme
on
NETWORK SCIENCE: FOUNDATION OF
SOCIAL NETWORK ANALYSIS
(December 03-08, 2018)

INTRODUCTION

Networks are created by interactions between people/entities and are of great interest to researchers today. Social network analysis and Social media analytics are two derivations of Network Science, which are extensively researched among computer scientists and practiced in diverse domains. This course introduces participants to the theory, measures, algorithms, and applications of Network Science.

Some of the questions network science tries to answer are – how and why patterns emerge in networks, how does information propagate, can groups of closely linked nodes be determined automatically, can one make recommendations on future actions, etc. These questions need to be answered in diverse contexts like marketing, rumor spreading, influential social actors in an organization, political party etc. Network science also tries to explain dynamics of evolving networks, formation of communities, behavior of social groups, useful for understanding societal evolution and behavior, relationships in international politics and economic entities. Interestingly these ideas apply equally well to technology networks, biological networks, communication networks, road networks, document networks, co-citation networks etc.

Through a combination of lectures and hand-on training sessions (using R), participants will learn how Network Science offers a unique perspective on inter-disciplinary phenomenon and the choices that one must consider when employing its methods and measures. Though intended for beginners, a basic familiarity with applied statistics may

be helpful, but is not necessary. At the end of each day, a research case study will be presented to impart the flavor of current research trends in the area.

COURSE CONTENTS

Module-1: Introduction to Network Science

- Network Science applications
- Basics of graph theory
- Network properties

Module-2: Centrality Measures

- Network centralities
- Web centralities

Module-3: Community Detection

- Community Structure in Social Networks
- Hierarchy based methods
- Modularity based methods
- Consensus based method

Module-4: Generative Models

- Properties of real world networks
- Erdos-Renyi Random Graph Models
- Preferential Attachment Model
- Watts-Strogatz Small World Model
- Forest Fire Graph Model

Module-5: Information Propagation

- Epidemic Modelling
- SIS Model
- SIR Model

Module-6: Research Challenges in Network Science

VENUE

Seminal Hall, 1st Floor, Department of Computer Science, University of Delhi, New Delhi

Schedule:

DAY 1 (3rd December, 2018)	
9:30 - 12:30	Introduction to Network Science, Graph Theory Basics, Topological Properties of Networks
12:30-1:30	Lunch
1:30 - 4:00	Hands-On Session Introduction to R Introduction to Relevant Packages
4:00 - 5:00	Introduction to Network Data-sets
DAY 2 (4th December, 2018)	
9:30 - 12:30	Centrality Measures for Social networks and the Web
12:30-1:30	Lunch
1:30 - 4:00	Hands-On Session Identifying Central Nodes in Networks Functions for Classical Centrality Measures
4:00 - 5:00	Expert Lecture
DAY 3 (5th December, 2018)	
9:30 - 12:30	Information Diffusion and Epidemic Modelling
12:30-1:30	Lunch

1:30 - 4:00	Hands-On Session Implementation and Interpretation of Information Diffusion Methods
4:00 - 5:00	Expert Lecture
DAY 4 (6th December, 2018)	
9:30 - 12:30	Community Structures in Social Networks
12:30-1:30	Lunch
1:30 - 4:00	Hands-On Session Functions for Community Detection and their Interpretation
4:00 - 5:00	Expert Lecture
DAY 5 (7th December, 2018)	
9:30 - 12:30	Generative Network Models
12:30-1:30	Lunch
1:30 - 4:00	Hands-On Session Use of Generative Models
4:00 - 5:00	Expert Lecture
DAY 6 (8th December, 2018)	
9:30 - 10:30	Evaluation of Participants
11:00-12:30	Expert Lecture

12:30-1:30	Lunch
1:30 – 3:30	Valedictory

RESOURCE PERSONS

1. Dr. VasudhaBhatnagar, Professor, Department of Computer Science, University of Delhi
2. Dr. SharanjitKaur, Associate Professor, AcharayaNarendraDev College, University of Delhi
3. Ms. RakhiSaxena, Assistant Professor, Deshbandhu College, University of Delhi
4. External Experts from IIT,IIIT and SAU
5. Research Scholars (Department of Computer Science) for hands on sessions

DETAILS OF REGISTRATION AND PROGRAMME FEES

Interested candidates are requested to register themselves by filling the following form by 1st December, 2018:

<https://goo.gl/forms/hx9oNZngxBBQnZ6o2>

REGISTRATION FEES: Rs. 500/- (Non-refundable)

Online Payment of the Registration Fee through NEFT to the following account:

Account Name: Principal, Ramanujan College

Account Number: 0156000100585618

Bank & Branch: Punjab National Bank, Kalkaji

IFSC: PUNB0015600

MICR Code: 110024052

COORDINATORS

Dr. Nikhil Kumar Rajput, Assistant Director, Teaching Learning Centre, Ramanujan College, University of Delhi

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PATRON

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Director (Teaching Learning Centre)
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Principal, Ramanujan College
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