NATIONAL UNIVERSITY
of Computer & Emerging Sciences, Lahore

Department of Computer Science

DS5115 – Social Network Analysis

Spring 2019

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Course Information

Program: MS(DS) **Credit Hours:** 3 **Type:** Elective
Pre-requisites (if any):
Course Website (if any) :
Class Meeting Time: Tue, Thurs 2:00 – 3:30 PM
Class Venue: CS-2

Course Description/Objectives/Goals?

This course presents mathematical methods and computational tools for Social Network Analysis (SNA). It includes interdisciplinary concepts including sociology, mathematics especially graph theory and probability theory, computer science and economics. This course will focus on designing and analyzing models to perform analysis on the social structures. This course will also address the computational challenges faced due to large network data and present some useful algorithms to deal with these challenges. In this course we will start with basic statistical descriptions of networks, analyze network structure, roles and positions of nodes in networks, connectivity patterns and methods for community detection. In the second part of the course we will discuss models and processes on how information flow through the network and ways to utilize this model in terms of community detection, role identification, product recommendation and detecting information outbreaks. It also includes discussion on how social networks evolve over time.

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Course Textbook

1. David Easley and John Kleinberg. "Networks, Crowds, and Markets: Reasoning About a Highly Connected World." Cambridge University Press 2010.
2. Recommended research papers.

Additional references and books related to the course:

1. Matthew O. Jackson “Social and Economic Networks”. Princeton University Press 2008

Tentative Weekly Schedule

Week	Topics to be covered	Readings	Assignments/Projects?
1	Introduction to course and structure of social network		
2	Introduction to graph theory + introduction to SNAP		
3	Measuring network and Random graph model (Erdos-Reney)		Assignment 1
4	Small World phenomena		
5	Link Analysis of the network		
6	Role identification using motifs and graphlets		Assignment 2
7	Community structure		
8	Community detection (spectral clustering)		
9	Node representation learning		Assignment 3
10	Network effect and information cascade		
11	Information cascade continue		
12	Influence maximization		Project Deliverable 1
13	Network centrality		
14	Network evolution		
15	Information Outbreak detection (optional)		Project Deliverable 2

(Tentative) Grading Criteria

1. 3-4 Assignments (15%)
2. 4-5 Quizzes (10%)
3. 1 Midterm Exam (25%)
4. Final Exam (40%)
5. Project/Presentation (10%)

Course Policies

1. Quizzes may be un-announced.
2. No makeup for missed quiz or assignment.
3. Zero tolerance policy on plagiarism