CSE3132: Social Network Analysis

Programme: B.Tech (CSE) **Year:** Third **Semester:** Sixth
Course: Program Elective **Credits:** 3 **Hours:** 40

Course Context and Overview:
This course focuses on the different phenomena on online social networks and the ways to analyze them. This course is designed for students who have had little or no prior experience with Social Network Analysis. However, the students are expected to be familiar with algorithmic thinking. This program is directed towards understanding the dynamics of online social networks and observing patterns of activities and rationalize why they happen. Towards this, analysis of the structure of the network is introduced first, then the analysis of content is introduced. Later the algorithms for analysis based on cognitive concepts are introduced. R and Python are used for the implementations.

Prerequisites Courses: There are no prerequisite courses for this course.

Course outcomes (COs):

On completion of this course, the students will have the ability to:	
CO1:	Explain the graph based representation and analysis of social networks.
CO2:	Explain the various phenomena that happen on the online social networks.
CO3:	Explain and implement the algorithms to quantify some of the phenomena on the online social networks.
CO4:	Apply the concepts and algorithms to do meaningful analysis on the social network.

Course Topics

Contents	Lecture Hours
UNIT – 1 **Introduction**	**2**
Introduction to the course, Introduction to Social Networks, Difference between online and offline networks, Online Social network as a socio cognitive space	
UNIT –2 **Web as a Graph**	**6**
The Random Graph Model, Statistical network properties, Degree distribution, Clustering coefficient, Centrality measures	
UNIT-3 **Link Analysis**	**8**
HITS and PageRank, The Small World Phenomenon, Strength of weak ties, Bipartite graphs, Homophily and Social Influence, Power laws and preferential attachment, Triadic closure	

UNIT-4 **Content Analysis** PoS tagging, Word sense disambiguation, Text similarity measures (Character based, Term based, Corpus based), WordNet	**8**
UNIT-5 **Information Diffusion in Social Networks** Herd behavior, Information cascades, Diffusion of innovations, Emotion contagion, Epidemics	**8**
UNIT-6 **Community Detection Methods** Algorithm of Girvan and Newman, Walktrap, Fast greedy, Label propagation, edge betweenness, leading eigenvector	**8**

Textbook references:

Text Book:

There is no official text book for this course.

Reference books:

1. Easley D, Kleinberg J., *"Networks, crowds, and markets": Reasoning about a highly connected world.",* Cambridge University Press; 2010 Jul 19.
2. Zafarani R, Abbasi MA, Liu H. *"Social media mining": an introduction,* Cambridge University Press; 2014 Apr 28.
3. Manning CD, Schütze H., *"Foundations of statistical natural language processing*", Cambridge: MIT press; 1999 Jun 18.
4. Yang Z, Algesheimer R, Tessone CJ., "*A comparative analysis of community detection algorithms on artificial networks",* Scientific reports. 2016 Aug 1; 6:30750.

Evaluation Methods:

Item	Weightage
Project Evaluation 1	20%
Midsem	20%
Project Evaluation 2	20%
Endsem	40%

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