2.G. Gordon Schulmeyer (4th eds.), Handbook of Software Quality Assurance Artech House,Inc, 2008.
3. G. O'Regan, A Practical Approach to Software Quality, Springer Verlag, 2002.
4. Daniel Galin, Quality Assurance: From theory to implementation, Pearson Education Ltd., 2004
5. S.H. Kan, Metrics and Models in Software Quality Engineering (2nd ed.), Pearson Education Inc., 2003.
6. J.D. McGregor and D.A. Sykes, A Practical Guide to Testing, Addison-Wesley, 2001.
7. Glenford J. Myers, The Art of Software Testing (2nd ed.), John Wiley, 2004.
8. D. Graham, E.V. Veenendaal, I. Evans and R. Black, Foundations of Software Testing, Thomson Learning, 2007.

MCAE310 Social Networks

Course Objectives: The course aims to equip students with various SNA approaches to data collection, cleaning, and pre-processing of network data.

Course Learning Outcomes: On completing this course, the student will be able to:

CO1: Explain the basic concepts and principles of social network.

CO2: Identify different types of social networks and their characteristics.

CO3: Implement and apply various social network analysis techniques, such as, influence maximization, community detection, link prediction, and information diffusion.

CO4: Apply network models to understand phenomena such as social influence, diffusion of innovations, and community formation.

Unit-I: Introduction to Social Network Analysis: Introduction to Social Network Analysis, Types of Networks, Nodes Edges, Node Centrality, betweenness, closeness, eigenvector centrality, network centralization, Assortativity, Transitivity, Reciprocity, Similarity, Degeneracy and Network Measure, Networks Structures, Network Visualization, Tie Strength, Trust, Understanding Structure Through User Attributes and Behavior.

Unit-II: Link Analysis and Link Prediction: Applications of Link Analysis, Signed Networks, Strong and Weak Ties, Link Analysis and Algorithms, Page Rank, Personalized PageRank, DivRank, SimRank, PathSim. Temporal Changes in a Network, Evaluation Link Prediction Algorithms, Heuristic Models,Probabilistic Models, Applications of Link Prediction.

Unit-III: Community Detection: Applications of Community Detection, Types of Communities, Community Detection Algorithms, Disjoint Community Detection, Overlapping Community Detection, Local Community Detection, Evaluation of Community Detection Algorithms.

Unit-IV: Influence Maximization: Applications of Influence Maximization, Diffusion Models, Independent Cascade Model, Linear Threshold Model, Triggering Model, Time-Aware Diffusion Model, Non-Progressive Diffusion Model. Influence

Maximization Algorithms, Simulation-Based Algorithms, Proxy-Based Algorithms, Sketch-Based Algorithms, Community-Based Influence Maximization, and Context-Aware Influence Maximization.

Unit-V: Multilayer Social Network: Multilayer Social Networks, Formation of Multilayer Social Networks, Heuristic-based Approaches, Greedy Approaches, Centrality-based Approaches, Meta-heuristic Approaches, Path-based Approaches, Measuring Multilayer Social Networks.

Readings:

1. Tanmoy Chakraborty, Social Network Analysis, Wiley India, 2021.
2. David Knoke and Song Yang. Social network analysis. SAGE publications, 2019.
3. Mark E. Dickison, Matteo Magnani and Luca Rossi, Multilayer social networks, Cambridge University Press, 2016.
4. Jennifer Golbeck, Analyzing the social web, Morgan Kaufmann, 2013.
5. Stanley Wasserman, and Katherine Faust. Social network analysis: Methods and applications, Cambridge University Press, 2012.
6. M.E.J. Newman, Networks: An introduction. Oxford University Press, 2010.
7. Wei Chen, Carlos Castillo and Laks V.S. Lakshmanan, Information and influence propagation in social networks. Springer Nature, 2014
8. Virinchi Srinivas and Pabitra Mitra, Link prediction in social networks: role of power law distribution. New York: Springer International Publishing, 2016

MCSO301: DATA ANALYSIS AND VISUALIZATION [3-0-1]

Course Objectives: The course develops students' competence in cleaning and analyzing data related to a chosen application. It also aims to develop skills in using various tools for data visualization and choosing the right tool for given data.

Course Learning Outcomes:
On completing the course, the students will be able to :
CO1: use data analysis tools with ease.
CO2: load, clean, transform, merge, and reshape data.
CO3: create informative visualisations and summarise data sets.
CO4: analyse and manipulate time series data.
CO5: solve real world data analysis problems.

Syllabus
Unit 1 Introduction: Introduction to Data Science, Exploratory Data Analysis and Data Science Process. Motivation for using Python for Data Analysis, Introduction of Python shell iPython and Jupyter Notebook. Essential Python Libraries: NumPy, pandas, matplotlib, SciPy, scikit-learn, statsmodels
Unit 2 Getting Started with Pandas: Arrays and vectorized computation, Introductio to pandas Data Structures, Essential Functionality, Summarizing and Computing Descriptive Statistics. Data Loading, Storage and File Formats. Reading and Writing Data in Text Format, Web Scraping, Binary Data Formats, Interacting with Web APIs, Interacting with Databases Data Cleaning and Preparation. Handling Missing Data, Data Transformation, String Manipulation
Unit 3 Data Wrangling: Hierarchical Indexing, Combining and Merging Data Sets Reshaping and Pivoting. Data Visualization matplotlib: Basics of matplotlib, plotting with pandas and seaborn, other python visualization tools
Unit 4 Data Aggregation and Group operations: Data grouping, Data aggregation, General split-apply-combine, Pivot tables and cross tabulation