Recommender System

Code: CS32121CS	Course Type: Elective	Semester: I
Evolution Scheme (TA-MSE-ESE): 20-30-100	Total Marks: 150	L-T-P (Credits): 3-0-0 (3)

Pre-Requisites: Mathematics, Machine Learning

Course Objective: To enable students to understand and apply fog and edge computing paradigms for efficient, secure, and low-latency IoT and real-time applications.

Course Outcomes: At the end of the course, the student will be able to

CO-1	Understand recommender systems, data types, preprocessing, and basic machine learning methods.
CO-2	Understand collaborative filtering approaches, similarity measures, and model based recommendation techniques.
CO-3	Apply content-based recommender systems using feature engineering and supervised learning techniques.
CO-4	Apply advanced recommender systems including DNN, LLM, group, and context-aware techniques.

Course Articulation Matrix:

PO	PEO-1	PEO-2	PEO-3	PEO-4	PEO-5
CO-1	2	1	1	1	1
CO-2	2	1	1	1	1
CO-3	3	2	-	-	2
CO-4	3	2	-	-	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Syllabus:

Unit-1: Introduction to Recommender System, Types of recommender system, Data for recommendation: Explicit Vs Implicit data collection, Scales of measurement, Statistical and machine learning foundations for recommender system, Data preprocessing.

Unit-2: Introduction to collaborative filtering, Collaborative filtering approaches: Memory based and model based, Memory based collaborative filtering foundations: Distance and similarity measures, User based collaborative filtering; Item based collaborative filtering, Model based collaborative filtering foundations: matrix factorization, UV decomposition, Singular value decomposition Model based collaborative filtering techniques: SVD, SVD++ etc.

Unit-3: Content based recommender system foundations, Examples with text data, Feature engineering: Feature extraction, feature selection, dimensionality reduction, Content based recommender system examples with few supervised machine learning techniques. Evaluation of recommender systems: Online and offline evaluation, metrics such as RMSE, AME, Good Item MAE,

Unit-4: Good predicted item MAE, Precision, Recall, F1 Measure, NDCG, Average Reciprocal Rank, Top@N Measure. Overview of other types of recommender systems DNN-Based Recommendation Systems, LLM-Based Recommendation System, Group Recommendation System, trust based, social network based, and context aware systems.

Learning Resources:

Text Books:

1. Ricci, F., Rokach, L. and Shapira, B., 2011. Introduction to recommender systems handbook. In Recommender systems handbook (pp. 1-35). Springer, Boston, MA.
2. Aggarwal, C.C., 2016. Recommender systems (Vol. 1). Cham: Springer International Publishing.