राष्ट्रीय प्रौद्योगिकी संस्थान पटना / NATIONAL INSTITUE OF TECHNOLOGY PATNA
संगणक विज्ञान एंव अभियांत्रिकी विभाग / DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
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No:- Date:

CSX4233 Recommendation Systems

L-T-P-Cr: 3-0-0-3

Pre-requisites: Basics of Machine Learning

Objectives/Overview:

- Explaining the importance and working of the recommendation system.
- The course focuses on the applicability of the recommendation system in various areas like books, research papers, tourist places, television programs etc.
- The course explains major techniques of recommendation system like content based filtering, collaborative filtering, knowledge-Based recommender systems, evaluation of recommender systems, etc.
- Knowledge of advanced topic in recommendation systems like attacks on recommender system, matrix factorization techniques.

Course Outcomes:

At the end of the course, a student should:

Sl. No.	Outcome	Mapping to POs
1.	To learn the goal and applicability of recommendation system in various fields.	PO4, PO5
2.	To acquire knowledge of basics of content based recommendation system.	PO2, PO3
3.	To learn various types of memory based collaborative recommendation techniques.	PO2, PO3
4.	To gain knowledge of model based collaborative filtering techniques used in recommendation system.	PO2, PO3
5.	Understanding of the evaluation of the recommendation system.	PO2, PO3
6.	To learn about the some advanced topics in recommendation system such as different types of attacks, group recommendation system and multi-criteria recommendation systems.	PO2, PO3

UNIT I: Introduction to Recommendation systems:
Lectures: 3
Recommender Systems Function, Recommendation Techniques, Recommender Systems as a Multi-Disciplinary Field, Challenges.

UNIT II: Content based filtering:
Lectures: 08
Basic Components of Content-Based Systems, Preprocessing and Feature Extraction, Learning User Profiles and Filtering, Nearest Neighbor Classification.

UNIT III: Collaborative filtering:
Lectures: 10
User-Based collaborative filtering, Similarity Function Variants, Variants of the Prediction Function, Item-Based Collaborative filtering, Comparing User-Based and Item-Based Methods, Strengths and Weaknesses of Neighborhood-Based Methods.

UNIT IV: Model based recommendation systems:
Lectures: 8
Rule-Based Collaborative Filtering, Association Rules, Naive Bayes Collaborative Filtering, Neural Network, Singular Value Decomposition, Stochastic Gradient Descent, Regularization.

UNIT V: Evaluation of the recommendation system:
Lectures: 5
General Goals of Evaluation Design: Accuracy, Coverage, Confidence and Trust, Novelty, Serendipity, Diversity, Scalability, Segmenting the Ratings for Training and Testing, Accuracy Metrics in Offline Evaluation.

UNIT VI: Advanced Topics in recommendation systems:
Lectures: 8
Matrix Factorization recommendation techniques, Attacks in Recommender Systems, Types of Attacks: Random Attack, Average Attack, Bandwagon Attack, Love/Hate Attack, Reverse Bandwagon Attack, Detecting Attacks on Recommender Systems, Group Recommender Systems, Multi-Criteria Recommender Systems.

Text/Reference Books

1. Charu C. Aggarwal, “Recommender Systems: The Textbook”, Springer.
2. Francesco Ricci, Lior Rokach, Bracha Shapira, Paul B. Kantor, “ Recommender Systems Handbook”, Springer.