IT492: Recommendation Systems

Instructor: Dr. Arpit Rana, arpit_rana@daiict.ac.in

Prerequisites: Machine Learning, Basic Programming in Python

Slot: B.Tech. VI or VIII Semester / M.Tech. - II Semester

Category: Technical Elective

Course Credits(L--T--P--Cr): 3--0--2--4

Lectures (online): Monday: 10:15 – 11:30; Friday: 08:30 – 09:45

Lab and Practical: Wednesday 14:00 – 16:00

TA contact info: TBD

Course Description:

This course provides students with an understanding of the role of a recommendation system in an organization, its components, and the theories and techniques used to construct them. The course will cover basic terminologies, most widely used recommendation approaches: content-based, collaborative, and hybrid; offline and online evaluation techniques; and more advanced applications in various domains.

Course Structure

- **Lecture:** Learn the theories and state-of-the-art techniques of recommender systems.
- **Lab:** Learn how to use Python-based tools to support lecture and project topics (mandatory)

Suggested Books:

- **Recommender Systems: The Textbook [2016] by Charu C. Aggarwal, Springer**

Course Outcomes:

After successful completion of the course, the student will have the ability to -

- Understand the fundamentals of recommender systems
- Understand the types of recommendation algorithms
- Understand the evaluation techniques of recommender systems
- Understand the practical issues through case studies
- Apply all of the above in Python (using *Surprise* library)

P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12
X	X	X		X				X			X

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Evaluation Scheme:

- **Mid-semester Exam:** 30 %
- **End-semester Exam:** 35 %
- **Lab Projects:** 35 %

Tentative Course Plan[1]:

Units	Topics	Number of Lectures
Introduction to Recommender Systems	Definition, objectives, components, approaches, and challenges	2
Recommendation Techniques: Collaborative Filtering	Neighborhood-based Collaborative Filtering (User-User, Item-Item, SLIM, Graph-based) Model-based Collaborative Filtering (Latent Factor Models: MF and its variants)	9
Recommendation Techniques: Content-based Filtering	Content-based Recommendation, Content-based vs. Collaborative Filtering	4
Recommendation Techniques: Hybrid Techniques	Ensemble-based and Hybrid Recommendation -- Switching hybrids, Weighted hybrids, and Cascade hybrids	3
Evaluation	Evaluation Paradigms: User Studies, Online, and Offline	4
Advanced Topics in Recommender Systems	Context-sensitive Recommendations	4
	Time-sensitive Recommendations	4
	Conversational Recommendations	4
	Explaining Recommendations	5
Re-ranking Approaches	Re-ranking for Diversity, Explainability, Context, etc.	4
Case Studies	Practical Issues of Recommender Systems	3

1 — This course plan is subject to change without notice.

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Preliminary Schedule of the Course:

Week	Lecture	Lab	Due[1]
Week-1 [17 Jan 2022]	Introduction to Recommender Systems	– No lab –	-
Week-2 [24 Jan 2022]	Recommendation Techniques: Collaborative Filtering (Memory-based)	Python Warm-up	-
Week-3 [31 Jan 2022]	Recommendation Techniques: Collaborative Filtering (Model-based)	Getting Started with "Surprise"	-
Week-4 [7 Feb 2022]	Recommendation Techniques: Collaborative Filtering (Model-based contd...)	LA - 1	
Week-5 [14 Feb 2022]	Recommendation Techniques: Content-based Filtering	LA - 1	Sunday, 20 Feb 2022
Week-6 [21 Feb 2022]	Recommendation Techniques: Hybrid Techniques	LA - 2	
Week-7 [28 Feb 2022]	Evaluation	LA - 2	Sunday, 6 Mar 2022
Week-8 [7 Mar 2022]	Mid-term Examination	LA - 3	
Week-9 [14 Mar 2022]	In-semester Break	LA - 3	
Week-10 [21 Mar 2022]	Re-ranking Approaches	LA - 3	Sunday, 27 Mar 2022
Week-11 [28 Mar 2022]	Advanced Topics in Recommender Systems: Context-sensitive RS	LA - 4	
Week-12 [4 Apr 2022]	Advanced Topics in Recommender Systems: Time-sensitive RS	LA - 4	
Week-13 [11 Apr 2022]	Advanced Topics in Recommender Systems: Explanations in RS	LA - 4	
Week-14 [18 Apr 2022]	Advanced Topics in Recommender Systems: Conversational RS	LA - 4	Sunday, 24 Apr 2022
Week-15 [25 Apr 2022]	Course Evaluation		

1 – Lab Assignments (LAs) are due at 10:00 PM on the due date listed.