UNIVERSITY OF ENGINEERING AND MANAGEMENT, KOLKATA PRESENTS

2024 SUMMER SCHOOL ON

AI Based Recommendation System

Duration: 29th May to 9th June

Days: Monday to Sunday

Time: 11 AM to 4 PM (Time may be adjusted as per the availability of the expert)

Course Fees: INR 5000/-

Offered by: Department of CSE (AI & ML)

Instruction Mode: Online

Open Seats: 30

USP of the Course

AI-based recommendation system lies in its ability to leverage advanced algorithms and data analytics to provide personalized recommendations, enhancing user experience and driving engagement. Here are some key aspects:

I. Personalization: AI-based recommendation systems excel in providing personalized recommendations tailored to each user's preferences, behavior, and context. By analyzing user interactions, historical data, and demographic information, these systems can offer highly relevant and timely suggestions, increasing the likelihood of user satisfaction and conversion.

II. Algorithmic Sophistication: AI-driven recommendation systems employ sophisticated algorithms such as collaborative filtering, content-based filtering, matrix factorization, and deep learning models. These algorithms can effectively capture complex patterns and relationships within large datasets, resulting in accurate and diverse recommendations.

III. Real-time Adaptability: AI-based recommendation systems are capable of adapting in real-time to changes in user preferences, market trends, and inventory availability. By continuously analyzing incoming data streams and updating recommendation models, these systems ensure that recommendations remain fresh, relevant, and reflective of the latest user behavior.

IV. Scalability and Efficiency: AI-powered recommendation systems are designed to handle large volumes of data and user interactions efficiently. Through parallel computing, distributed

processing, and optimization techniques, these systems can scale seamlessly to accommodate growing user bases and increasing data volumes without sacrificing performance.

V. Multimodal Recommendations: Modern AI-based recommendation systems can leverage multiple types of data sources, including text, images, audio, and video, to provide multimodal recommendations. By analyzing diverse data modalities, these systems can offer richer and more comprehensive recommendations, catering to a wide range of user preferences and content types.

VI. Interpretability and Transparency: Some AI-based recommendation systems incorporate interpretability features, allowing users to understand the rationale behind each recommendation. By providing explanations or visualizations of recommendation factors, these systems enhance user trust, satisfaction, and engagement.

VII. Ethical Considerations and Fairness: Leading AI-based recommendation systems prioritize ethical considerations and fairness in recommendation generation. They employ techniques such as fairness-aware algorithms, bias detection, and mitigation strategies to ensure that recommendations are inclusive, unbiased, and respectful of user privacy and preferences.

VIII. Integration and Customization: AI-based recommendation systems are often designed to seamlessly integrate with existing platforms, applications, and workflows. They may offer customization options, APIs, and SDKs that enable businesses to tailor recommendation experiences to their specific requirements, branding, and user interfaces.

By emphasizing these aspects, an AI-based recommendation system distinguishes itself as a powerful tool for enhancing user engagement, driving revenue, and delivering personalized experiences across a variety of domains, including e-commerce, content streaming, social media, and more. Join us this summer and take the first step towards a rewarding career in one of the most in-demand industries of the 21st century.

Prerequisite: Basic Knowledge of Machine Learning, Statistics, and Probability.

Course Summary:

Introduction to Recommendation Systems, **Overview of recommendation systems and their importance:** Types of recommendation systems (collaborative filtering, content-based filtering, hybrid), Introduction to AI and machine learning in recommendation systems, Understanding Data for Recommendation Systems; **Data collection and preprocessing:** Exploratory data analysis (EDA) for recommendation systems, Data representation (user-item interactions, user features, item features); **Collaborative Filtering:** Memory-based collaborative filtering (user-based and item-based), Model-based collaborative filtering (matrix factorization, singular value decomposition), Hands-on exercise: Implementing collaborative filtering algorithms; **Content-Based Filtering:** Term Frequency-Inverse Document Frequency (TF-IDF), Cosine similarity, Building a content-based recommendation system, Hands-on exercise: Developing a content-based recommendation system; **Hybrid Recommendation Systems:** Combining collaborative

filtering and content-based filtering, Weighted hybrid approach, Feature combination hybrid approach, Hands-on exercise: Building a hybrid recommendation system; **Evaluation Metrics for Recommendation Systems:** Accuracy metrics (precision, recall, F1-score), Ranking metrics (Mean Reciprocal Rank, Normalized Discounted Cumulative Gain), Offline evaluation vs. online evaluation; **Introduction to Machine Learning Models for Recommendation Systems:** Linear regression for recommendation, Logistic regression for recommendation, Decision trees for recommendation, Hands-on exercise: Implementing machine learning models for recommendation systems; **Advanced Techniques in Recommendation Systems:** Factorization Machines, Neural Collaborative Filtering, Deep Learning for recommendation systems, Hands-on exercise: Exploring advanced recommendation techniques; **Model Training and Deployment:** Data splitting (train-test-validation), Model training techniques, Model deployment strategies, Hands-on exercise: Training and deploying recommendation models, Ethical and Fairness Considerations, Mitigating biases in recommendation systems; **Final Project:** Hands-on project: Designing and implementing a recommendation system using a dataset of choice, Presentation (optional) and discussion of final projects, Q&A and wrap-up.

Duration: 24 Hours (12 Days)

Hour 1:

- Introduction to Recommendation Systems

Hour 2-3:

Overview of recommendation systems and their importance

- Types of recommendation systems (collaborative filtering, content-based filtering, hybrid)
- Introduction to AI and machine learning in recommendation systems
- Understanding Data for Recommendation Systems

Hour 4:

Data collection and preprocessing

- Exploratory data analysis (EDA) for recommendation systems
- Data representation (user-item interactions, user features, item features)

Hour 5-7:

Collaborative Filtering

- Memory-based collaborative filtering (user-based and item-based)
- Model-based collaborative filtering (matrix factorization, singular value decomposition)
- Hands-on exercise: Implementing collaborative filtering algorithms

Hour 8-9:

Content-Based Filtering

- Term Frequency-Inverse Document Frequency (TF-IDF)
- Cosine similarity
- Building a content-based recommendation system
- Hands-on exercise: Developing a content-based recommendation system

Hour 10-13:

Hybrid Recommendation Systems

- Combining collaborative filtering and content-based filtering
- Weighted hybrid approach
- Feature combination hybrid approach
- Hands-on exercise: Building a hybrid recommendation system

Hour 14:

Evaluation Metrics for Recommendation Systems

- Accuracy metrics (precision, recall, F1-score)
- Ranking metrics (Mean Reciprocal Rank, Normalized Discounted Cumulative Gain)
- Offline evaluation vs. online evaluation

Hour 15-18:

Introduction to Machine Learning Models for Recommendation Systems

- Linear regression for recommendation
- Logistic regression for recommendation
- Decision trees for recommendation
- Hands-on exercise: Implementing machine learning models for recommendation systems

Hour 19-20:

Advanced Techniques in Recommendation Systems

- Factorization Machines
- Neural Collaborative Filtering
- Deep Learning for recommendation systems
- Hands-on exercise: Exploring advanced recommendation techniques

Hour 21-22:

Model Training and Deployment

- Data splitting (train-test-validation)
- Model training techniques
- Model deployment strategies
- Hands-on exercise: Training and deploying recommendation models
- Ethical and Fairness Considerations
- Mitigating biases in recommendation systems

Hour 23-24:

Final Project:

- Hands-on project: Designing and implementing a recommendation system using a dataset of choice
- Presentation (optional) and discussion of final projects
- Q&A and wrap-up

Eligibility Criteria:

For IEM Students:

- Enrollment Requirement: Must be currently enrolled as a degree-seeking student at IEM, Newtown or IEM Saltlake or IEM Kolkata

For Non-IEM Students:

- Age Requirement: Applicants must be at least 18 years old by the start of the courses.
- Educational Qualification: A high secondary degree/diploma degree is mandatory.
- English Language Proficiency: Must demonstrate proficiency in English as per the specified requirement.
- Application: Students must complete the Summer Sessions application to gain access to enroll in summer courses.

Please note that eligibility criteria may be subject to updates or changes, and prospective applicants should verify the latest requirements on the official UEM website.