Recommender Systems

- Overview of Recommender Systems
- Recommender Systems and Artificial Intelligence
- Real World Challenges for Recommender Systems
- Applications and Scope of Recommender Systems

Shahzaib Hamid
AI Sciences Instructor

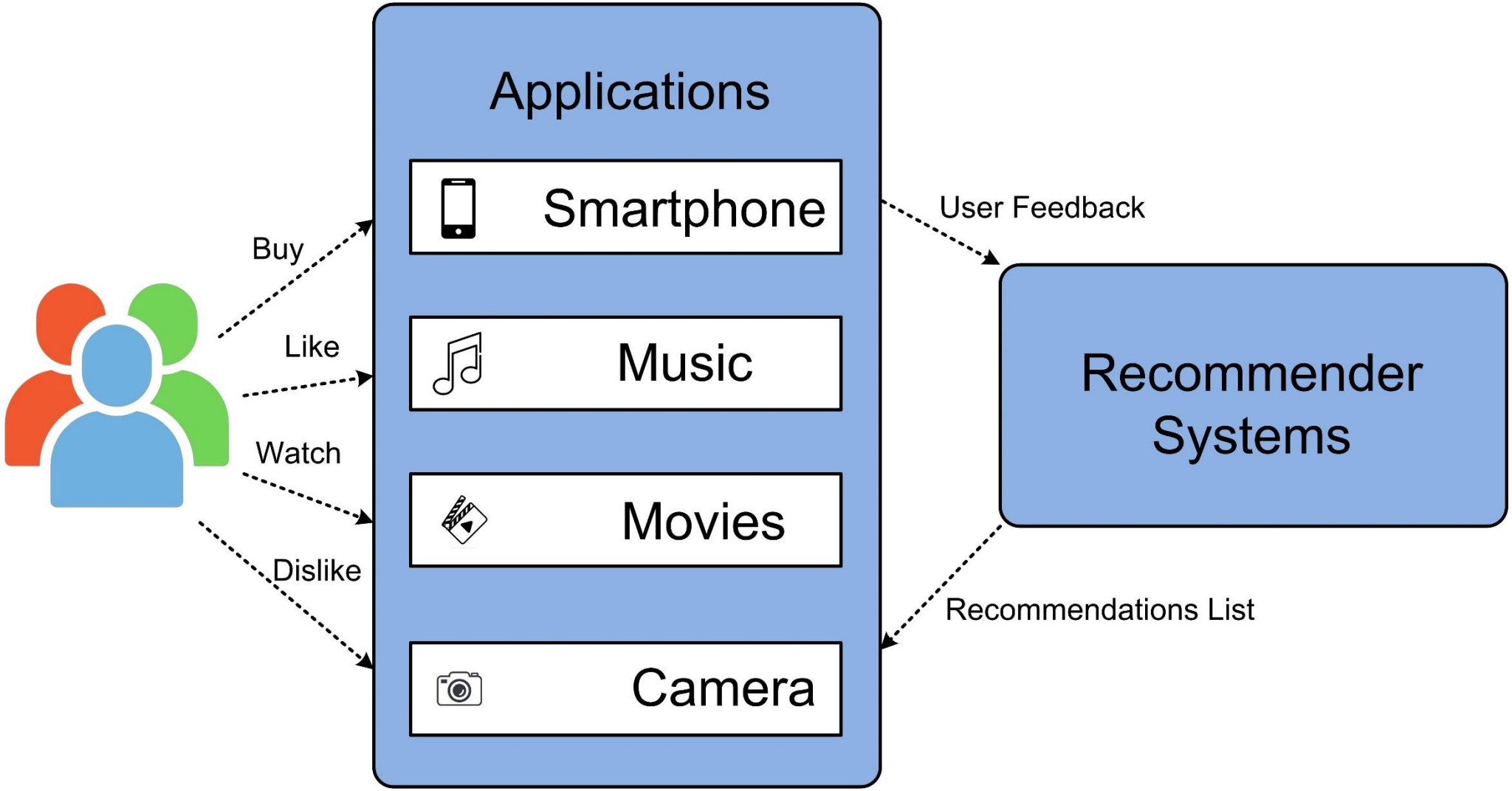
Overview

- Recommender Systems
- Recommender Systems Process
- Goals of Recommender Systems
- Generations of Recommender Systems
- Nexus of Recommender Systems and Artificial Intelligence
- Real World Challenges of Recommender Systems
- Applications of Recommender Systems

Recommender Systems

- Emerged in 90's, gained a boost in recent years.
- Reason for paradigm shift from ecommerce to online advertisements.
- Typically, algorithms aiming to suggest relevant items to user.
- Predicts user's interests and recommend items interesting to them.
- Companies use these systems to boost their sales in a very personalized manner.
- Improves user experiences by making platform more desirable and addictive.

Recommender Systems Process



Goals of Recommender Systems

Relevance	Novelty	Serendipity	Increasing recommendation diversity
• Recommend items to a user that are more relevant • User will consume items that are more relevant	• Recommender systems are effective when the recommended item is not old • Repeated recommendations can also lead to reduction in sales	• Recommended items should be more surprising to the user • **Example:** An Italian hotel in Italy will not surprise the customer • **Example:** An Indian hotel in Italy may surprise the customer	• Recommended items should be of different but relevant types • Diversity has the benefit of ensuring that the user does not get bored

Generations of Recommender Systems

1st Generation Recommended Systems

- Knowledge-based Recommender Systems
- Content-Based Recommender Systems
- Collaborative Filtering Based Recommender Systems
- Hybrid Recommender Systems

2nd Generation Recommended Systems

- Matrix Factorization Based Approach
- WUM (Web Usage Mining) Based Recommender Systems
- Personality Based Recommender Systems

3rd Generation Recommended Systems

- Deep Content-based Recommendation Systems
- Product Based Recommender System
- DL-Collaborative Recommended System
- Restricted Boltzmann Machines and Collaborative Filtering

Nexus of Recommender Systems and Artificial Intelligence

- Artificial intelligence recently has changed the dynamics of recommendation systems
- Enhanced the user experience and increase user satisfaction.
- Created advanced insights into the relationships between users and items
- Presented more complex data representations
- Discovered comprehensive knowledge in demographical, textural, virtual and contextual data
- AI, data analytics and big data present a great opportunity for recommender systems to embrace the impressive achievements of AI

Artificial Intelligence in Recommender Systems

- Deep neural networks in recommender systems
- Multi-layer perceptron-based recommender systems
- Autoencoder-based recommender systems
- Convolutional neural network-based recommender Systems
- Recurrent neural network-based recommender systems
- Graph neural network-based recommender systems
- Generative adversarial network-based recommender
- Transfer learning in recommender systems
- Active learning in recommender systems
- Reinforcement learning in recommender systems
- Natural language processing in recommender systems

Real World Challenges of Recommender Systems

Cold Start

Data Sparsity

Privacy

Scalability

Changing User Preferences

Autonomy and personal identity

Sparsity

Synonymy

Complex onboarding process

Applications of Recommender Systems

- Applications of recommender systems are not limited to only these

• Books • Stores • Related products Amazon	• Movies • Dramas • Short Stories • Web Series Netflix	• Jokes Jester	• News • Articles • Reports • Editorials GroupLens	• Movies • Dramas • Documentaries MovieLens	• Music last.fm
• News • Articles • Reports • Surveys Google News	• Advertisements Google Search	• Friends • Advertisements • Stories Facebook	• Music Pandora	• Online Videos • YT Shorts • Channels Youtube	• Movies • Dramas • Web Series • Short Films IMDb