Collaborative Filtering Summary

Algorithm	Description	Assumption	Input	Output	Pros	Cons	Use Case
Collaborative Filtering - neighborhood based	Find a cohort of users who provided similar ratings. Derive the outcome rating from the cohort users	Similar users or items have similar likes	Ratings matrix with user-item preferences.	Completed ratings matrix	The only input needed is the ratings matrix Domain agnostic	Cold start problem for new users and items Computation grows linearly with the number of items and users	eCommerce, music, new connection recommendations
Collaborative Filtering - Latent matrix factorization	Decompose the user-item matrix into two matrices (P and Q) with latent factors. Fill the blank values in the ratings matrix by dot product of P and Q	User's preference of an item can be better explained by their preference of an item's character (inferred)	Ratings matrix with user-item preferences.	Completed ratings matrix	Works in sparse matrix More accurate than neighborhood based collaborative filtering	Cannot explain why the prediction is made	Content recommendations

Content-Based Filtering Summary

Algorithm	Description	Assumption	Input	Output	Pros	Cons	Use Case
Content-based filtering	Abstract the features of the item and build item profile. Use the item profile to evaluate the user preference for the attributes in the item profile	Recommend items similar to those the user liked in the past	User-item rating matrix and Item profile	Completed ratings matrix	Addresses cold start problem for new items Can provide explanations on why the recommendation is made	Requires item profile data set Recommenders are domain specific	Music recommendation from Pandora and CiteSeer's citation indexing
Content-based - Supervised learning models	A personalized classification or regression model for every single user in the system. Learn a classifier based on user likes or dislikes of an item and its relationship with item attributes	Every time a user prefers an item, it is a vote of preference for item attributes	User-item rating matrix and Item profile	Completed ratings matrix	Every user has a separate model and could be independently customized. Hyper personalization	Storage and computational time	eCommerce, content, and connection recommendations