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GROUP-3

RS - ASSIGNMENT - 2

1) Compare User-based collaborative filtering and Item-based collaborative filtering.

Ans:-

Feature	User based collaborative filtering	Item based collaborative filtering
(1) Concept	Recommends items by finding similar items	Recommends items by finding similar items.
(2) Similarity Basis	Based on user behaviour	Based on item interactions
(3) Computational cost	High (as user similarity changes dynamically)	Lower (item similarities are more stable)
(4) Cold Start problem	Struggles with new users	Struggles with new items
(5) Personalization	Highly personalized as it depends on user preferences	Less personalized as it generalized item similarities
(6) Scalability	Less scalable for larger user bases	More scalable as item similarities can be precomputed
(7) Data Sparsity	Struggles when user interactions are sparse	Performs better in sparse datasets
(8) Dynamic Adaption	Changes as new user interactions are recorded	More stable as item relationships change slowly.
(9) Best use-case	When user preferences change frequently & data is rich	When items remain consistent & users interact sparsely

2) Write about strengths and weaknesses of neighbourhood based methods.

Ans:- ① User - based collaborative filtering :-

This approach finds users with similar behaviour and recommends items based on their preferences.

- Strengths :-

① Highly Personalized :-

Since recommendations are based on user similarity, they are tailored to individual tastes

② Great for dynamic preferences :-

Works well when user behaviour frequently changes.

③ Easier To understand and interpret :-

If a person enjoys the same TV show as you, their preferences can guide your new recommendations.

- Weakness :-

① Scalability issues :-

As the number of users increases, computing similarities among them becomes expensive.

② Cold - start problem (users) :-

A new user with no interaction history won't get good recommendations.

⑤ Frequent Recalculation needed :-

Since user preferences change over time, similarity calculations must be updated regularly.

(11) Item - based collaborative filtering :-

This method finds similar items based on how users have interacted with them

- Strengths :-

① More scalable :-

Item similarities are relatively stable, so recommendation can be precomputed and stored.

② Handles sparse data better :-

Even if user interact with few items, strong item relationships can still generate useful recommendations.

③ Cold start is less of an issue (for users) :-

Even new users can receive recommendations based on items they view or interact with.

- Weakness :-

① Cold Start problem (for item) :-

A brand new item with no interactions won't be recommended effectively.

② Less personalized :-

Since recommendations are based on item similarity based rather than user specific preferences, they might not feel highly tailored.

③ Fail with unique preferences :-

Users with niche preferences may not get useful recommendations.