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Chennai



**DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA
SCIENCE**

Recommender System



SEARCH AND FILTERING TECHNIQUES



There are primarily 6 types of recommendation systems :

- **Collaborative Filtering**
- **Content-Based Filtering**
- Demographic Filtering
- Knowledge-base Filtering
- Community-based Filtering
- **Hybrid Approach Filtering**

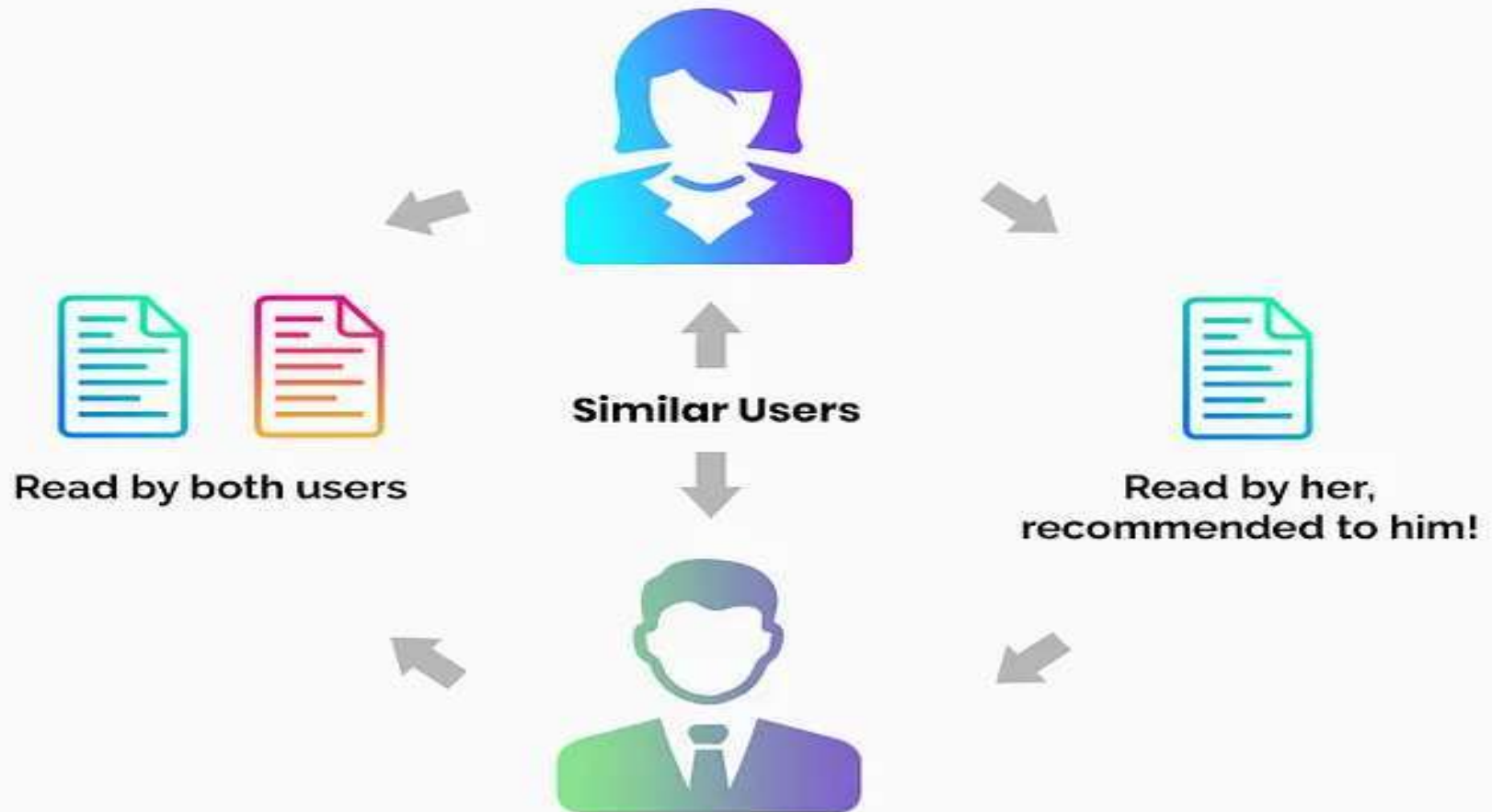


COLLABORATIVE FILTERING



- The collaborative filtering method is based on gathering and analyzing data on user's behavior.
- This includes the user's online activities and predicting what they will like based on the similarity with other users.

Collaborative filtering





COLLABORATIVE FILTERING



- **For example**, if user A likes Apple, Banana, and Mango while user B likes Apple, Banana, and Jackfruit, they have similar interests. So, it is highly likely that A would like Jackfruit and B would enjoy Mango. This is how collaborative filtering takes place.
- Two kinds of collaborative filtering techniques used are:
 - **User-User collaborative filtering**
 - **Item-Item collaborative filtering**
- One of the main advantages of this recommendation system is that it can recommend complex items precisely without understanding the object itself. There is no reliance on machine analyzable content.

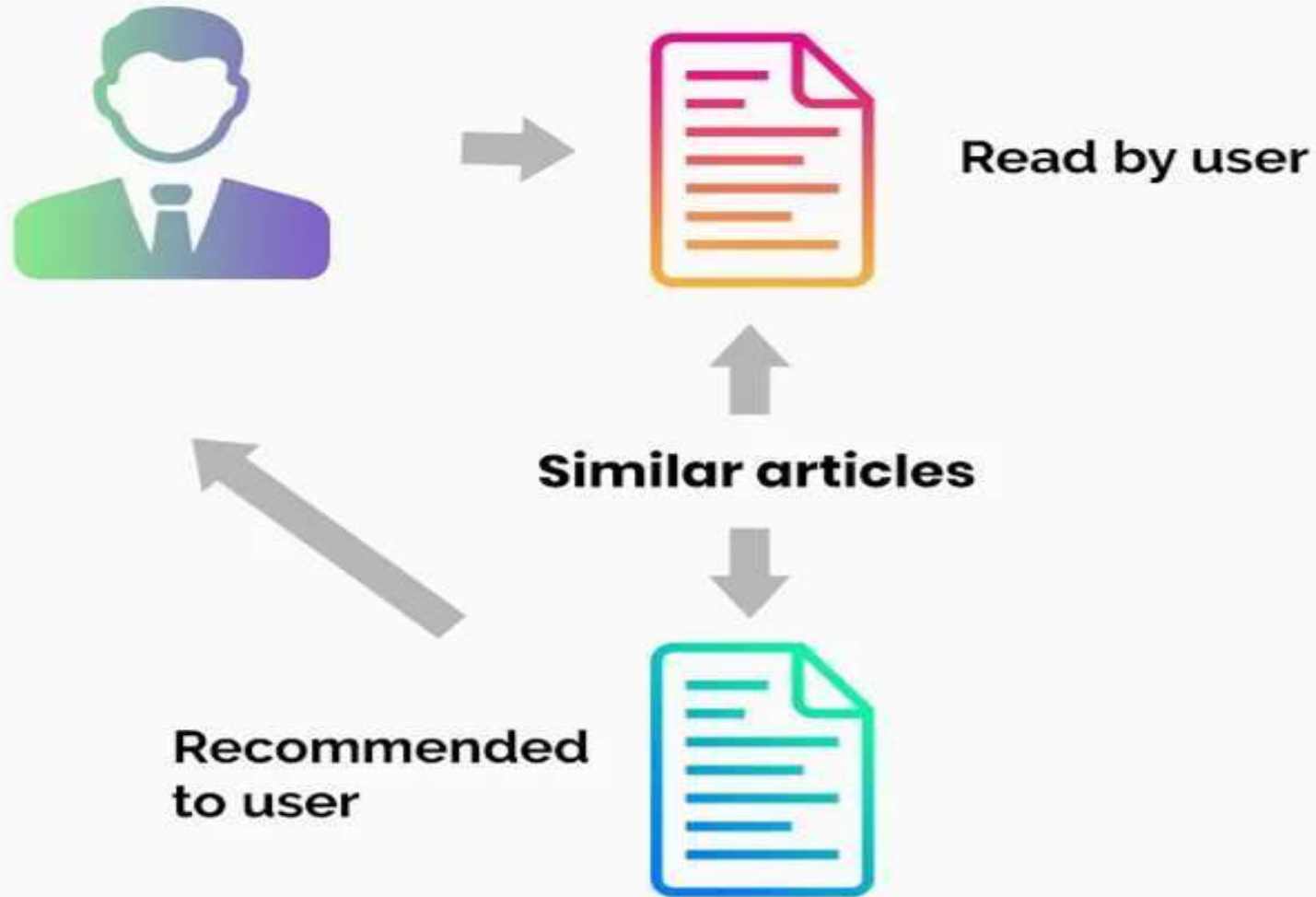


CONTENT BASED FILTERING



- Content-based filtering methods are based on the description of a product and a profile of the user's preferred choices.
- In this recommendation system, products are described using keywords, and a user profile is built to express the kind of item this user likes.

Content-based filtering





CONTENT BASED FILTERING



- For instance, if a user likes to watch movies such as Iron Man, the recommender system recommends movies of the superhero genre or films describing Tony Stark.
- The central assumption of content-based filtering is that you will also like a similar item if you like a particular item.

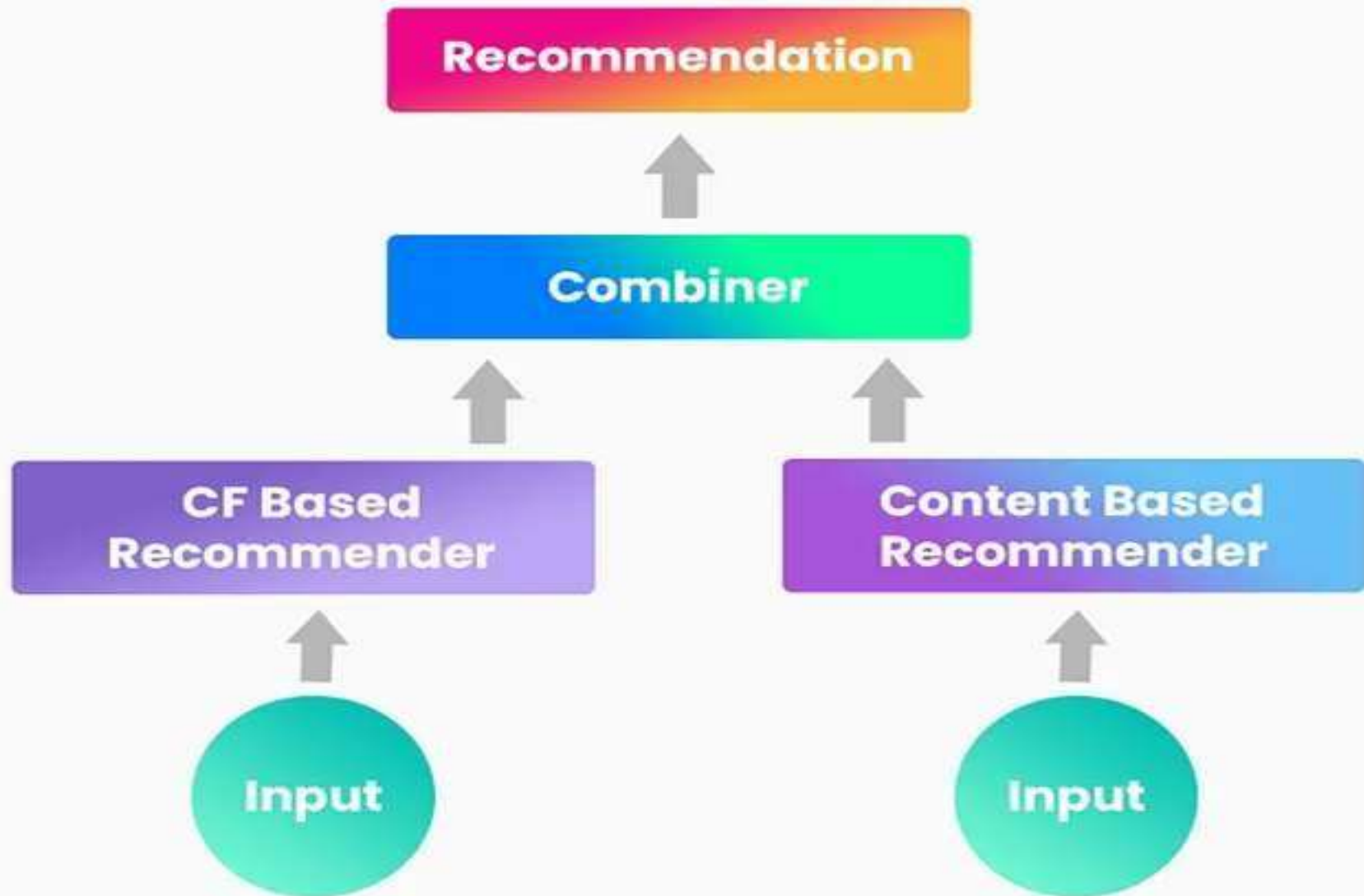


HYBRID APPROACH FILTERING



- In hybrid recommendation systems, products are recommended using both content-based and collaborative filtering simultaneously to suggest a broader range of products to customers.
- This recommendation system is up-and-coming and is said to provide more accurate recommendations than other recommender systems.

Hybrid Recommendations





HYBRID APPROACH FILTERING



- Netflix is an excellent case in point of a hybrid recommendation system.
- It makes recommendations by juxtaposing users' watching and searching habits and finding similar users on that platform.
- This way, Netflix uses collaborative filtering.
- By recommending such shows/movies that share similar traits with those rated highly by the user, Netflix uses content-based filtering.
- They can also veto the common issues in recommendation systems, such as cold start and data insufficiency issues.



RELEVANCE FEEDBACK



- Relevance feedback takes the output that is initially returned from the given query.
- This initial output can be used to gather user information and to know whether that output is relevant to perform a new query or not.
- The feedbacks can be classified as follows –
 - 1.Explicit Feedback
 - 2.Implicit Feedback
 - 3.Pseudo Feedback



RELEVANCE FEEDBACK



1. Explicit Feedback

- It may be defined as the feedback that is obtained from the assessors of relevance.
- These assessors will also indicate the relevance of a document retrieved from the query.
- In order to improve query retrieval performance, the relevance feedback information needs to be interpolated with the original query.
- Assessors or other users of the system may indicate the relevance explicitly by using the following relevance systems –

1. Binary relevance system.

2. Graded relevance system.



RELEVANCE FEEDBACK



Binary relevance system

- This relevance feedback system indicates that a document is either relevant (1) or irrelevant (0) for a given query.

Graded relevance system

- The graded relevance feedback system indicates the relevance of a document, for a given query, on the basis of grading by using numbers, letters or descriptions.
- The description can be like “not relevant”, “somewhat relevant”, “very relevant” or “relevant”.



RELEVANCE FEEDBACK



2.Implicit Feedback

- It is the feedback that is inferred from user behavior.
- The behavior includes the duration of time user spent viewing a document, which document is selected for viewing and which is not, page browsing and scrolling actions, etc.
- One of the best examples of implicit feedback is *dwel time*, which is a measure of how much time a user spends viewing the page linked to in a search result.



RELEVANCE FEEDBACK



3.Pseudo Feedback

- It is also called Blind feedback.
- It provides a method for automatic local analysis.
- The manual part of relevance feedback is automated with the help of Pseudo relevance feedback so that the user gets improved retrieval performance without an extended interaction.
- The main advantage of this feedback system is that it does not require assessors like in explicit relevance feedback system.
- Consider the following steps to implement this feedback



RELEVANCE FEEDBACK



- **Step 1** – First, the result returned by initial query must be taken as relevant result. The range of relevant result must be in top 10-50 results.
- **Step 2** – Now, select the top 20-30 terms from the documents using for instance term frequency(tf)-inverse document frequency(idf) weight.
- **Step 3** – Add these terms to the query and match the returned documents. Then return the most relevant documents.

