

Agenda


01 Recommendation Engine

02 Types of Recommendation Engine

03 Recommendation Engine in R

Recommendation Engine

Recommendation Engine

A cartoon illustration of a man with a beard and glasses, wearing a blue shirt and khaki pants, standing with his arms crossed and looking thoughtful. A thought bubble is above his head.

What is
Recommendation
Engine?

A filtering system that seeks to predict and show the items of user interest

It may or may not be accurate

Utilized in a variety of areas

Mostly used in the digital domain

Can significantly boost revenues, CTRs, conversions and other important metrics

Recommendation Engine

What is a
Recommendation
Engine?



Data filtering tools that make use of algorithms and data
to recommend the most relevant items to a particular use



An automated form of
“Shop Counter Guy”

Types of Recommendation Engine

Types of Recommendation Engine

What are different
type of
Recommendation
Engine?

Recommendation Engines

Collaborative Filtering

Content-Based Filtering

Hybrid Recommendation
Systems

Collaborative Filtering Recommender Systems

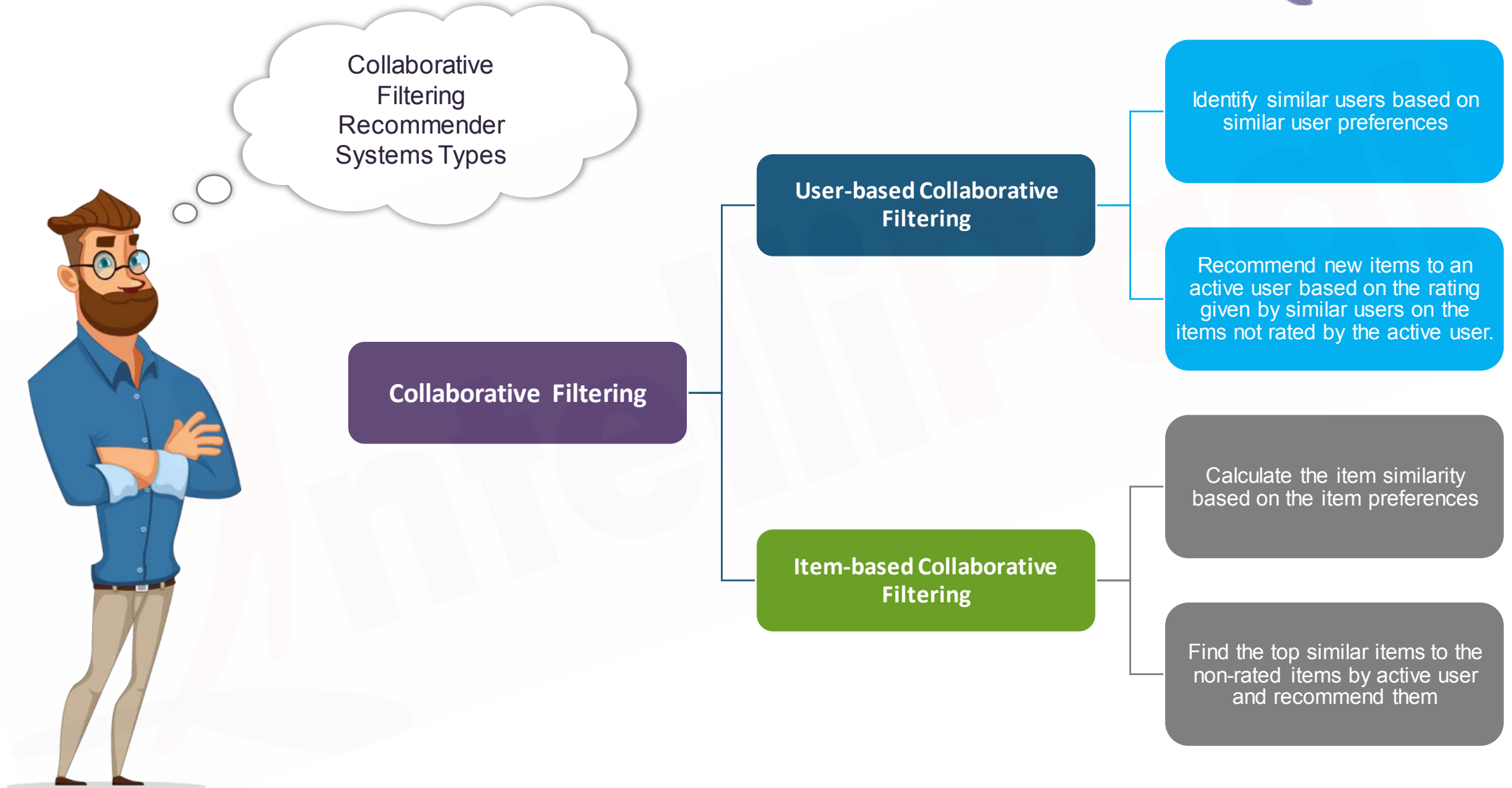
Collaborative Filtering Recommender Systems

What is Collaborative Filtering Recommender System ?

Filtering items from a large set of alternatives is done collaboratively by users' preferences



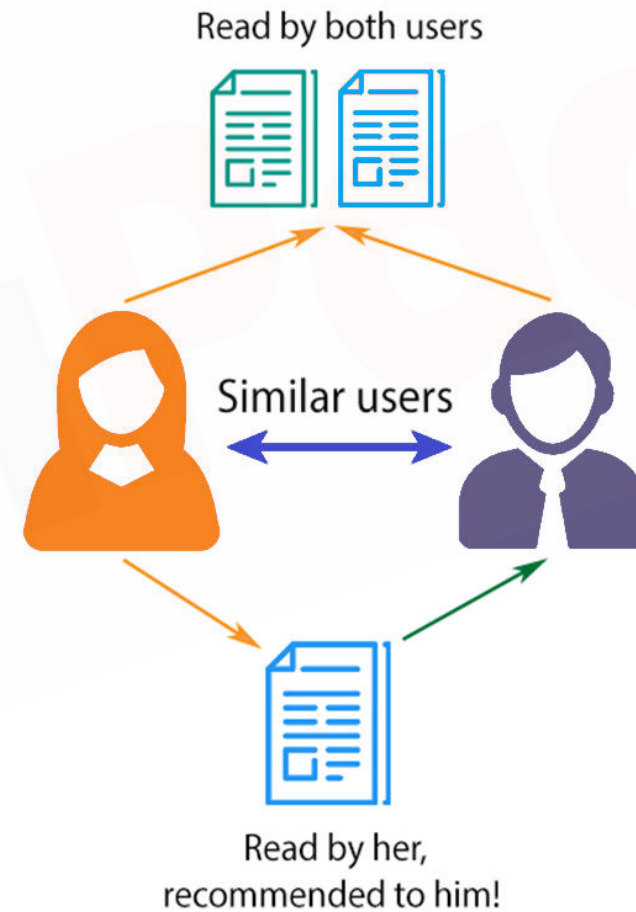
Collaborative Filtering Recommender Systems



User Based Collaborative Filtering

User-based Collaborative Filtering

Recall User-Based
Collaborative
Filtering



User-based Collaborative Filtering

How do we measure the similarity?

Pearson Correlation

$$u_{ik} = \frac{\sum_j (v_{ij} - v_i)(v_{kj} - v_k)}{\sqrt{\sum_j (v_{ij} - v_i)^2 \sum_j (v_{kj} - v_k)^2}}$$

Cosine Similarity

$$\cos(u_i, u_j) = \frac{\sum_{k=1}^m v_{ik} v_{jk}}{\sqrt{\sum_{k=1}^m v_{ik}^2 \sum_{k=1}^m v_{jk}^2}}$$

$$v_{ij}^* = K \sum_{v_{kj} \neq ?} u_{jk} v_{kj}$$



Recommendation Engine in R

Recommendation Engine in R

Building the collaborative filtering models on top of the “MovieLense” dataset

```
> head(MovieLense@data)
6 x 1664 sparse Matrix of class "dgCMatix"
[[ suppressing 45 column names 'Toy Story (1995)', 'GoldenEye (1995)', 'Four Rooms (1995)' ... ]]

1 5 3 4 3 3 5 4 1 5 3 2 5 5 5 5 5 3 4 5 4 1 4 4 3 4 3 2 4 1 3 3 5 4 2 1 2 2 3 4 3 2 5 4 5 5 .....
2 4 . . . . . 2 . . 4 4 . . . . 3 . . . . . 4 . . . . . . . . . . . . . . . . . . . . . . . . . . . .
3 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
4 . . . . . . . . . . 4 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
5 4 3 . . . . . . . . . . . . . . . . 4 . . . 3 . . 4 3 . . . 4 . . . . . . . . . . . 4 . 5 . . . . . .
6 4 . . . . . 2 4 4 . . 4 2 5 3 . . . 4 . 3 3 4 . . . . 2 . . . 4 . . . . . . . . . . . . . . . . . . . . . .

.....suppressing columns in show(); maybe adjust 'options(max.print= *, width = *)'
.....
```

Tasks To Be Performed


1

Build “User Based Collaborative Filtering” model on top of the ‘MovieLense’ dataset and recommend 6 new movies to a user

2

Build “Item Based Collaborative Filtering” model on top of the ‘MovieLense’ dataset and recommend 6 new movies to a user


Recommendation Engine in R

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Load the required
packages and have
a glance at the
“MovieLense”
dataset

```
library(recommenderlab)  
  
data("MovieLense")  
  
MovieLense@data
```


Recommendation Engine in R

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Convert the
'MovieLense' data
into a vector and
find out all the
unique ratings

```
as.vector(MovieLense@data) ->  
vector_ratings
```



```
unique(vector_ratings)
```

Recommendation Engine in R




Remove the rating
'0' and have a
glance at the
number of ratings
for each category

```
vector_ratings[vector_ratings!=0]->vector_ratings
```

```
table(vector_ratings)->table_ratings
```

```
table_ratings
```

Recommendation Engine in R



Extract a fraction of the dataset and divide the dataset into train and test sets

```
MovieLense[rowCounts(MovieLense)>50, colCounts(MovieLense)>100]->  
rating_movies
```




```
sample(x=c(T,F),size=nrow(rating_movies),replace = T, prob = c(0.9,0.2)) -  
>split_movie
```



```
rating_movies[split_movie,]->recc_train  
rating_movies[!split_movie,]->recc_test
```

Recommendation Engine in R

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Build 'UBCF' model
& predict the
values

```
Recommender(data = recc_train,method="UBCF")->recc_model_ubcf  
n_recommended_ubcf<-6
```



```
predict(object=recc_model_ubcf,newdata=recc_test,n=n_recommended_ubcf)->recc_predicted_ubcf
```

Recommendation Engine in R


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Recommend 6 new
movies to user-
number 1 and
user-number5

```
recc_predicted_ubcf@items[[1]]->user1_movie_numbers  
recc_predicted_ubcf@itemLabels[user1_movie_numbers]
```

```
recc_predicted_ubcf@items[[5]]->user5_movie_numbers  
recc_predicted_ubcf@itemLabels[user5_movie_numbers]
```

Recommendation Engine in R

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Build 'IBCF' model
& predict the
values

```
Recommender(data = recc_train, method="IBCF")->recc_model_ibcf  
n_recommended_ibcf<-6
```



```
predict(object=recc_model_ibcf, newdata=recc_test, n=n_recommended_ibcf)->recc_predicted_ibcf
```

Recommendation Engine in R



Recommend 6 new
movies to user-
number 1 and
user-number5

```
recc_predicted_ibcf@items[[1]]->user1_movie_numbers  
recc_predicted_ibcf@itemLabels[user1_movie_numbers]
```

```
recc_predicted_ibcf@items[[5]]->user5_movie_numbers  
recc_predicted_ibcf@itemLabels[user5_movie_numbers]
```

Quiz

Which of these is the right code to implement “Item Based Collaborative Filtering” model?

1. `Recommender(data = recc_train,method="IBCF")`
2. `Recommend(data = recc_train,method="IBCF")`
3. `Recommendation(data = recc_train,method="UBCF")`
4. `Recommender(data = recc_train,method="UBCF")`

Which of these is the right code to implement “Item Based Collaborative Filtering” model?

Solution:

1. `Recommender(data = recc_train,method="IBCF")`

Thank You



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