# Recommender System

have techiques

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① content Based filtering

② collaborative Based filtering

## ① content Based filtering

Let take an example to understant it Let Say a costumer 1 and costumer 2

costumer 1 purchase → mobile, earphone, screenguard

and costumer 1 given rating too Such as 5, 5, 4 are as follows

the costumer 2 also purchase → mobile, earphone

the costumer 2 is more likely to buy screenguard so what is happening in content based filter based on the costumer 1 characteristics we are recommeding product which costumer 2 is also have same characteristics behaviour. basically in content based

filtering we recommending product based on content he purchase (it uses item based attributes)

* but before applying the Recommedeter system machine should know some information like

① who is the target ?

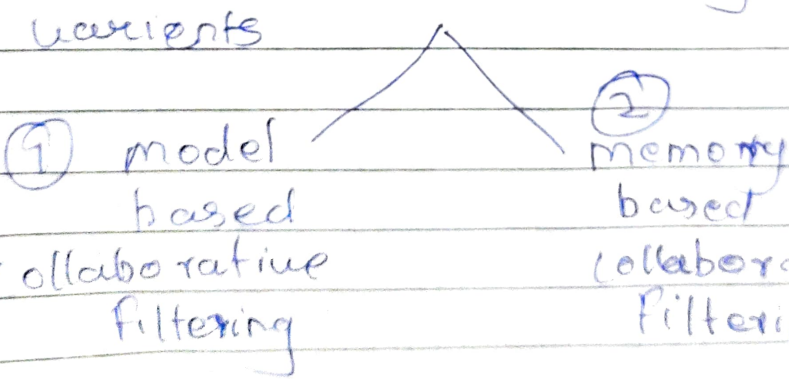
② what is the prefierres ?

② collaborative Based filtering

as word collaborative we can know it something related to collaboration something group together lets understaind this by taking one example if some costumer called C, is watching some movie (note :- when you dont have rating system in sys that time collaborative based filtering is really useful) (it works on something called userItem interaction matrix ~~do and~~) before come to the example lets understand some important point what if cost apart from capturing rating we can capture costumers behaviours (Affinity)

like screentime, click, cart, likes, share etc. So here all the behaviours we will plot in user item interaction. So come example $C_1$ watched some movie like Avengers, Jumanji, cars, etc through so $C_1$ will capture behaviours we will plot in user item interaction and suppose $C_2$ also behaviouring like $C_1$ so we will also recommend $C_1$ movies to $C_2$ which $C_1$ likes.

So collaborative based filtering has two variants




1. it try to predict the next best item for the particular user may be new recommendation

② it uses user item interaction matrix to see different users behaviours and based on the memory the matrix we recommends item to the user

but disaduantage of coldaborative based filtering is that it uses high amount of computational power. where as content based filtering doesnt need much coltputat ional power. and collaborative is Lazy learner.

and we can take another approach is that we mix up both techiques and come up with better results.

user item interactions matrix

| | item 1 | item 2 | item 3 |
|---|---|---|---|
| person 1 | 3 | 4 | 5 |
| person 2 | 5 | 1 | |
| person 3 | 3 | 4 | |
| Person 4 | | | |

since person 1 behaviours is similar to person 3 so we will recommend him item 3.

So how similarity is calculated

by

cosine - based similarity

$$\cos(A,B) = A \cdot B / |A| * |B|$$

Note :- A and B is our customers and the values we will take from user item interaction matrix

$$|A| = (a_1^2 + a_2^2 + \cdots + a_N^2)^{1/2}$$

$$|B| = (b_1^2 + b_2^2 + \cdots + b_N^2)^{1/2}$$

if cosine similarity is 180° means there is no similarity by when values is less maybe 90° or 60° means its similar.

if cosine value comes 1 = similar

0 = not similar

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if computation power is there then how to reduce.

(1) Randomly Sample costumers

(2) Discard infrequent buyers.

(3) Discard item that are very popular or unpopular.

(4) Dimension reduction can reduce no. of columns.

★ Runtime vs. quality of Recommendation

Recommending while the costumer is browsing

Recommend better but later

★ Search - based methods

- Based on previous purchase.

* but you will think Recommendation System is similar to Association Rule but its not.

Association rules is like

if customer buys A production then what the probability or likelihood to buy product B

$$A \longrightarrow B.$$

IRR Recommendation if costumer buy A product the what should I recommend next product B or C or D

$$A \longrightarrow B, C, D.$$

* But How to start Recommending to new costumer.

1. popular item
2. Demographically relevant items.
3. Browsing history.