OUR PERSONALIZED MUSIC RECOMANDATION SYSTEM

Music is Everything

ABOUT US

We are the team of Graduate and Post Graduate engineering students, who are willing to kickstart their career in IT related fields.

It was a great opportunity for all of us to be a part of Innomatics Research Labs. The way Kanav Bansal sir taught was too simple to understand,and very easy to grasp.

Team Members

- **Gaurav Kumar - B Tech (ME) (2019-2023)**
- **Siddharth Tewani - B Tech (CSE)(2018-2022)**
- **Durga U - M.Sc (Data Science)(2020-2022)**
- **Arpit Jaiswal - B Tech (CSE)(2019-2023)**
- **Duggirala Akhil -B Tech (CSE) (2018-2022)**

What is Recommandation System?

Recommender systems are the systems that are designed to recommend things to the user based on many different factors. These systems predict the most likely product that the users are most likely to purchase and are of interest to. Companies like Netflix, Amazon, etc. use recommender systems to help their users to identify the correct product or movies for them.

Recommendation System

$\longrightarrow$

INNOMATICS
RESEARCH LABS

How it basically works.
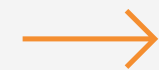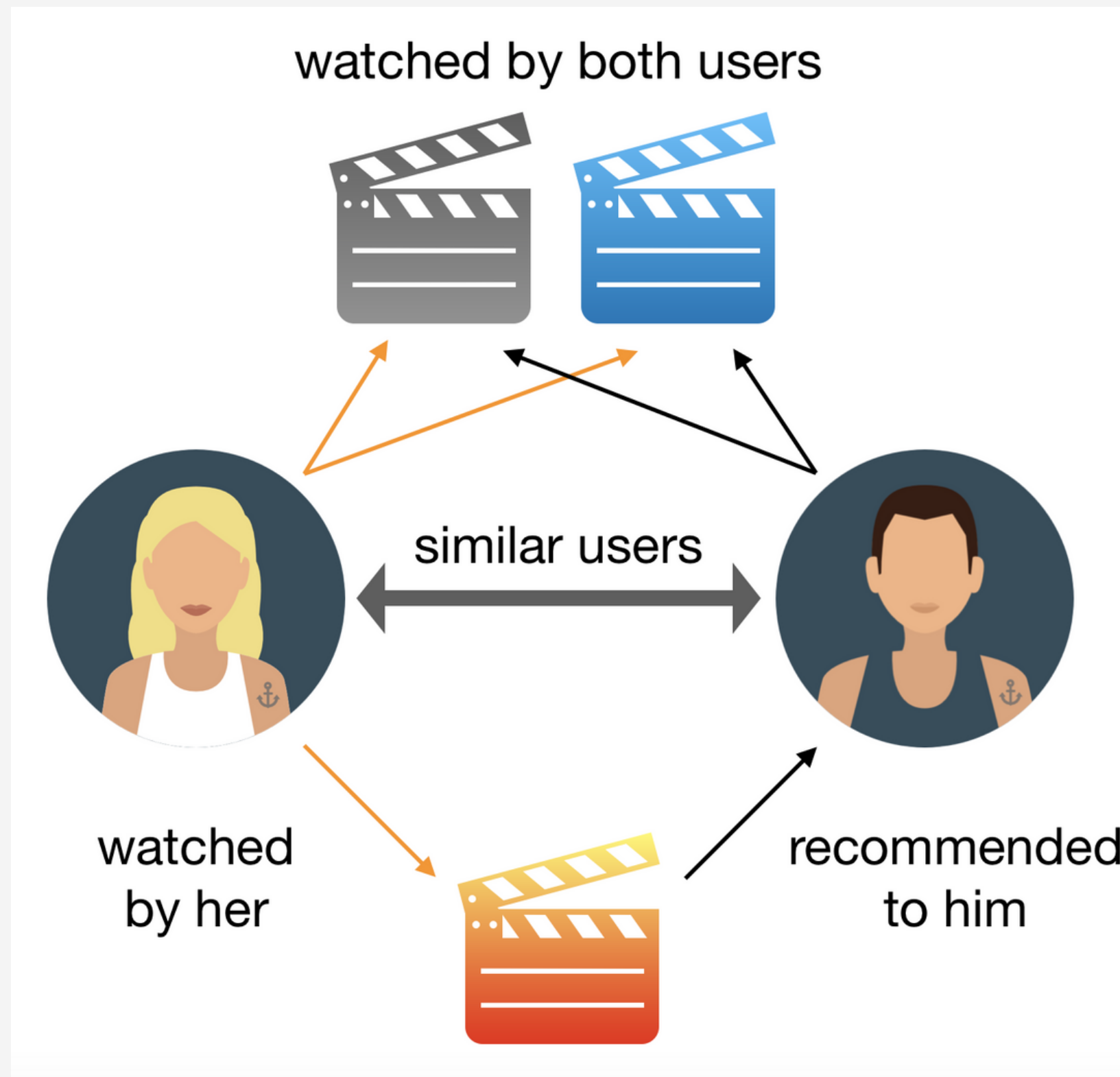
Different Techniques for Recommandation Systems

Popularity Based Filtering

Popularity based recommendation system works with the trend. It basically uses the items which are in trend right now.

Content Based Filtering

A Content-Based Recommender works by the data that we take from the user, either explicitly (rating) or implicitly (clicking on a link)

Collaborative Based Filtering

Collaborative filtering methods are based on collecting and analyzing a large amount of information on user behaviors, activities or preferences and predicting what users will like based on their similarity to other users.
It is of two types: -

- Item-Item similarity method
- User-User similarity method

INNOMATICS
RESEARCH LABS

Popularity Based Filtering

As the name suggests Popularity based recommendation system works with the trend. It basically uses the items which are in trend right now. For example, if any product which is usually bought by every new user then there are chances that it may suggest that item to the user who just signed up.

INNOMATICS
RESEARCH LABS
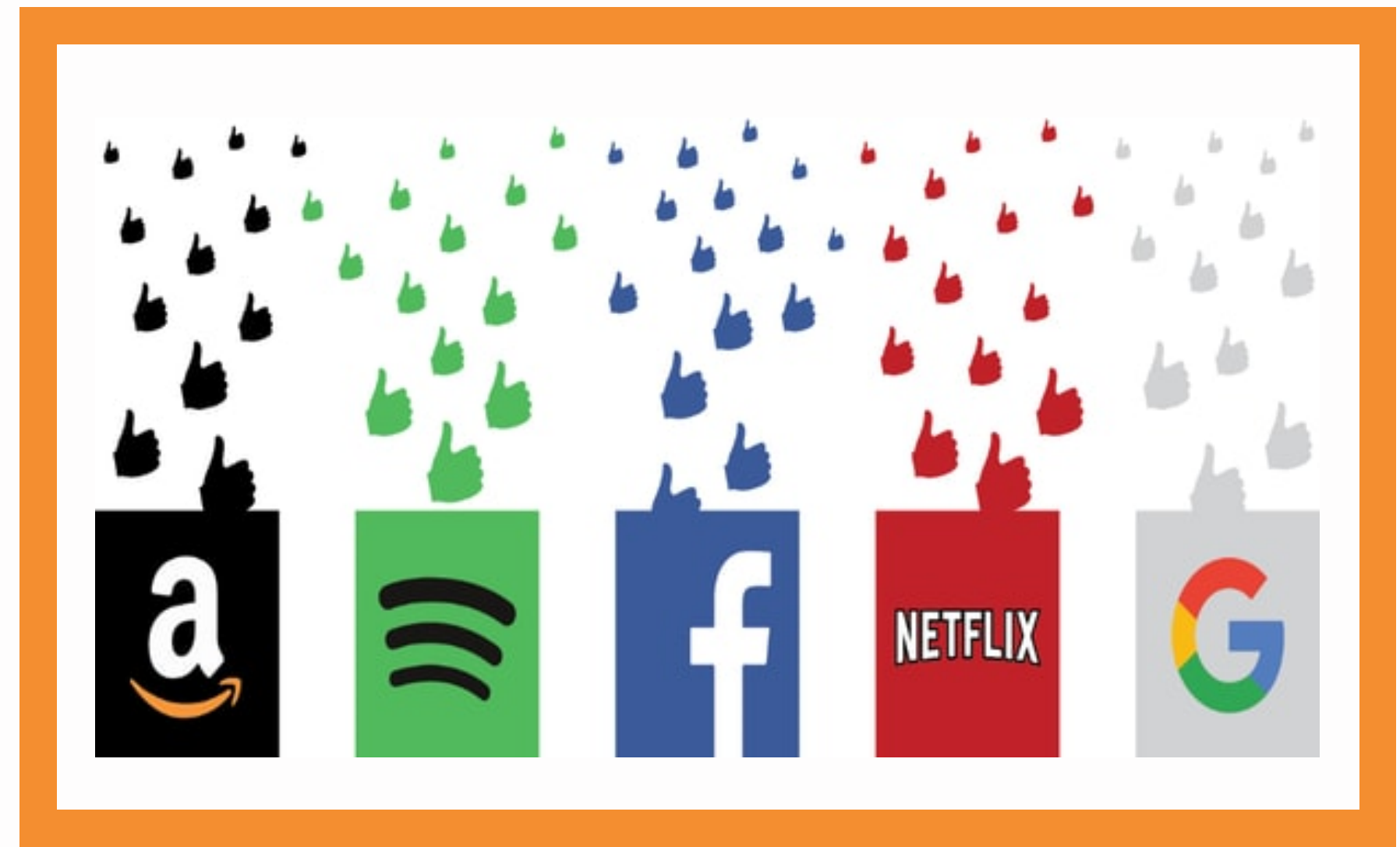
Top 10 Popularity Based Recommendations

| Rank	song
1.0	Sehr kosmisch
2.0	Undo
3.0	You're The One
4.0	Dog Days Are Over (Radio Edit)
5.0	Revelry
6.0	Secrets
7.0	Horn Concerto No. 4 in E flat K495: II. Romanc...
8.0	Hey_ Soul Sister
9.0	Fireflies
10.0	Tive Sim

- These are the top 10 most famous songs so they will be recommended to every user.

- The only drawback of this approach that it is not personalized.

COLLABORATIVE BASED FILTERING

It is done by 2 Methods
- By Using Item-Item Similarity
- By Using User-User Similarity

INNOMATICS
RESEARCH LABS
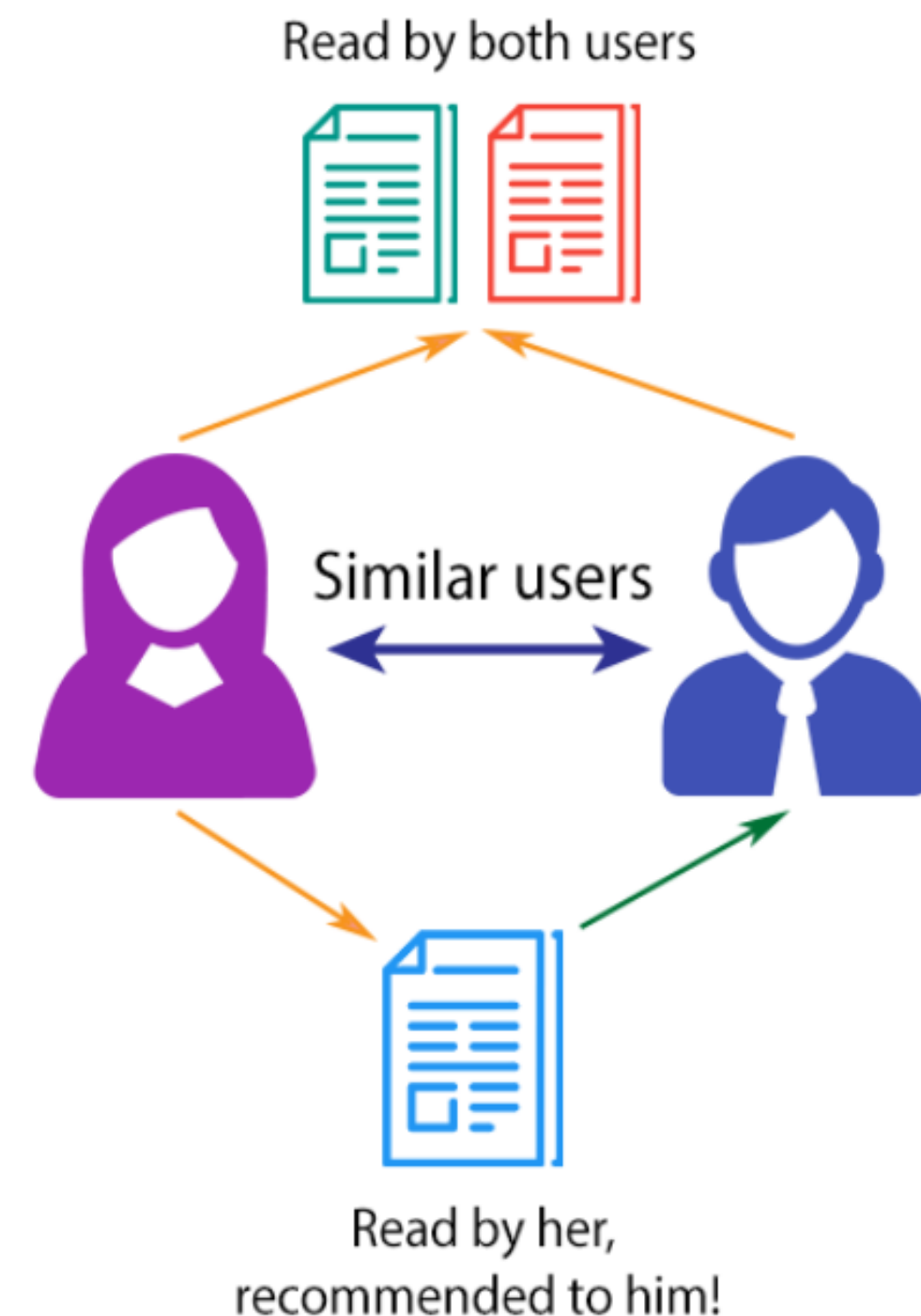
ITEM-ITEM
&
USER-USER
FILTERING

INNOMATICS
RESEARCH LABS

Recommendations using Collaborative Filtering by Nearest Neighbours Approach

```
As you are 00014a76ed063e1a749171a253bca9d9a0ff1782:
You will like these songs

1: Speak

2: Sweet home Alabama

3: Easy

4: Dog Days Are Over (Radio Edit)
```

```
If you liked Greece 2000:
 Then you will Definetly like these songs too

1: Let Me Be Myself

2: Citizen/Soldier

3: Bedroom Suite

4: Hero/Heroine

5: Rock Star
```
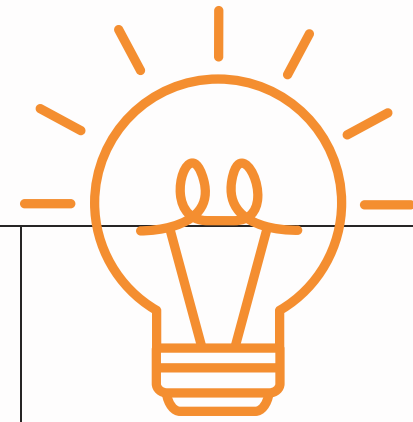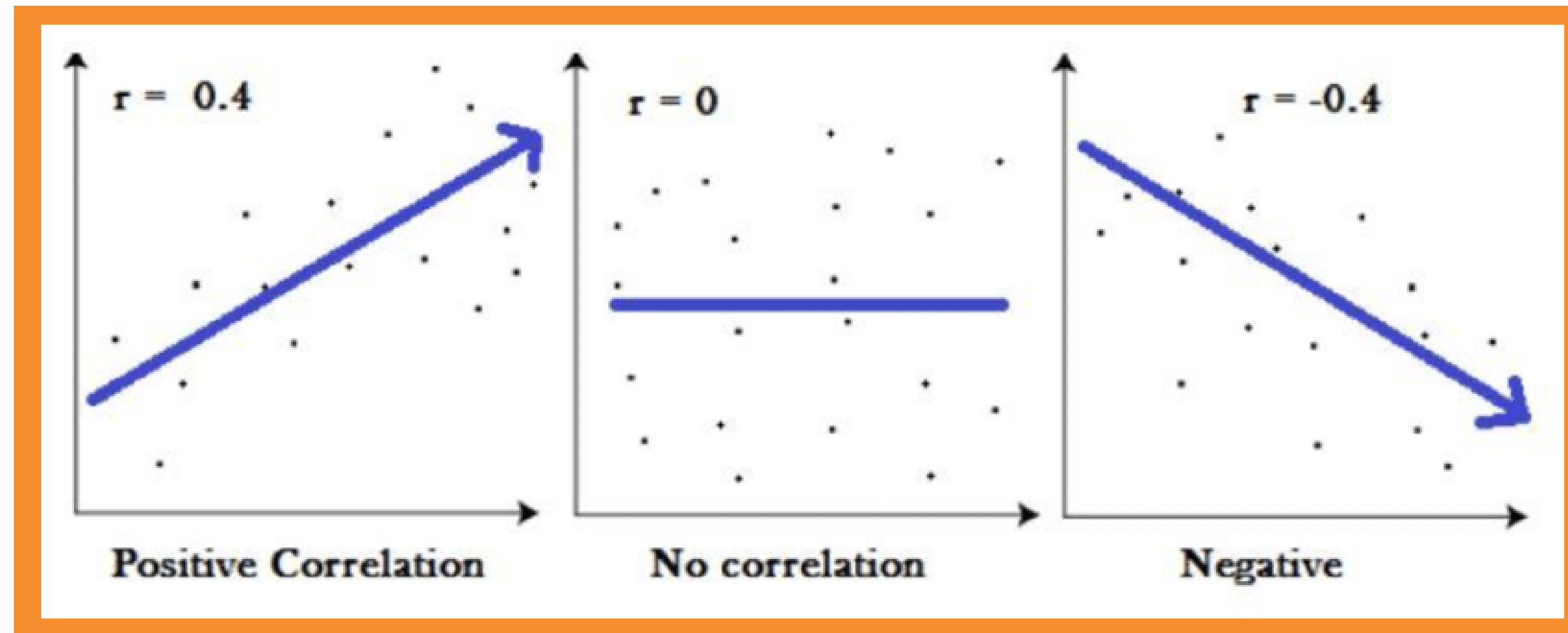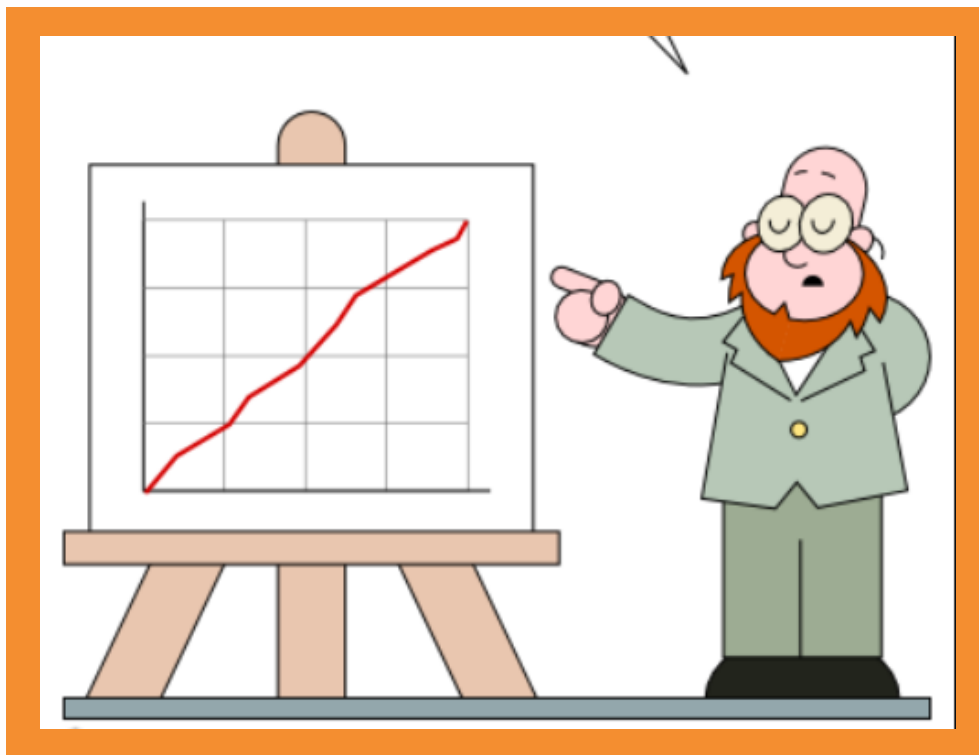
Implementation of Both User Based and Item Based Collaborative filtering using Nearest Neighbours

Using Correlation

TYPES OF CORRELATIONS

Recommendations using Collaborative Filtering by Correlation Approach

	pearsonR
song	
I'll Be Your Man	1.000000
Esta Es Para Hacerte Féliz	0.089782
Snow [Hey Oh] (Album Version)	0.057385
Tighten Up	0.041757
Your Touch	0.039344

```
] similar_user('000151896668691680bb1a2e58afde1541ec92ced')

Top 5 songs that other most similar users are loving:
1 -----> Speak
2 -----> For Emma
3 -----> Speak
4 -----> re:stacks
5 -----> For Emma
```

Implementation of Both User Based and Item Based Collaborative filtering using Correlation

Recommendations Using Surprise Library

```
FOr Song----> The Gift
Lift Me Up
In The Waiting Line
Forever & Always
FOr Song----> Casting A Spell (Remixed) (1998 Digital Remaster)
El Cuatrero
Unite (2009 Digital Remaster)
Dog Days Are Over (Radio Edit)
FOr Song----> Give It To Me
Unite (2009 Digital Remaster)
Lift Me Up
Rain
```

Implementation of Item Based Collaborative Filtering Using Surprise Library

Content Based
Filtering

A Content-Based Recommender works by the data that we take from the user, either explicitly or implicitly. By the data we create a user profile, which is then used to suggest to the user, as the user provides more input or take more actions on the recommendation, the engine becomes more accurate.

CONTENT-BASED FILTERING

Read by user

Similar articles

Recommended
to user

INNOMATICS
RESEARCH LABS
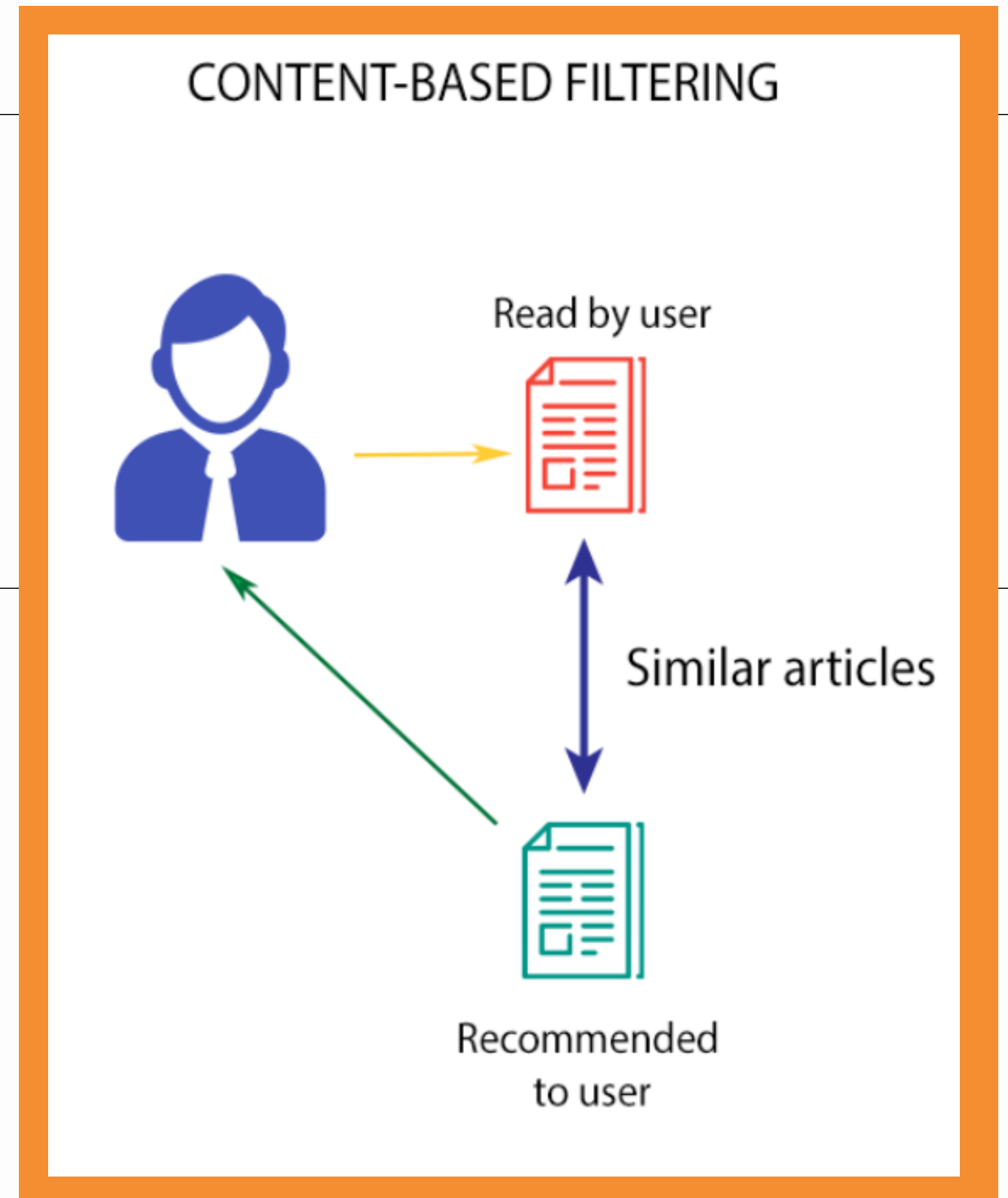
Data required for Content Based
Recommandation System

	title_x	cast	director	keywords	genres
0	Avatar	[Sam Worthington, Zoe Saldana, Sigourney Weaver]	James Cameron	[culture clash, future, space war]	[Action, Adventure, Fantasy]
1	Pirates of the Caribbean: At World's End	[Johnny Depp, Orlando Bloom, Keira Knightley]	Gore Verbinski	[ocean, drug abuse, exotic island]	[Adventure, Fantasy, Action]
2	Spectre	[Daniel Craig, Christoph Waltz, Léa Seydoux]	Sam Mendes	[spy, based on novel, secret agent]	[Action, Adventure, Crime]
3	The Dark Knight Rises	[Christian Bale, Michael Caine, Gary Oldman]	Christopher Nolan	[dc comics, crime fighter, terrorist]	[Action, Crime, Drama]
4	John Carter	[Taylor Kitsch, Lynn Collins, Samantha Morton]	Andrew Stanton	[based on novel, mars, medallion]	[Action, Adventure, Science Fiction]

FUTURE SCOPE

We have applied several filtering techniques for our recommendation system which includes:

*   Popularity Based Filtering
*   Content based Filtering (not enough RAM)
*   Collaborative Based filtering
    - Using Correlation
    - Using Nearest neighbours
    - Using Surprise

But our current recommendation model cannot recommend relevant products to a new user in a personalized manner ,i.e., it suffers from Cold Start Problem.

So to make sure it doesn't happen, it can be prevented by hybrid filtering which is actually a mixture of both content based and collaborative based filtering.

$\longrightarrow$

Collaborative filtering using surprise library should further be improved as the RMSE score is 1125.28

We can also try to implement collaborative filtering approach using Turicreate

Conclusion

- *It is better to have a combination of different approaches for a recommender systems having popularity based, content based and collaborative based filtering as each of the approach has its own drawback hence they can't be applied individually.*

- *Popularity based recommender systems are not personalized at all as they recommend the same songs for all kind of users.*

- *Content based recommender systems require high computational power as compared to collaborative filtering.*