Recommender Systems Challenge

DataQuest, May 2025

We aim to provide personalised offers across all interfaces to maximise the lifetime value of the relationship with all our customers.

Diverse, relevant and novel offers are part of a bigger customer journey that are personalised through context and executed across multiple interfaces.

Recommender System models are designed to solve this challenge well.

Examples of other companies who do this well are the personalised recommendations from Amazon, Netflix and Spotify.

The delivery of personalised offers should be prioritised and ranked based on customer needs derived through contextual data points.

To deliver the best possible customer experience, you need to develop a recommender system model, that can recommend the most relevant offers to each customer.

1. Train a recommender system machine learning model of your choice to solve this challenge, using the dataset provided.
2. Show a variety of accuracy and beyond-accuracy measures to motivate why your model is expected to work well.
3. Describe any additional considerations that you would expect if this system is used in a live/production environment.

Apply the above first on the *Kaggle e-Commerce* dataset, and then on the *FNB dataset*.

Dataset 1 – Kaggle

eCommerce

Kaggle E-Commerce Data

https://www.kaggle.com/datasets/carrie1/ecommerce-data

About Dataset

Context

Typically e-commerce datasets are proprietary and consequently hard to find among publicly available data. However, The UCI Machine Learning Repository has made this dataset containing actual transactions from 2010 and 2011. The dataset is maintained on their site, where it can be found by the title "Online Retail".

Content

"This is a transnational data set which contains all the transactions occurring between 01/12/2010 and 09/12/2011 for a UK-based and registered non-store online retail.The company mainly sells unique all-occasion gifts. Many customers of the company are wholesalers."

Acknowledgements

Per the UCI Machine Learning Repository, this data was made available by Dr Daqing Chen, Director: Public Analytics group. chend '@' lsbu.ac.uk, School of Engineering, London South Bank University, London SE1 0AA, UK.

Image from stocksnap.io.

Inspiration

Analyses for this dataset could include time series, clustering, classification and more.

Kaggle E-Commerce Data

https://www.kaggle.com/datasets/carrie1/ecommerce-data

InvoiceNo	StockCode	Description	Quantity	InvoiceDate	UnitPri
25900 unique values	4070 unique values	4224 unique values	-80995 81.0k	2010-12-01 2011-12-09	-11.1k
536365	85123A	WHITE HANGING HEART T-LIGHT HOLDER	6	12/1/2010 8:26	2.55
536365	71053	WHITE METAL LANTERN	6	12/1/2010 8:26	3.39
536365	84406B	CREAM CUPID HEARTS COAT HANGER	8	12/1/2010 8:26	2.75
536365	84029G	KNITTED UNION FLAG HOT WATER BOTTLE	6	12/1/2010 8:26	3.39
536365	84029E	RED WOOLLY HOTTIE WHITE HEART.	6	12/1/2010 8:26	3.39
536365	22752	SET 7 BABUSHKA NESTING BOXES	2	12/1/2010 8:26	7.65

E-Commerce Sales Forecast Data Analysis

https://www.kaggle.com/code/allunia/e-commerce-sales-forecast

Customer Segmentation Analysis

https://www.kaggle.com/code/farzadnekouei/customer-segmentation-recommendation-system


Dataset 2 – FNB
eCommerce
First National Bank A division of FirstRand Bank Limited. An Authorised Financial Services and Credit Provider (NCRCP20).

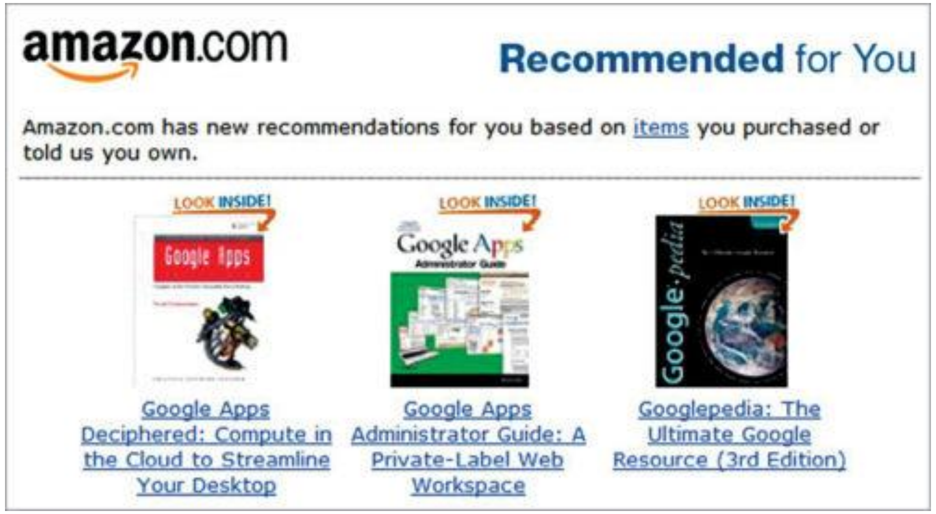
Dataset

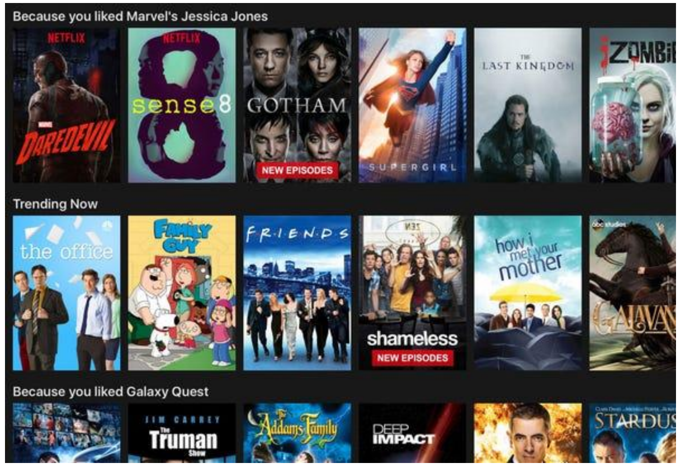
idcol	interactioı	int_date	item	page	tod	item_type	item_descrip	segment	beh_segment	active_ind
755	DISPLAY	17-Jan-23	NONE	Screen1	Afternoon	ALL		segment3	B01	Semi Active
4521	DISPLAY	27-Feb-23	NONE	Screen1	Afternoon	ALL		segment1	B07	Semi Active
4521	DISPLAY	18-Feb-23	NONE	Screen1	Afternoon	ALL		segment1	B07	Semi Active
4521	DISPLAY	30-Jan-23	NONE	Screen1	Morning	ALL		segment1	B07	Semi Active
4521	CLICK	5-Feb-23	IBAB	Screen1	Afternoon	INSURE	GENERIC MESSAGE	segment1	B07	Semi Active
4521	CHECKOUT	5-Feb-23	IBAB	Screen1	Afternoon	INSURE	GENERIC MESSAGE	segment1	B07	Semi Active
6145	DISPLAY	26-Feb-23	NONE	Screen1	Evening	ALL		segment3	B01	Cold Start
6145	DISPLAY	27-Jan-23	NONE	Screen1	Early	ALL		segment3	B01	Cold Start
6145	DISPLAY	10-Feb-23	NONE	Screen1	Morning	ALL		segment3	B01	Cold Start
6145	DISPLAY	10-Jan-23	NONE	Screen1	Afternoon	ALL		segment3	B01	Cold Start
7125	DISPLAY	18-Feb-23	NONE	Screen1	Morning	ALL		segment3	B01	Cold Start
8469	DISPLAY	5-Feb-23	NONE	Screen1	Morning	ALL		segment1	B01	Semi Active
8469	DISPLAY	14-Jan-23	NONE	Screen1	Afternoon	ALL		segment1	B01	Semi Active
8469	DISPLAY	21-Feb-23	NONE	Screen1	Morning	ALL		segment1	B01	Semi Active
13768	DISPLAY	2-Feb-23	NONE	Screen1	Morning	ALL		segment3	B01	Cold Start
14454	DISPLAY	9-Feb-23	NONE	Screen1	Morning	ALL		segment2	B01	Active
14454	CLICK	8-Feb-23	CAFM	Screen2	Morning	TRANSACT	FUSION MIGRATION	segment2	B01	Active
14454	CHECKOUT	8-Feb-23	CAFM	Screen2	Morning	TRANSACT	FUSION MIGRATION	segment2	B01	Active
15000	CLICK	31-Jan-23	CARF	Screen2	Morning	LEND	REVOLVING FACILITY	segment3	B01	Cold Start
15000	CHECKOUT	31-Jan-23	CARF	Screen2	Morning	LEND	REVOLVING FACILITY	segment3	B01	Cold Start

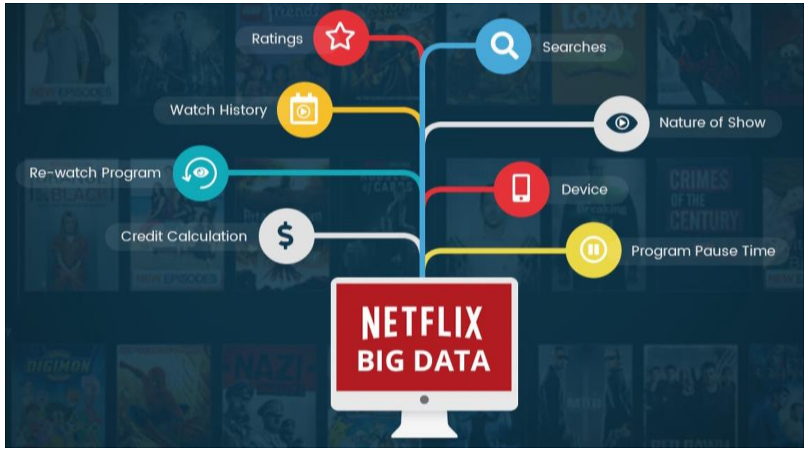
Introduction to Recommender Systems

RecSys 101

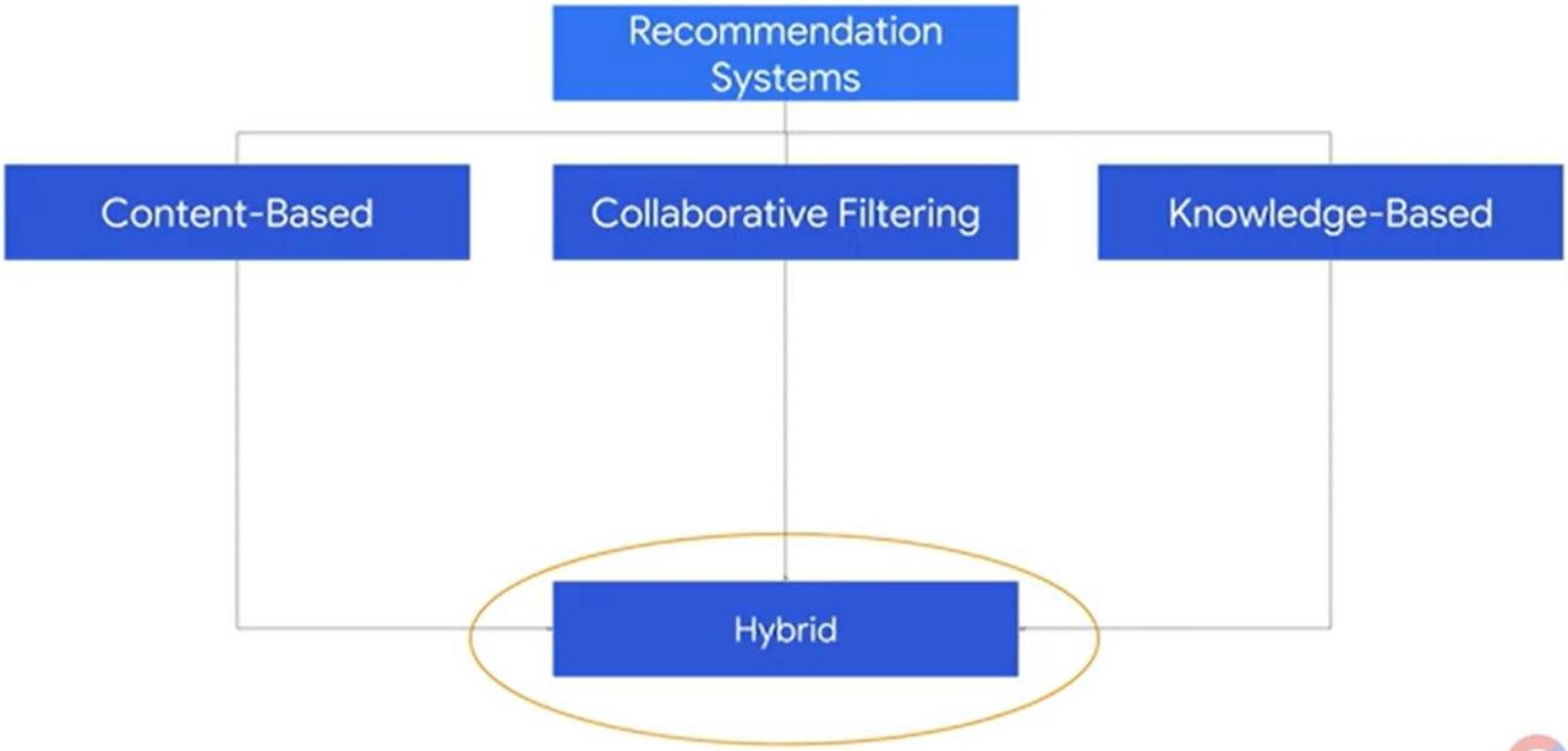
RecSys Introduction







Real-world recommendation systems are a hybrid of three broad theoretical approaches

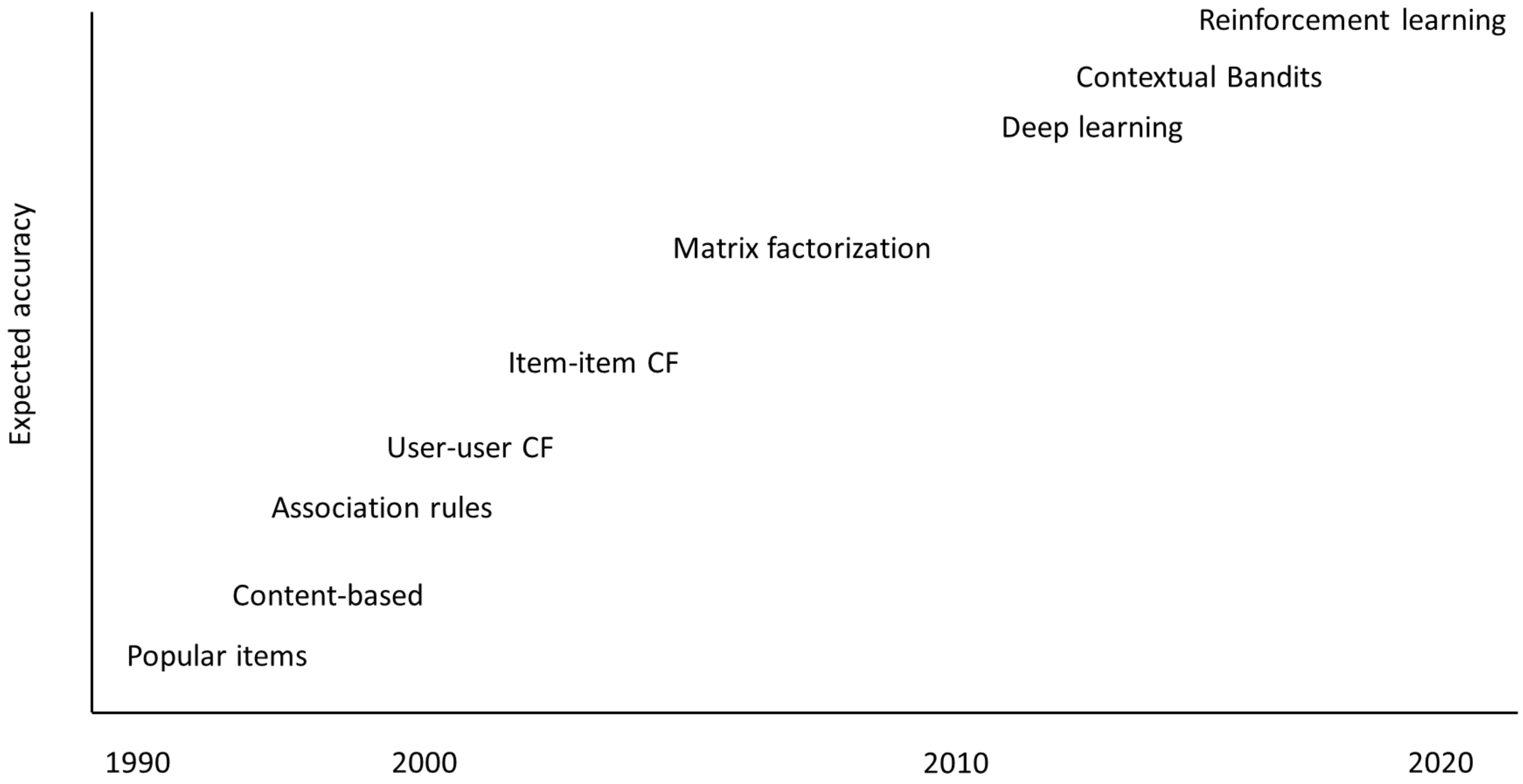


Non-personalised | Semi-personalised | Personalised

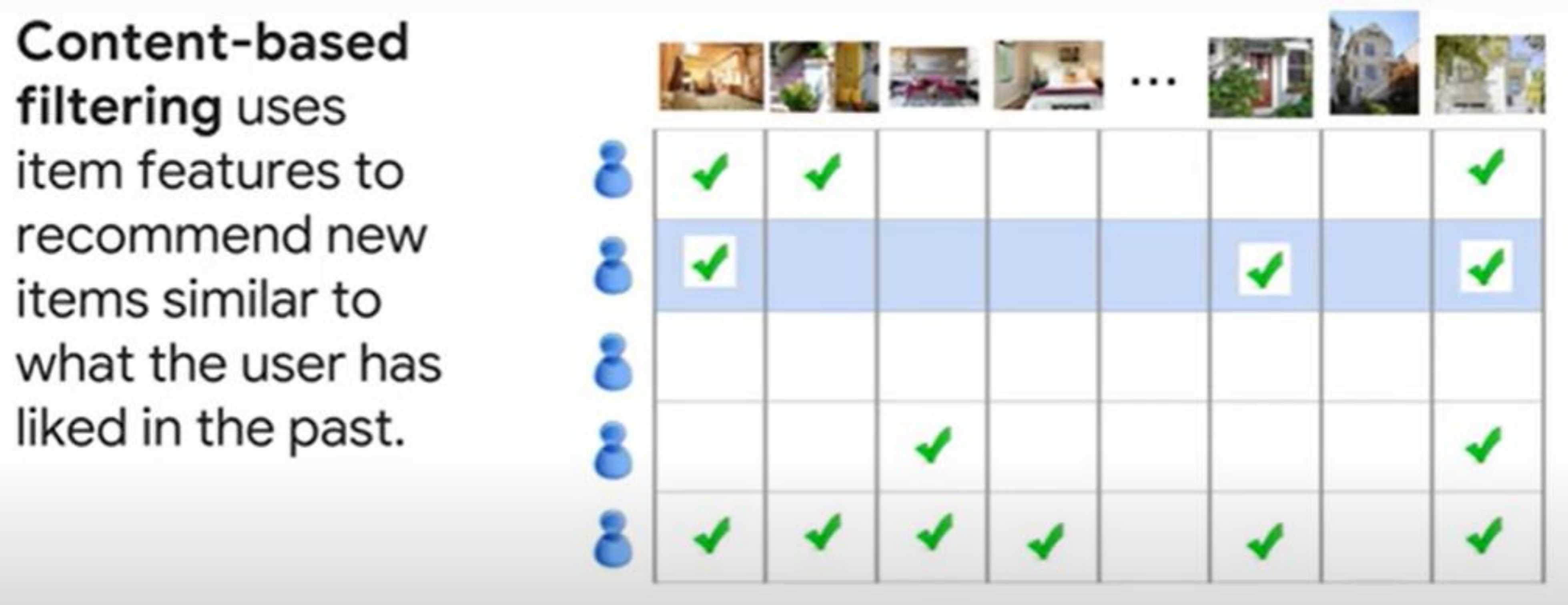
Most popular items

Based on aggregated interactions at a segment group level

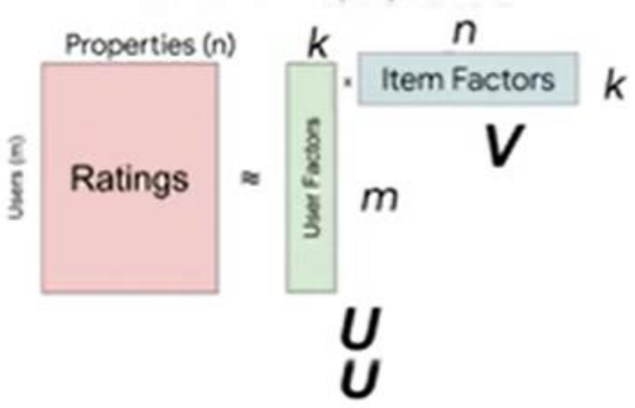
Based on personal interactions

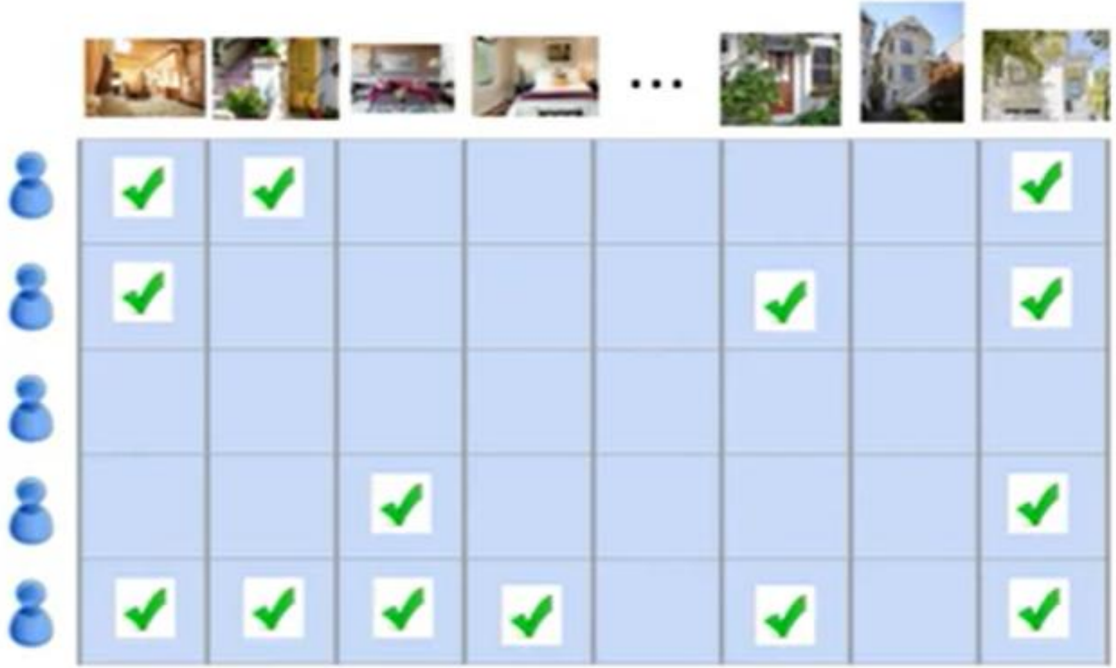

Reinforcement learning
Contextual Bandits
Deep learning
Matrix factorization
Item-item CF
User-user CF
Association rules
Content-based
Popular items
Expected accuracy
1990
2000
2010
2020

Content Based

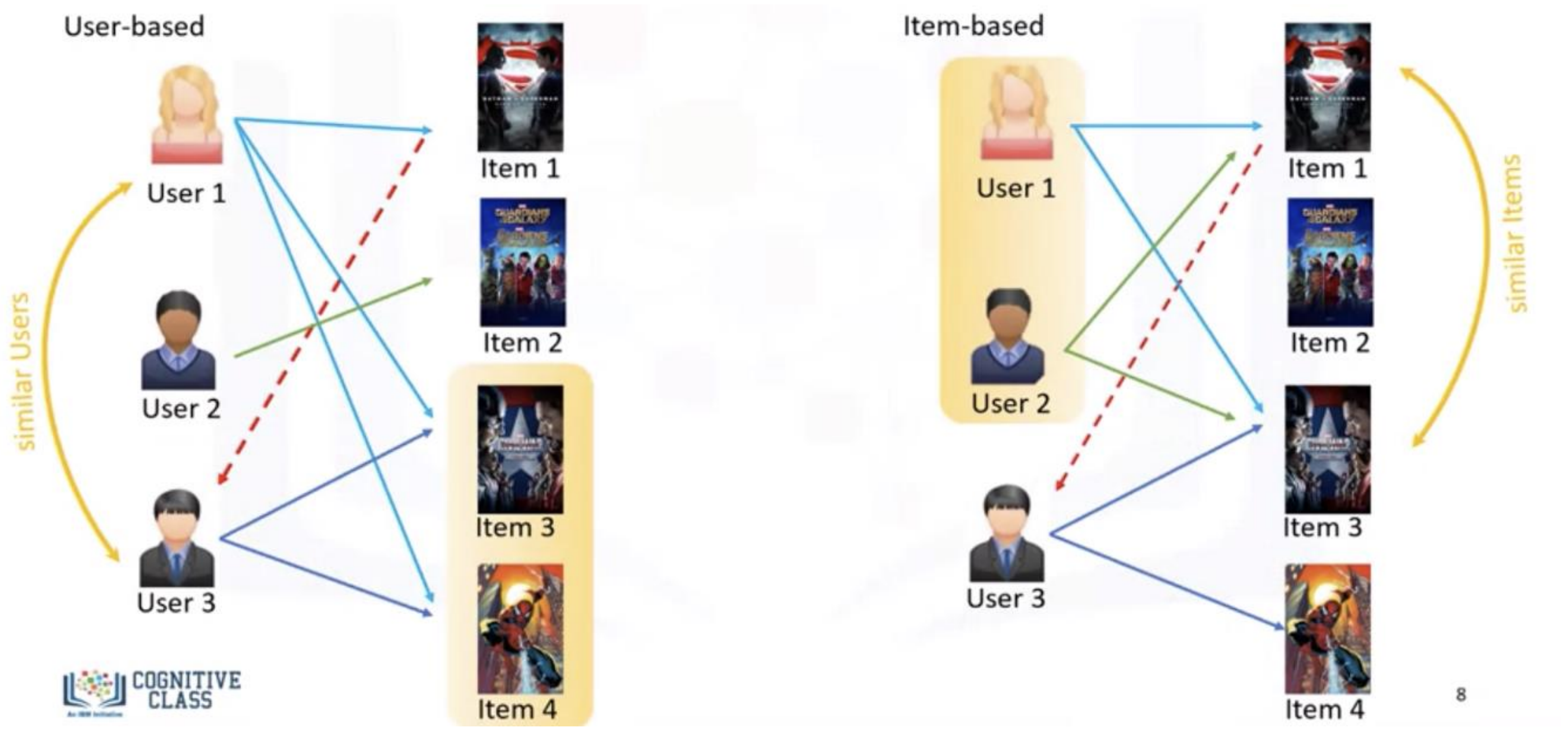


Collaborative Filtering uses similarities between users and items simultaneously to determine





Collaborative Filtering



References

What are recommendations systems machine learning
https://www.analyticssteps.com/blogs/what-are-recommendation-systems-machine-learning

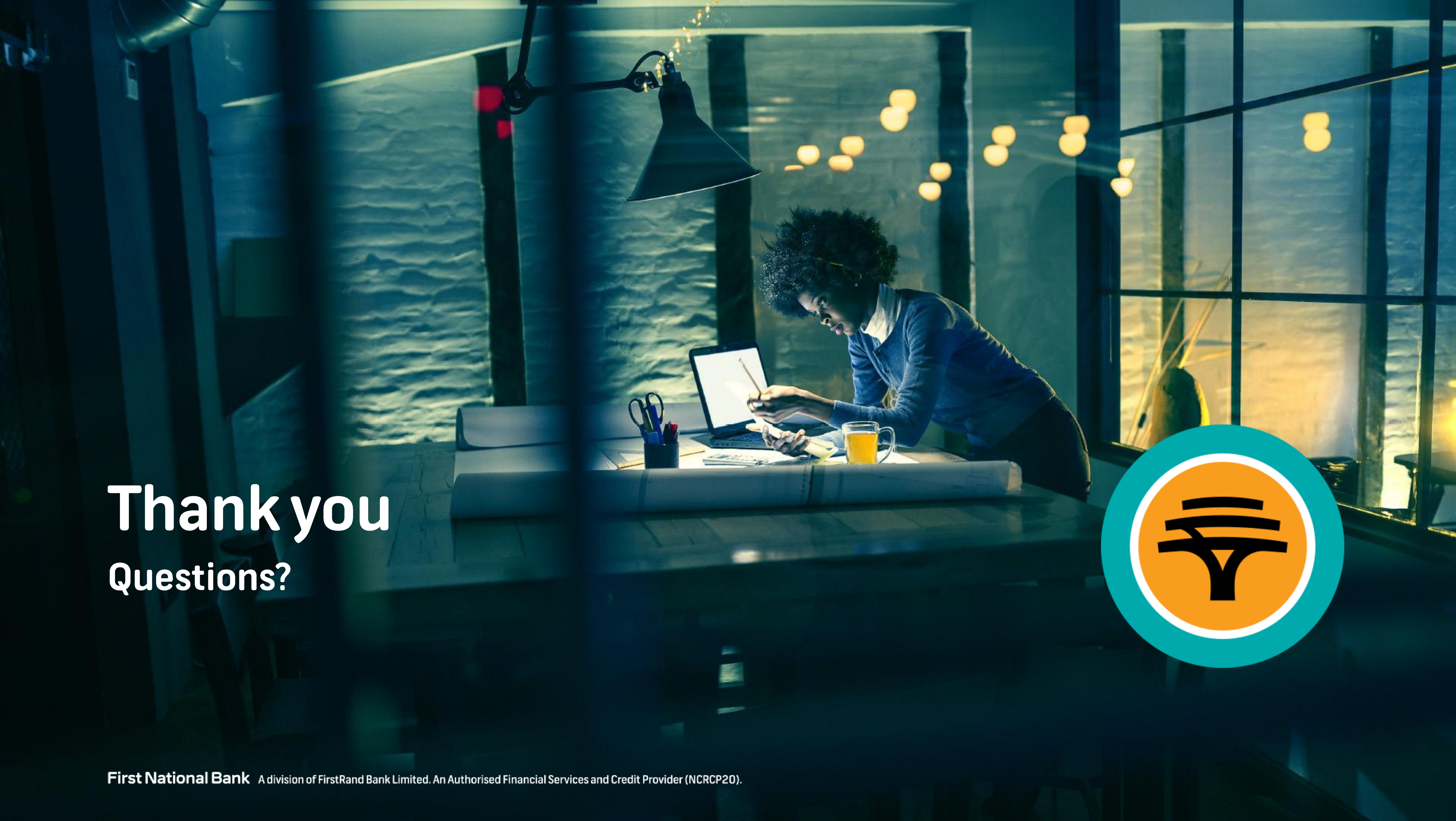
Recommendation systems: Principles, methods and evaluation
https://www.sciencedirect.com/science/article/pii/S1110866515000341

https://developers.google.com/machine-learning/recommendation

Recommendation Systems on Google Cloud
https://www.cloudskillsboost.google/course_templates/39?catalog_rank=%7B%22rank%22%3A2%2C%22num_filters%22%3A0%2C%22has_search%22%3Atrue%7D&search_id=31637355

Content-Based Recommender

https://analyticsindiamag.com/how-to-build-a-content-based-movie-recommendation-system-in-python/



Thank you

Questions?