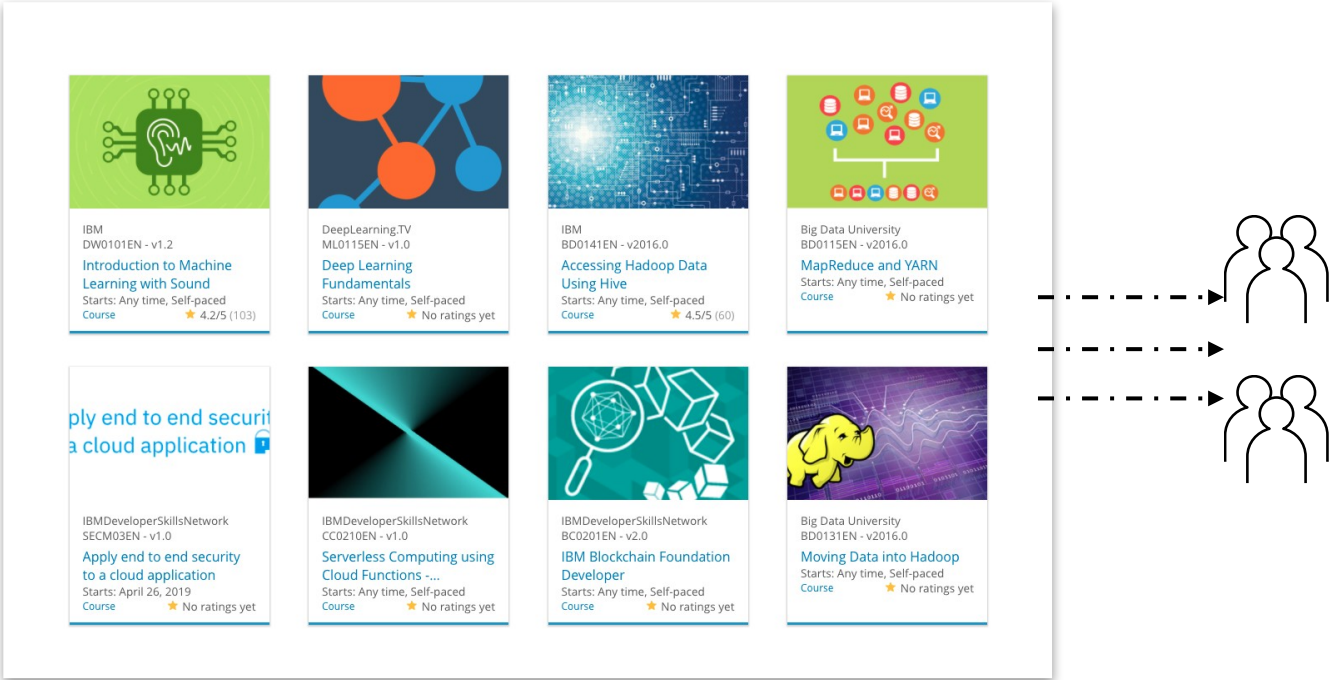
Build a Personalized Online Course Recommender System with Machine Learning

Anand kumar
16th December 2025



Outline

- Introduction and Background
- Exploratory Data Analysis
- Content-based Recommender System using Unsupervised Learning
- Collaborative-filtering based Recommender System using Supervised learning
- Conclusion
- Appendix

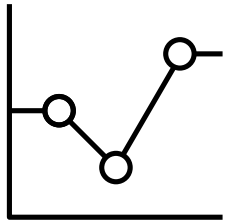
Introduction

- Making Recommendation System using Supervised learning
- Making Recommendation System using Unsupervised Learning
- Two Approaches – User Based Collaborative Filtering and Item Based Collaborative Filtering

Instructions for learner:

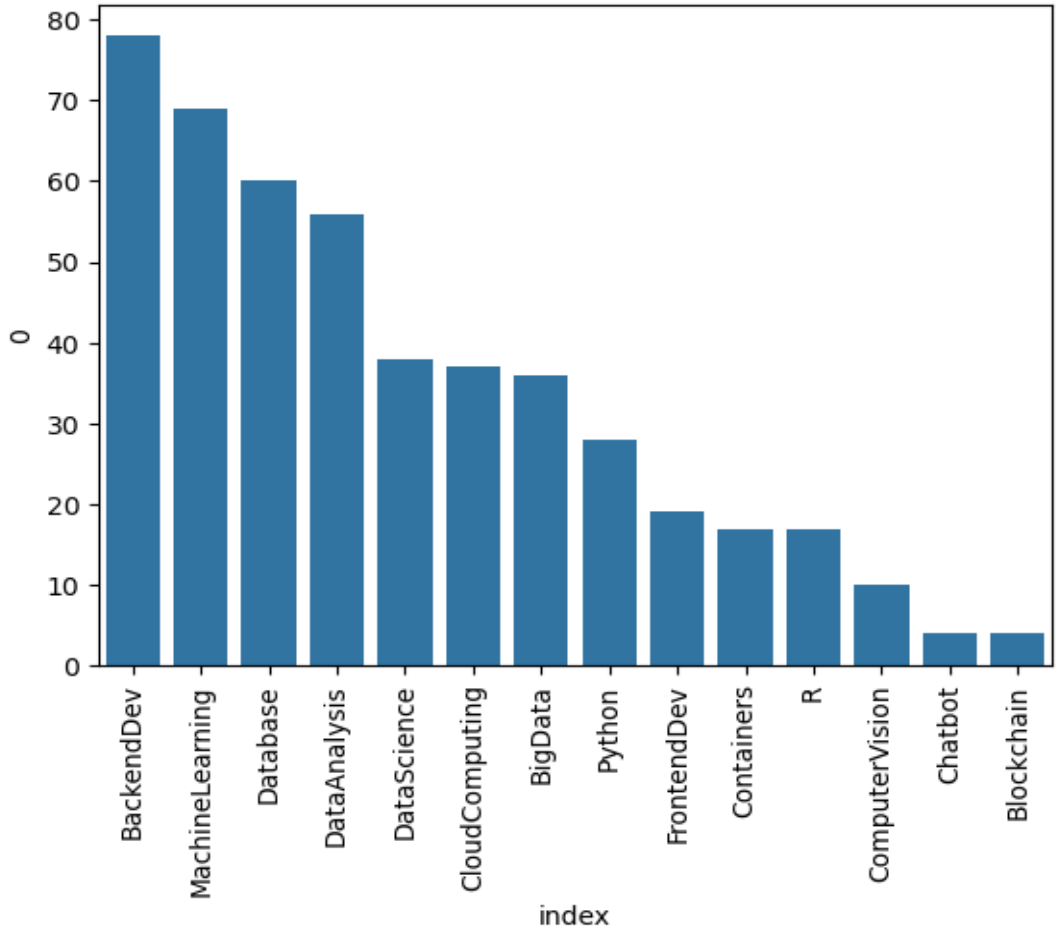
- Describe the project background and context
- Describe the problem states and write the hypotheses

Exploratory Data Analysis



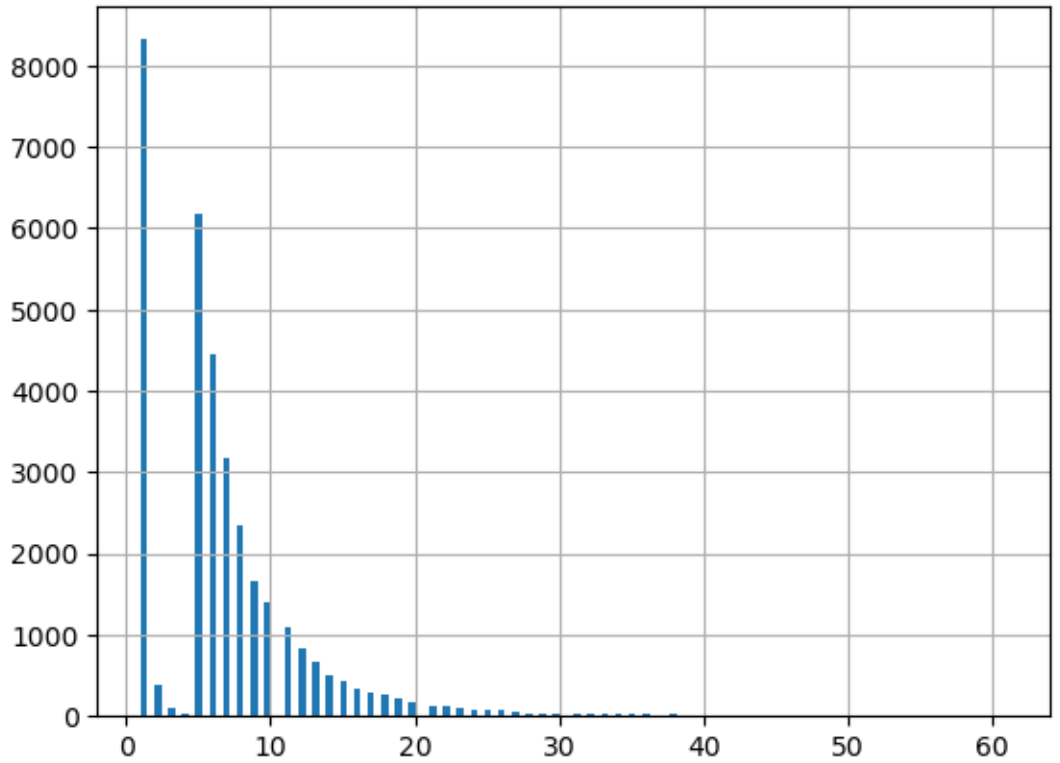
Course counts per genre

- BackendDev is the Highest among Course Genre followed by Machine Learning
- DataAnalysis, DataScience, CloudComputing is almost same
- BlockChain and Chat Bot are lowest among genres



Course enrollment distribution

- Clearly Most User rated 1 item with over 8000



20 most popular courses

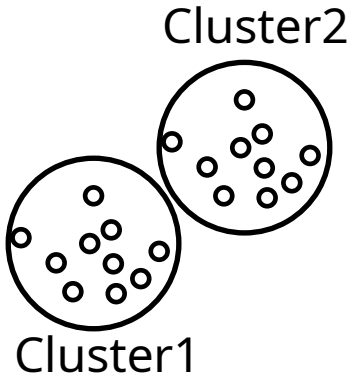
- most popular 20 courses here
- Courses related to Data Science are most popular. Ex- python for data science

	TITLE	# Enrolls
83	python for data science	14936
64	introduction to data science	14477
9	big data 101	13291
56	hadoop 101	10599
69	machine learning with python	9394
27	data analysis with python	8303
36	data science methodology	7719
99	spark fundamentals i	7551
35	data science hands on with open sou	7199
11	blockchain essentials	6719
39	data visualization with python	6709
45	deep learning 101	6323
15	build your own chatbot	5512
85	r for data science	5237
105	statistics 101	5015
62	introduction to cloud	4983
49	docker essentials a developer introd	4480
46	deep learning with tensorflow	3914
104	sql and relational databases 101	3697
71	mapreduce and yarn	3670

Word cloud of course titles

Data Science terms are most popular

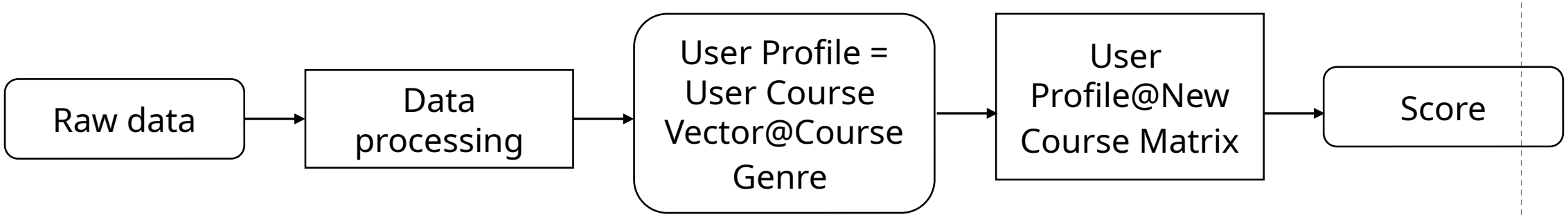
Content-based Recommender System using Unsupervised Learning



Flowchart of content-based recommender system using user profile and course genres

- flowchart which clearly illustrate implemented the content-based recommender system using user profile vectors and course genre vectors

- the flowchart



Evaluation results of user profile-based recommender system

Place your hyper-parameter settings, such as recommendation score or course similarity thresholds, etc.

Note: Threshold is 10

On average, how many new/unseen courses have been recommended per user (in the test user dataset)?

We have set threshold to 10

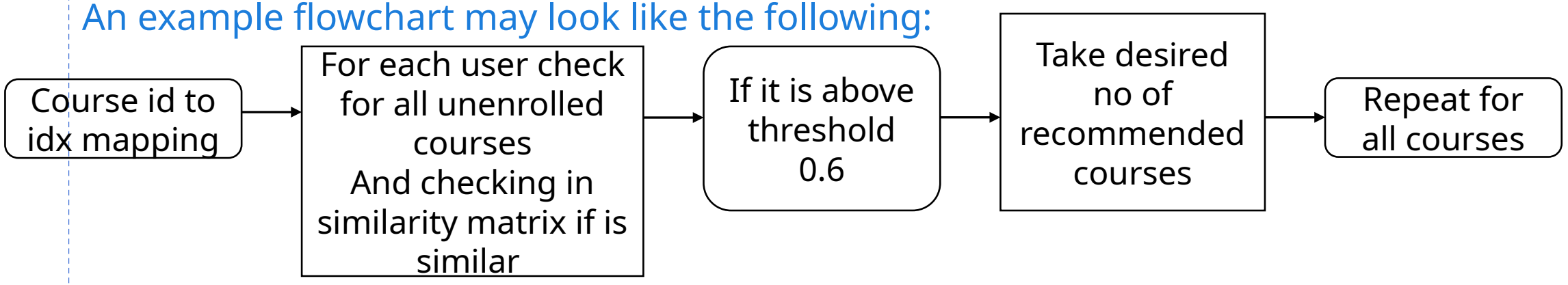
What are the most frequently recommended courses? Return the top-10 commonly recommended courses across all users?

Most users like data science related course so the courses recommended are python for data science, intro to data science, intro to ml

Flowchart of content-based recommender system using course similarity

- Plot a flowchart which should clearly illustrate how you implemented the course similarity based recommender system
- Briefly explain the flowchart in the slide note

An example flowchart may look like the following:



Evaluation results of course similarity based recommender system

Your hyper-parameter settings, such as a score or similarity threshold

0.6 threshold

On average, how many new/unseen courses have been recommended per user (in the test user dataset)?

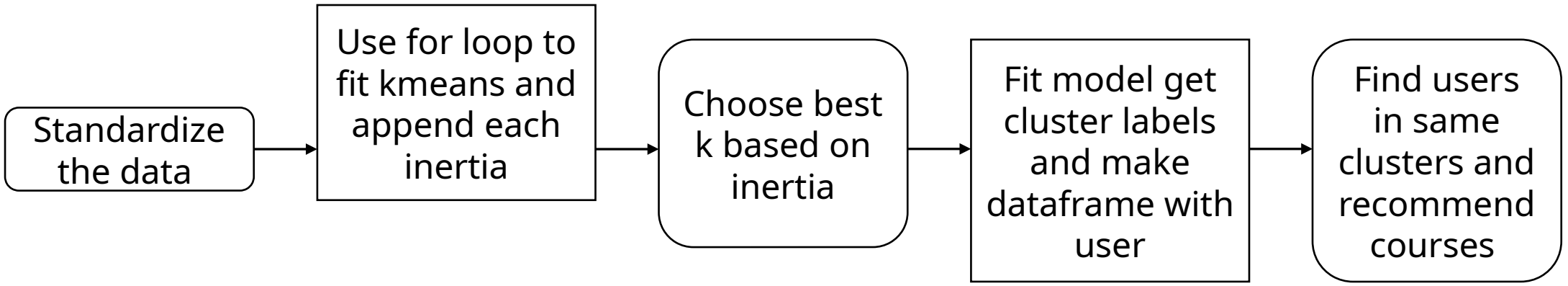
First 10 courses with highest similarity

What are the most frequently recommended courses? Return the top-10 commonly recommended courses?

Courses like python for data science, big data 101

Flowchart of clustering-based recommender system

- flowchart which should clearly illustrate how you performed user profile clustering based recommender system



Evaluation results of clustering-based recommender system

Your hyper-parameter settings, such as a score or similarity threshold

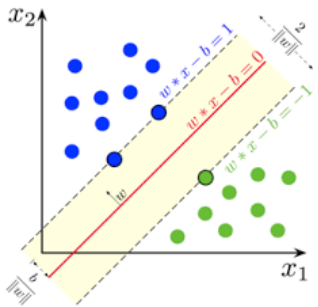
Note if you have tried multiple hyper-parameters, you may show your results in a grouped bar chart

On average, how many new/unseen courses have been recommended per user (in the test user dataset)? 10

What are the most frequently recommended courses? Return the top-10 commonly recommended courses?

Courses like python for data science, big data 101

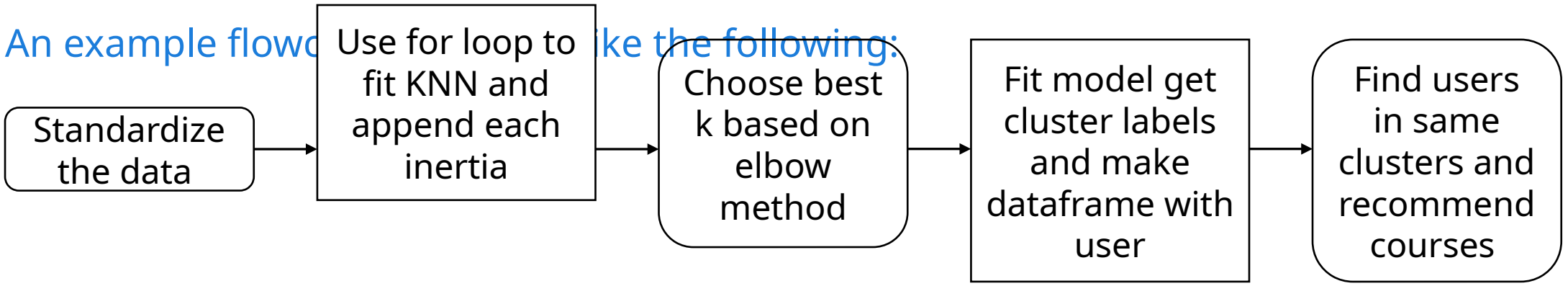
Collaborative-filtering Recommender System using Supervised Learning



Flowchart of KNN based recommender system

- Plot a flowchart which should clearly illustrate how you performed KNN based recommender system using course enrollments history
- Briefly explain the flowchart in the slide note

An example flowc ike the following:



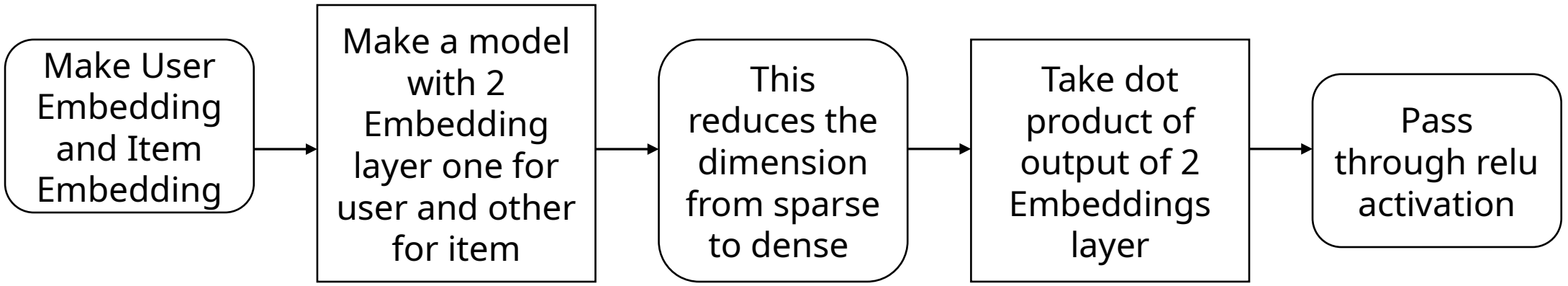
Flowchart of NMF based recommender system

- Plot a flowchart which should clearly illustrate how you performed NMF based recommender system
- Briefly explain the flowchart in the slide note

An example flowchart may look like the following:

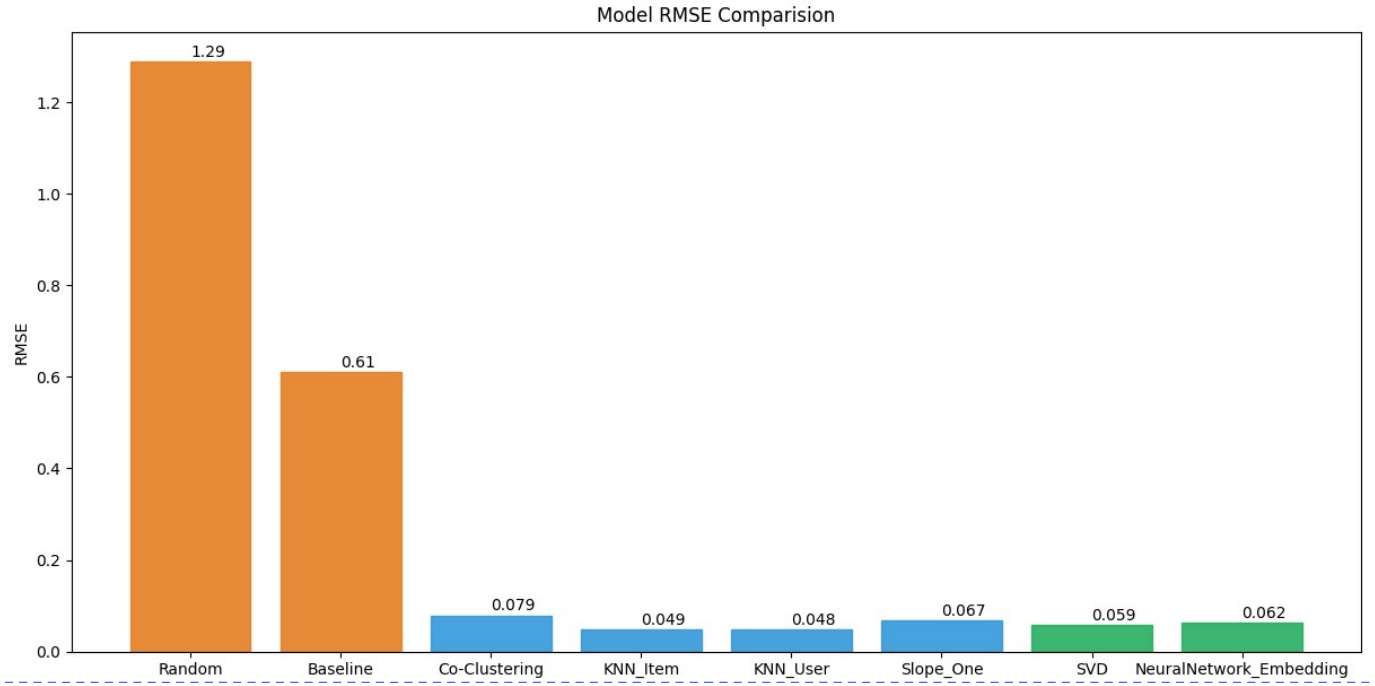
Flowchart of Neural Network Embedding based recommender system

- Plot a flowchart which should clearly illustrate how you performed Neural Network Embedding based recommender system



Compare the performance of collaborative-filtering models

- This Shows that Neural Network, SVD , KNN are better than traditional cosine similarity method



Optional: Build a course recommender system app with Streamlit

Streamlit app screenshot1

Streamlit app screenshot2

Conclusions

Neural Network is best used for Embedding user and item.

Classification Model should be used after embedding for recommendation

KNN is found best among all model

Neural Network, SVD can also be used ranking just below KNN in RMSE graph

Hyper parameters should be tuned correctly before deploying the recommendation model

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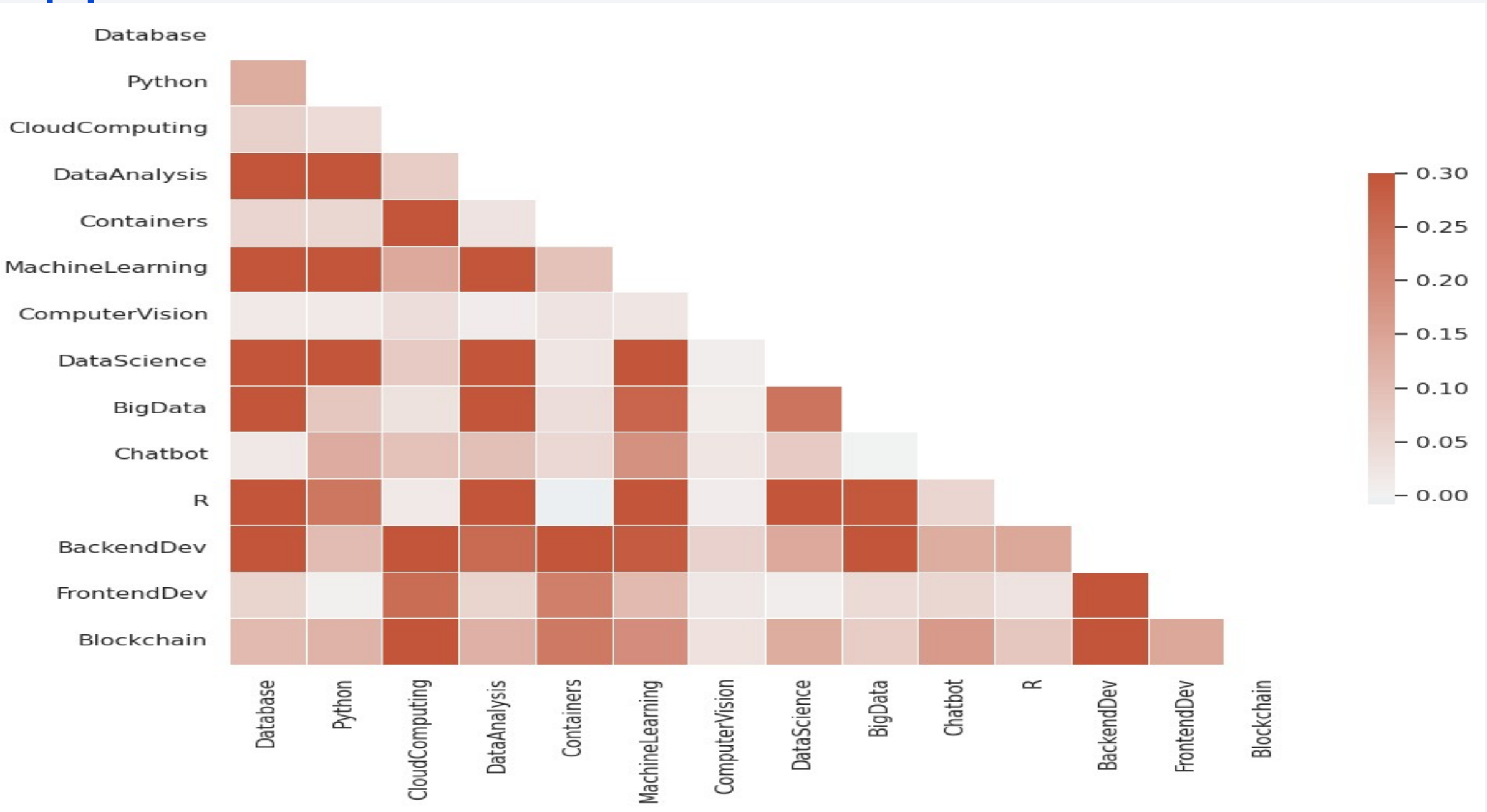
Appendix


Database
Python
CloudComputing
DataAnalysis
Containers
MachineLearning
ComputerVision
DataScience
BigData
Chatbot
R
BackendDev
FrontendDev
Blockchain
0.30
0.25
0.20
0.15
0.10
0.05
0.00