fuse | machines

PROGRESS PRESENTATION ON RECOMMENDATION UPSKILLING

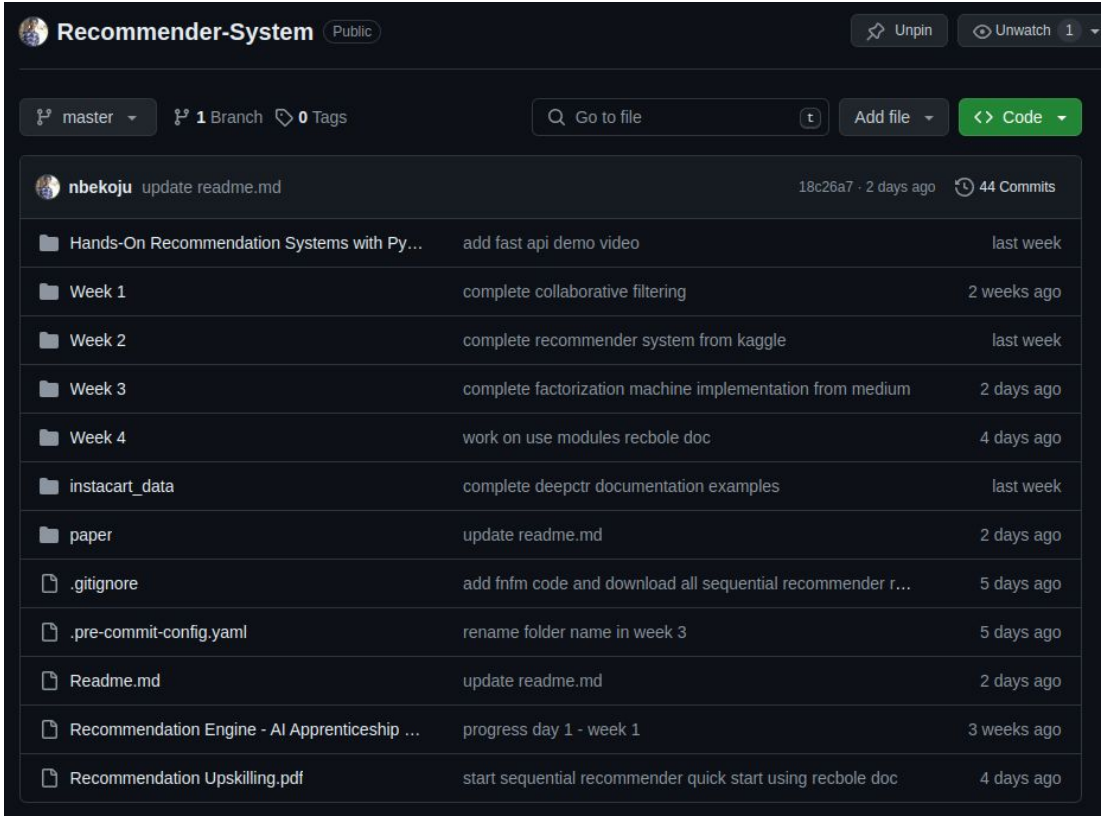
Nirajan Bekoju

BASIC OVERVIEW

- Week 1, 2, 3 (Completed)
- Week 4 (In progress)
- Week 5 (Not started yet)

GITHUB REPOSITORY

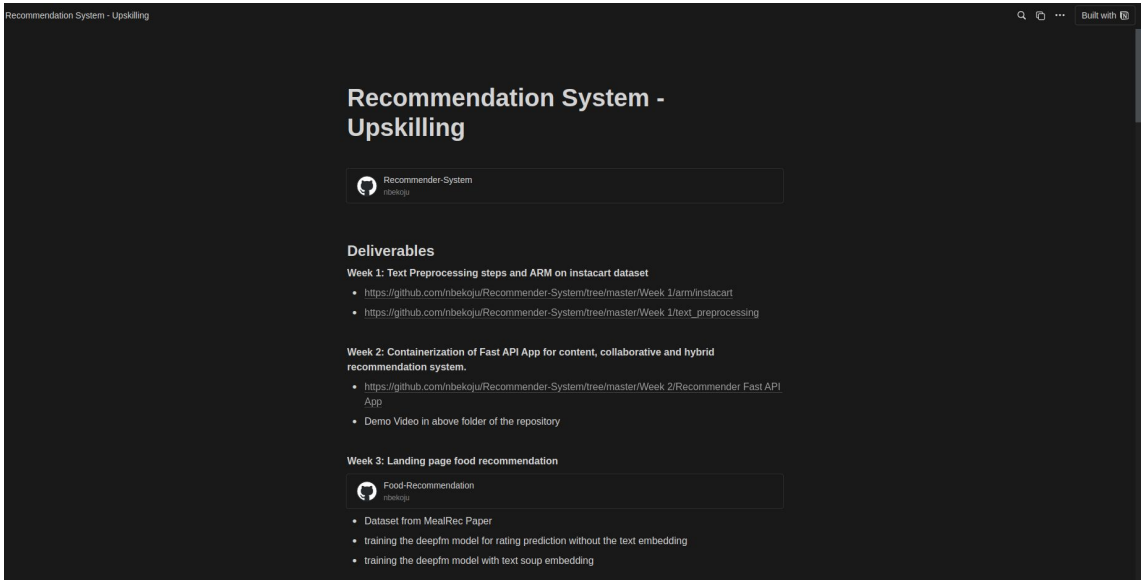
- https://github.com/nbekoju/Recommender-System



MY UPSKILLING JOURNEY - RECOMMENDATION SYSTEM

- https://nirajanbekoju.notion.site/Recommendation-System-Upskilling-487af8811c8d46d2a59049b9a5c9f4f1

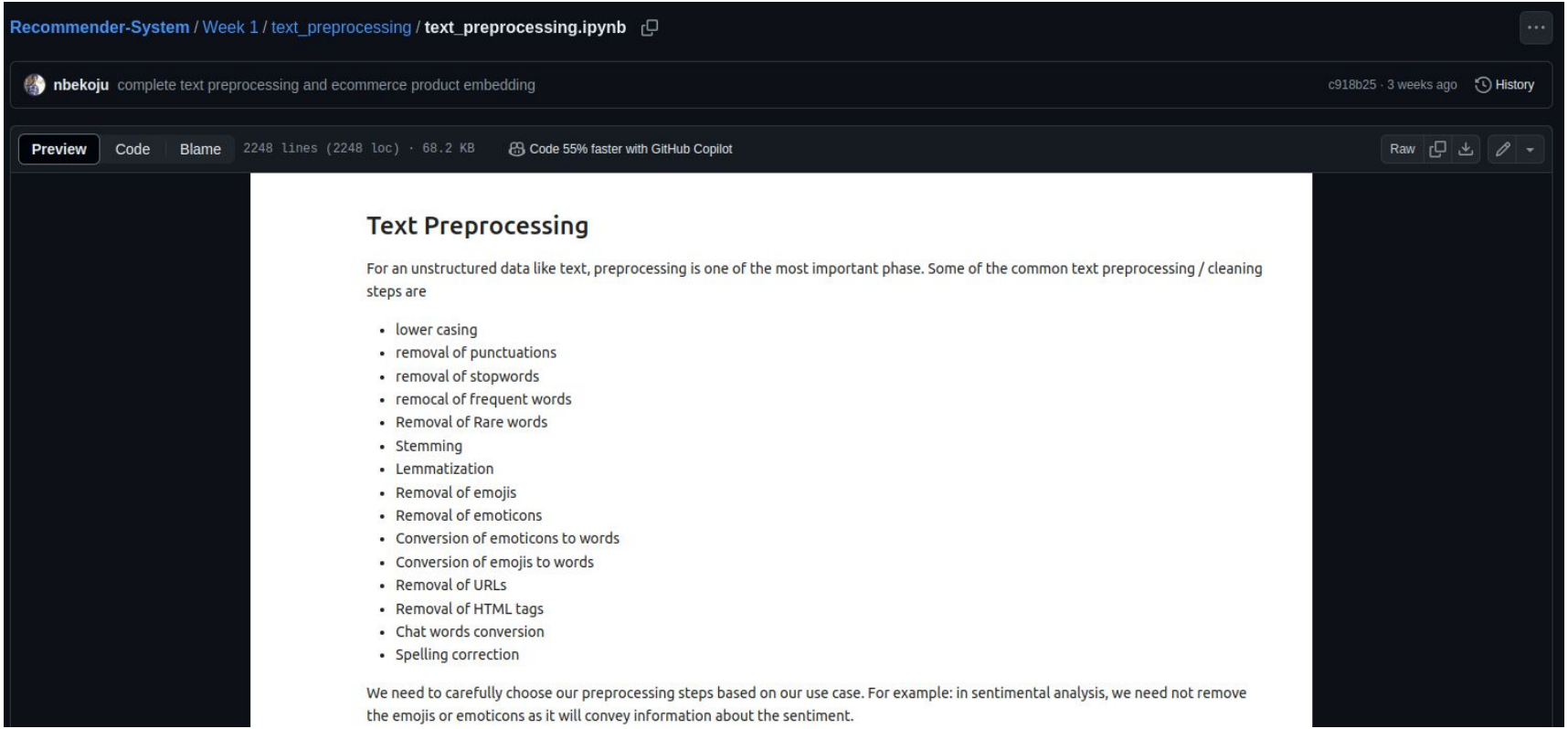
- Resources
- Code Link
- Research Paper Review



WEEK 1 - RESOURCE EXPLORATION

- Text Preprocessing
  - Tokenization, stemming, lemmatization, stop words and punctuation removal
  - Removal of URLs, HTML Tags
  - Chat Word Conversion (AFK →Away From Keyboard)
- Text Encoding
  - BOW, TF-IDF, Word2Vec, sBERT
- Association Rule Mining (ARM)
  - Apriori Method
  - FP-Growth Method

WEEK 1 - DELIVERABLES 1 : Text Preprocessing



WEEK 1 - DELIVERABLE 2

ARM ON INSTACART DATASET

ARM ON INSTACART DATASET : Data Preparation

- Instacart Data shows order id and its corresponding product metadata

	order_id	product_id	add_to_cart_order	reordered	product_name	aisle_id	department_id
0	1	49302	1	1	Bulgarian Yogurt	120	16
1	1	11109	2	1	Organic 4% Milk Fat Whole Milk Cottage Cheese	108	16
2	1	10246	3	0	Organic Celery Hearts	83	4
3	1	49683	4	0	Cucumber Kirby	83	4
4	1	43633	5	1	Lightly Smoked Sardines in Olive Oil	95	15

ARM ON INSTACART DATASET : Data Preparation

- For an order, get the list of product from previous data

	order_id	products
0	1	[Bulgarian Yogurt, Organic 4% Milk Fat Whole M...
1	36	[Grated Pecorino Romano Cheese, Spring Water, ...
2	38	[Shelled Pistachios, Organic Biologique Limes,...
3	96	[Roasted Turkey, Organic Cucumber, Organic Gra...
4	98	[Natural Spring Water, Organic Orange Juice Wi...

ARM ON INSTACART DATASET : RESULT

- ARM using apriori shows association between items in descending order by lift

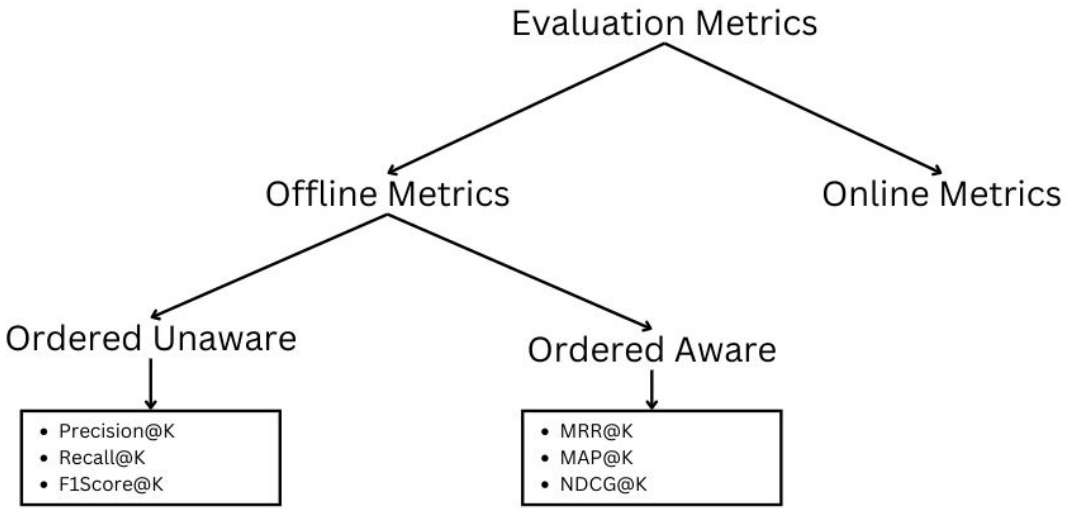
	Item #1	Item #2	Support	Confidence	Lift
2880	Unsweetened Whole Milk Peach Greek Yogurt	Unsweetened Whole Milk Strawberry Yogurt	0.000381	0.531915	606.887142
2878	Unsweetened Whole Milk Blueberry Greek Yogurt	Unsweetened Whole Milk Strawberry Yogurt	0.000328	0.500000	570.473913
2879	Unsweetened Whole Milk Mixed Berry Greek Yogurt	Unsweetened Whole Milk Strawberry Yogurt	0.000312	0.493976	563.600733
2877	Unsweetened Blackberry Water	Unsweetened Watermelon Water	0.000305	0.449438	440.077142
1300	Organic 4 Months Butternut Squash Carrots Appl...	Stage 1 Apples Sweet Potatoes Pumpkin & Bluebe...	0.000335	0.453608	407.654004
1538	Organic Blended Raspberry Whole Milk Greek Yogurt	Organic Greek Whole Milk Blended Strawberry Yo...	0.000305	0.416667	364.469444
57	Almond Milk Blueberry Yogurt	Almond Milk Peach Yogurt	0.000594	0.430939	353.394406
2433	Organic Pears, Peas and Broccoli Puree Stage 1	Stage 1 Apples Sweet Potatoes Pumpkin & Bluebe...	0.000320	0.365217	328.217868

WEEK 2

WEEK 2 - RESOURCE EXPLORATION

- Content-based, Collaborative-based and Hybrid Recommendation
  - These topics are covered by **Book: Hands on Recommendation System With Python (Chapter 4, 5, 6, 7)**
- Cold Start and **Long Tail Problems**
- **Evaluation Metrics**
- Deployment using FastAPI
- Containerization using Docker

WEEK 2 - EVALUATION METRICS



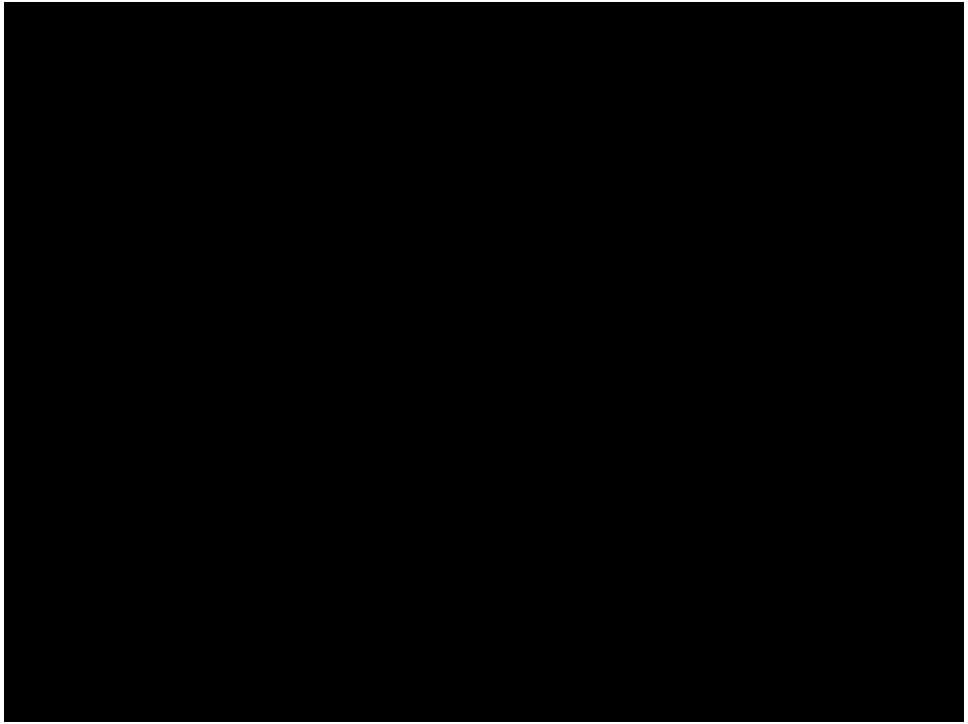
MRR → Mean Reciprocal Rank
MAP → Mean Average Precision
NDCG →Normalized Discouted Cumulative Gain

Spotify uses MRR@30 as the evaluation metric

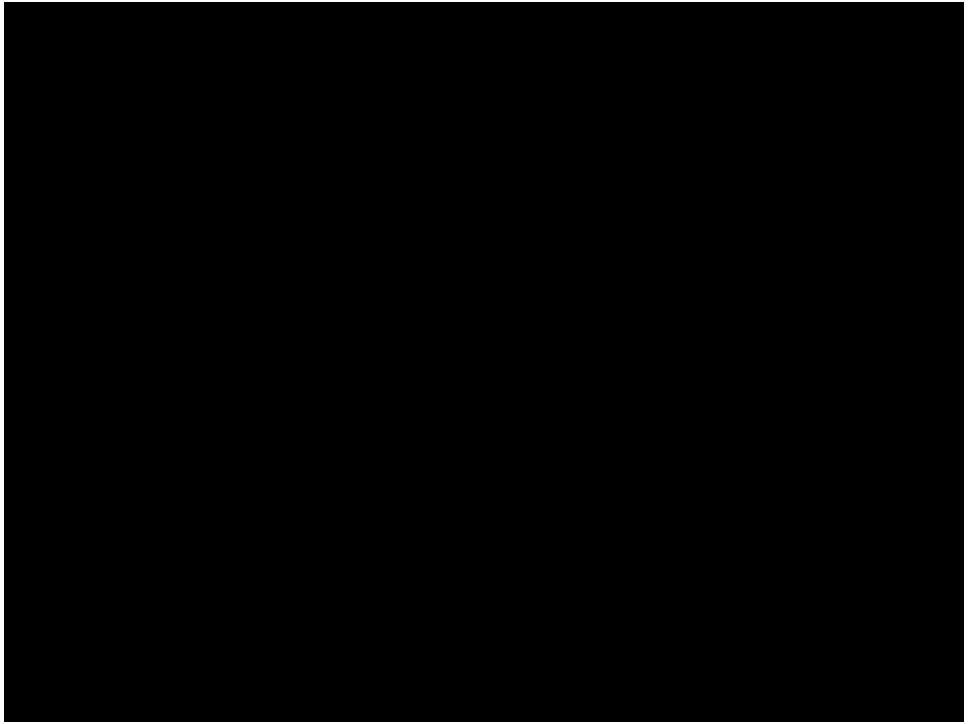
WEEK 2 - DELIVERABLES

FastAPI Application:
Content-based, Collaborative-based and Hybrid Movie Recommendation System

WEEK 2 - DELIVERABLE : DEMO VIDEO



WEEK 2 - DELIVERABLE : DEMO VIDEO



WEEK 2 - DELIVERABLE : DOCKERFILE

Code | Blame | 29 lines (20 loc) · 799 Bytes | Code 55% faster with GitHub Copilot

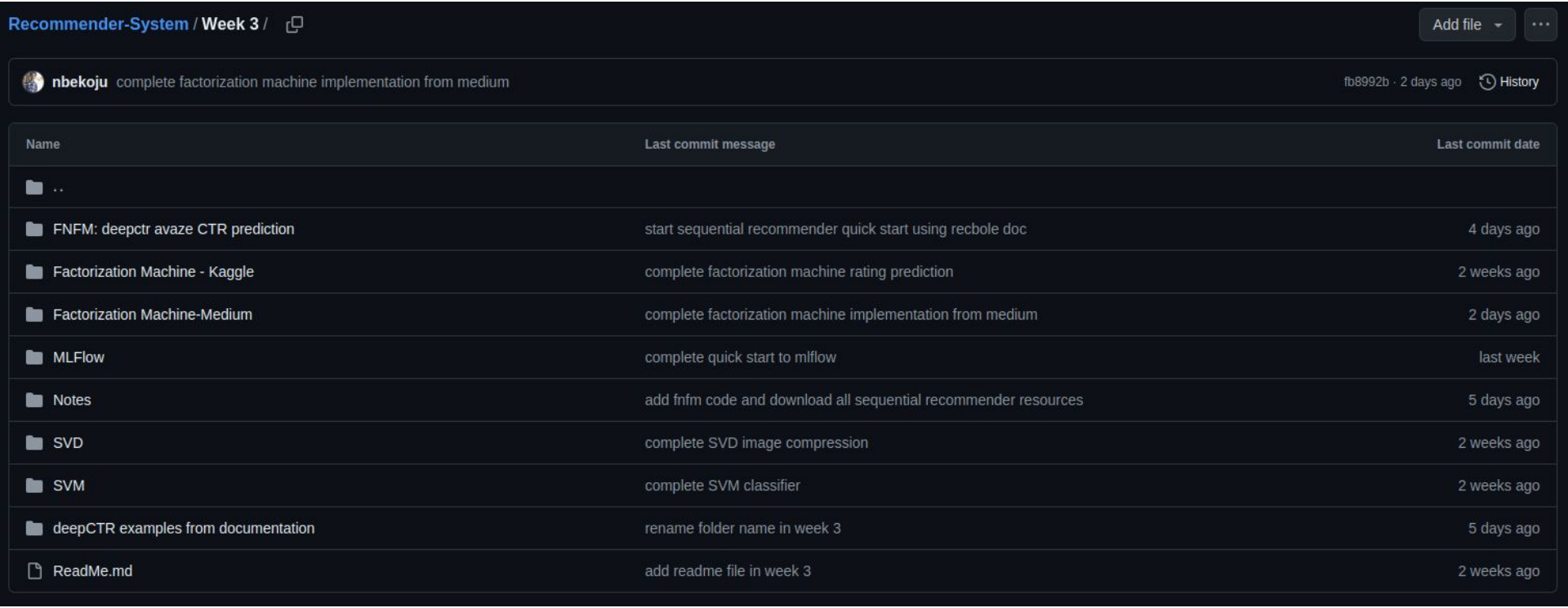
```dockerfile
FROM continuumio/miniconda3

WORKDIR /app

# Update Conda
RUN conda update -n base -c defaults conda

# Install build dependencies
RUN apt-get update && apt-get install -y \
    build-essential \
    libatlas-base-dev

# create the conda environment
COPY environment.yml .

# Update Conda and create the Conda environment
RUN conda env create -f environment.yml

# Make RUN commands use the new environment:
SHELL ["conda", "run", "-n", "recommender_fast_api", "/bin/bash", "-c"]

# Copy the rest of the application code to the working directory
COPY . .

# Expose the port that app runs on
EXPOSE 8000

# Activate the environment and run the FastAPI application
CMD ["conda", "run", "--no-capture-output", "-n", "recommender_fast_api", "uvicorn", "main:app", "--host", "0.0.0.0", "--port", "8000"]
```

WEEK 3

WEEK 3 - RESOURCE EXPLORATION

- Factorization Machine
- Deep Factorization Machine
- Neural Factorization Machine
- Field Aware Neural Factorization Machine
- DeepCTR
  - SparseFeat vs DenseFeat
  - Embeddings
  - Converting data to model format
  - Training, Evaluation and Inference
- MLFlow

WEEK 3 - REPOSITORY OVERVIEW



Recommender-System / Week 3 /

Add file

nbekoju complete factorization machine implementation from medium

fb8992b · 2 days ago History

Name	Last commit message	Last commit date
..		
FNFM: deepctr avaze CTR prediction	start sequential recommender quick start using recbole doc	4 days ago
Factorization Machine - Kaggle	complete factorization machine rating prediction	2 weeks ago
Factorization Machine-Medium	complete factorization machine implementation from medium	2 days ago
MLFlow	complete quick start to mlflow	last week
Notes	add fnfm code and download all sequential recommender resources	5 days ago
SVD	complete SVD image compression	2 weeks ago
SVM	complete SVM classifier	2 weeks ago
deepCTR examples from documentation	rename folder name in week 3	5 days ago
ReadMe.md	add readme file in week 3	2 weeks ago

WEEK 3 - DELIVERABLES

LANDING PAGE FOOD RECOMMENDATION USING deepCTR

https://github.com/nbekoju/Food-Recommendation

Dataset: https://github.com/WUT-IDEA/MealRec

DeepFM: https://arxiv.org/abs/1703.04247

LANDING PAGE FOOD RECOMMENDATION: DATA PREPARATION

	recipe_id	recipe_name	review_nums	category	aver_rate	ingredients	cooking_directions	nutritions	tags
0	6698	Mom's Zucchini Bread	9355	appetizer	4.754207	purpose flour salt baking soda baking powder g...	directions u prep n20 ncook n1 h nready n1 h 4...	u niacin u hascompletedata true u name u niaci...	north american breads easy beginner cook inexp...
1	6709	Zucchini Walnut Bread	58	appetizer	4.478873	chopped walnuts eggs white sugar vegetable oil...	directions u whisk together flour baking soda ...	u niacin u hascompletedata true u name u niaci...	weeknight breads fruit vegetables kid friendly...

Recipe Data

- Text preprocessing

User Recipe Interaction Data

- Date to year, month…

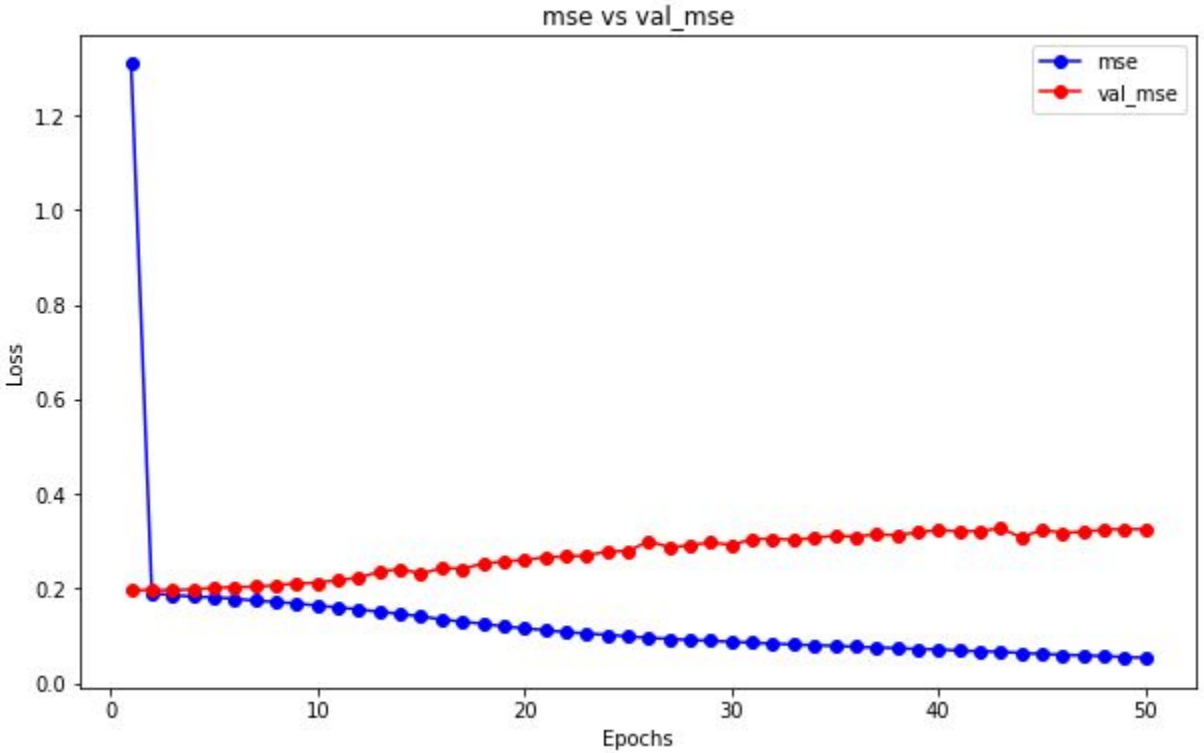
	user_id	recipe_id	rating	year	month	day	hour
0	39	61727	4	2001	3	26	7
1	39	7612	5	2004	8	2	16
2	39	12009	4	2001	2	28	10
3	39	88185	5	2009	5	18	14
4	39	24445	5	2015	5	7	15

LANDING PAGE FOOD RECOMMENDATION: DATA PREPARATION

- Join the two dataset
- Merge all text data into **soup column**
- Use sBERT for text encoding of soup column

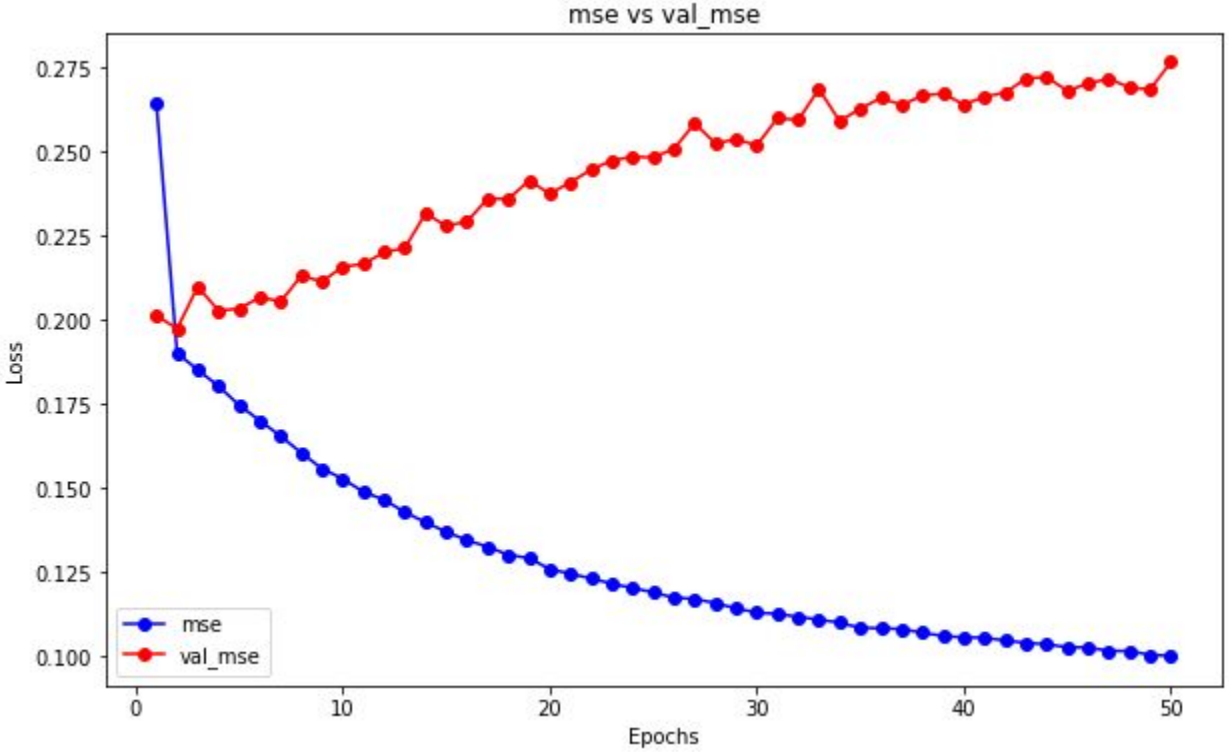
	user_id	recipe_id	rating	year	month	day	hour	review_nums	category	aver_rate	soup
0	39	61727	4	2001	3	26	7	2443	main-dish	4.439774	Ten Minute Enchilada Sauce vegetable oil self ...
1	39	7612	5	2004	8	2	16	848	dessert	4.683846	Chocolate Lovers' Favorite Cake devil food cak...
2	39	12009	4	2001	2	28	10	4573	main-dish	4.676716	Cajun Chicken Pasta linguine pasta boneless sk...
3	39	88185	5	2009	5	18	14	235	dessert	4.793919	Sopapilla Cheesecake cream cheese white sugar ...
4	39	24445	5	2015	5	7	15	21731	dessert	4.554303	Chewy Chocolate Chip Oatmeal Cookies butter pa...

LANDING PAGE FOOD RECOMMENDATION: TRAINING WITHOUT SOUP



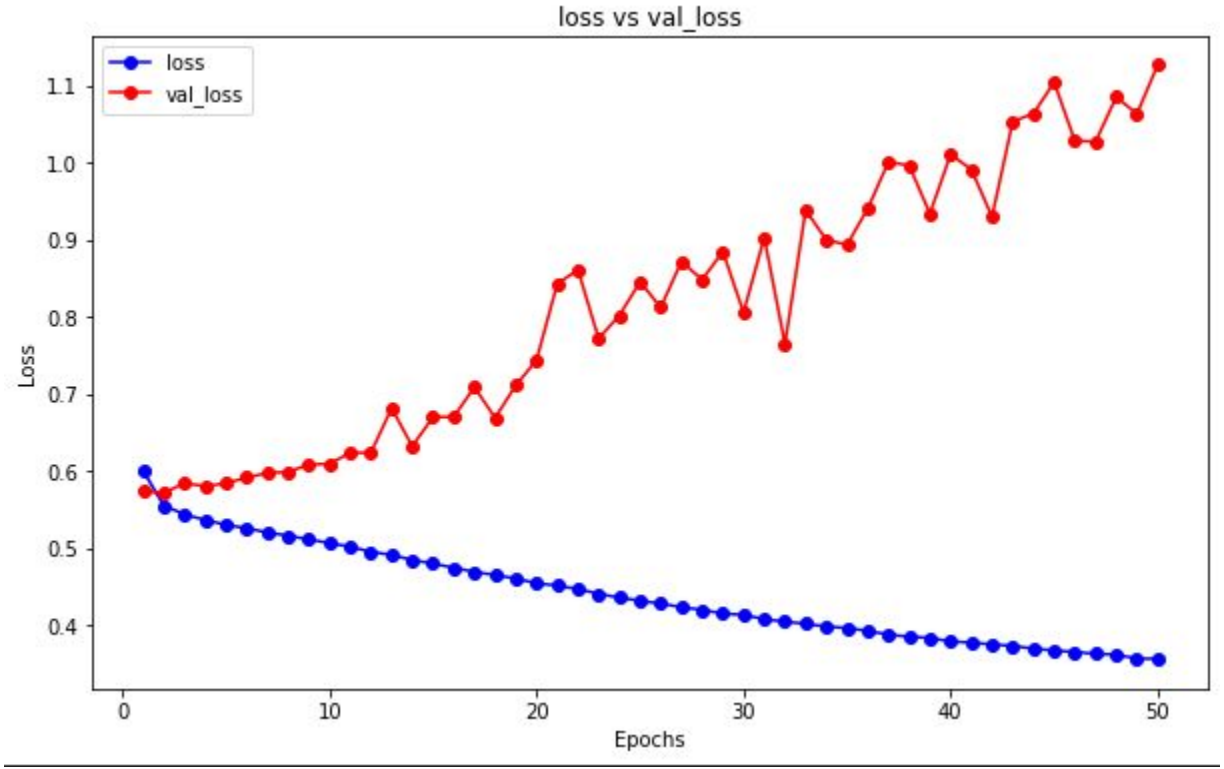
TEST MSE : 0.3246

LANDING PAGE FOOD RECOMMENDATION: TRAINING WITH SOUP



TEST MSE : 0.282

LANDING PAGE FOOD RECOMMENDATION: TRAINING WITH SOUP AS A BINARY TASK



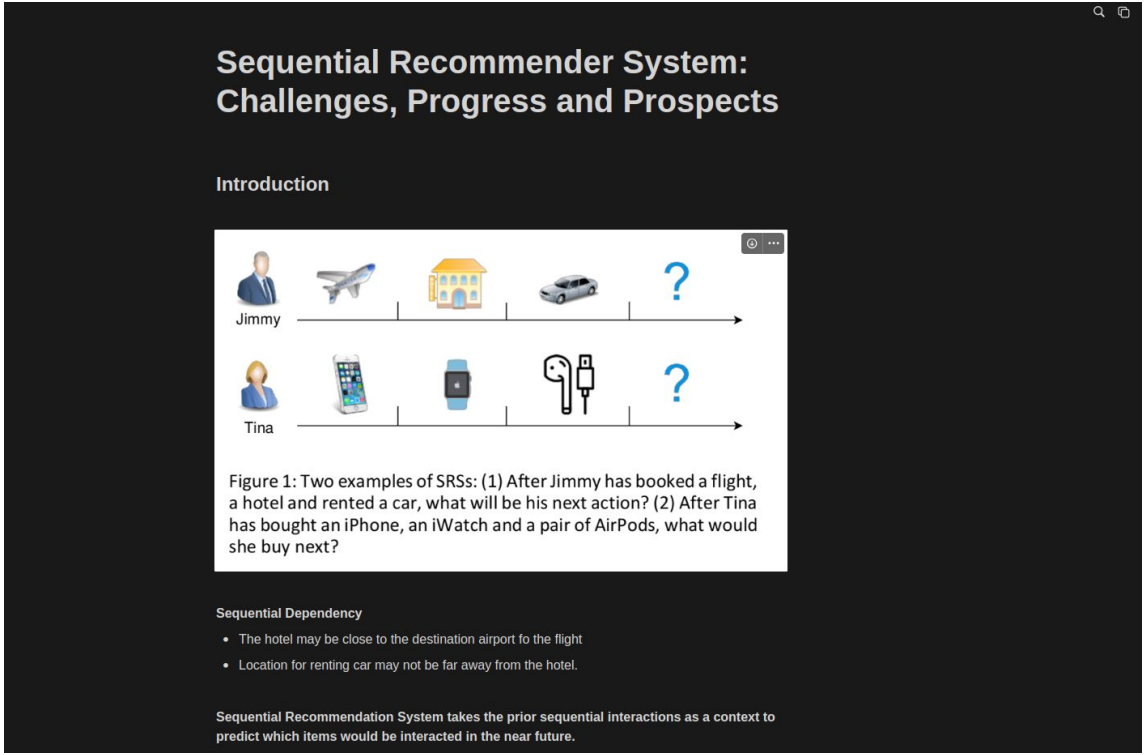
Loss = Binary CrossEntropy

TEST MSE : 0.256

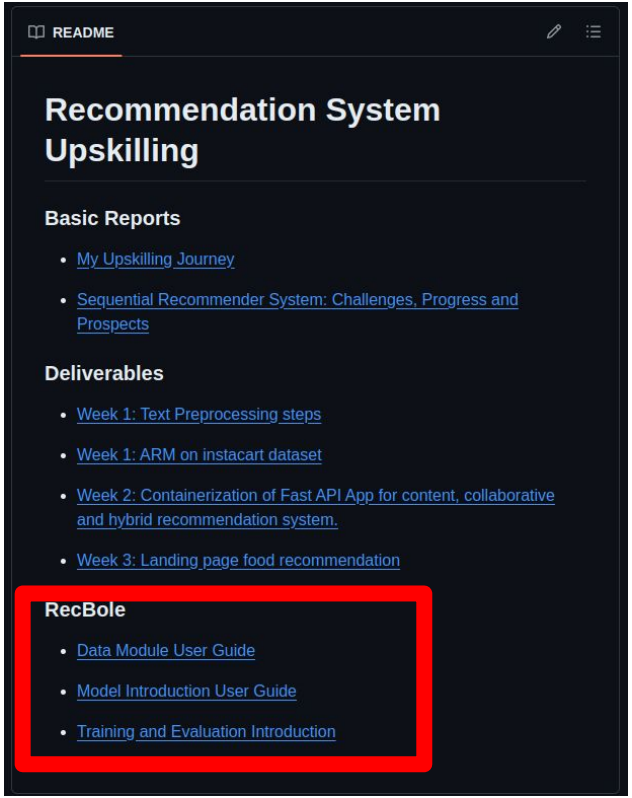
WEEK 4 : Sequential Recommender System

WEEK 4 - Sequential Recommender System: Challenges, Progress and Prospects

- https://nirajanbekoju.notion.site/Sequential-Recommender-System-Challenges-Progress-and-Prospects-11ffcfbce6634de196e68bc3b063f3b4



WEEK 4 - RecBole Notes



THANK YOU