IT492: Recommendation Systems

Lab Assignment - 01

[Deadline: 20th Feb 2022, Sunday 10 PM]

This assignment involves observing the effects on the assigned dataset of using different normalization techniques, similarity measures, significance weighting techniques, and finally the factorization techniques (for collaborative filtering) on the performance of a recommendation system.

Marking scheme and requirements

Full marks will be given for (1) working, readable, reasonably efficient, documented code that achieves the assignment goals and (2) for providing appropriate answers to the questions in your Google colab file (`name format: LA01_rollnumber`) submitted via Google Classroom on the **assigned dataset only**.

Please refer to the Dataset Allocation

Sr No	Student Id	Student Name	Student email	Registration Type	For LA-01, 02
1	202118004	ABHISHEK SINGH	202118004@daiict.ac.in	AUDIT	last.FM (Hetrec 2011)
2	202018004	P SARAN PANDIAN	202018004@daiict.ac.in	AUDIT	
3	202018026	AAKANKSHA SHAH	202018026@daiict.ac.in	AUDIT	
4	202111002	SHARMA HARSH DHARMENDRAKUMAR	202111002@daiict.ac.in	AUDIT	
5	202111029	GORASIYA RAGHAV NARESH	202111029@daiict.ac.in	AUDIT	
6	202018042	ABHIJEET KUMAR	202018042@daiict.ac.in	REGULARADD	Movielens 20M (Grouplens 2016)
7	202111010	KEVIN JITENDRABHAI JADIYA	202111010@daiict.ac.in	REGULARADD	
8	202111035	VANSH RAHUL BHANJIBHAI	202111035@daiict.ac.in	REGULARADD	
9	202111048	MANSURI PINJARA MOHAMMED JUNED HANIFBHAI	202111048@daiict.ac.in	REGULARADD	
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11	201801466	PARMAR SIDDHRAJ YOGESHBHAI	201801466@daiict.ac.in	REGULARADD	
12	202121004	SANDHYA KUMARI	202121004@daiict.ac.in	REGULARADD	
13	202116003	AMBUJ MISHRA	202116003@daiict.ac.in	REGULAR	Food Reviews (Kaggle 2019)
14	202116004	ARPITA NEMA	202116004@daiict.ac.in	REGULAR	
15	202116008	RAHUL KUMAR	202116008@daiict.ac.in	REGULAR	
16	202116009	RAHUL THAKUR	202116009@daiict.ac.in	REGULAR	
17	202116011	ROHAN BAGHEL	202116011@daiict.ac.in	REGULAR	
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19	202116002	AKSHAY KAUSHIK	202116002@daiict.ac.in	REGULAR	

Links to download the Datasets

- *last.FM (Hetrec 2011)*
- *Movielens 20M (Grouplens 2016)*
- *Food Reviews (Kaggle 2019)*

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Please adhere to the lab policy on the course website

- Cite resources and give credit where it's due. If you happen to discuss the questions with your peers, please mention your collaborators in your report/assignments.
- Acts of plagiarism will not be tolerated and will result in a straight ZERO for that assignment.
- Students who don't submit their assignment by 22nd Feb 2022, Tuesday 10 PM will simply get ZERO.

Main Assignment (10 Marks in Total)

Dataset Analysis (1 Mark)

1. Explore the dataset and present a summary of the same (e.g. number of users and items, minimum/maximum/average number of ratings for an item, information apart from ratings present in the dataset). Plot a histogram of item ratings to visualize the distribution.

Normalization Techniques (2 Marks)

2. Normalization techniques are used to account for user subjectivity in ratings. Analyze the effect of two normalization techniques: (i) Mean-Centering, and (ii) Z-Score Normalization; in the performance of user-user collaborative filtering using the k-NearestNeighbor model. Use one of the significance weighting techniques discussed in the class. Use 5-fold cross-validation and experiment with at least three values of k. Plot the average RMSE (across 5 folds) vs k values for both the normalization techniques in a single plot.

Similarity Measures (3 Marks)

3. In an item-item collaborative filtering setting using k-NearestNeighbors, experiment with the following similarity measures:
    a. Cosine Similarity
    b. Pearson Correlation
    c. Adjusted Cosine

    Use 5-fold cross-validation and experiment with at least three values of k. Plot the average RMSE (across 5 folds) vs k values for the above similarity measures in a single plot.

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Factorization Techniques (4 Marks)

4. Compare the performance of factoring (1) the similarity matrix (using Eigen Decomposition) and (2) the rating matrix (using Singular Value Decomposition) for the assigned dataset and report your observations.