

Course name: Data Science (5119010)

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< Long term project >

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Due Date: 17 June 2025, 11:59 pm

1. Environment

- OS: Windows, Mac OS, or Linux
- Languages: C or Python (any version is ok)

2. Goal: Predict *the ratings of movies in test data* by using the given training data containing movie ratings of users. You can choose any algorithm to predict (ex. content-based and collaborative filtering algorithms).

(Note) This assignment is to predict ratings for each user-item pair only within test data.

3. Requirements

The program must meet the following requirements:

- Execution file name: **recommender.exe**
- Execute the program with two arguments: training data name, test data name

■ Example:

```
C:\W>recommender.exe u1.base u1.test
```

- training data name = 'u1.base', test data name = 'u1.test'

- File format for a training data

```
[user_id]\t[item_id]\t[rating]\t[time_stamp]\n
```

```
[user_id]\t[item_id]\t[rating]\t[time_stamp]\n
```

```
[user_id]\t[item_id]\t[rating]\t[time_stamp]\n
```

```
[user_id]\t[item_id]\t[rating]\t[time_stamp]\n
```

...

■ Row: a record that was already rated by a user for an item

■ Example:

1	7	4	875071561
1	8	1	875072484
1	9	5	878543541
1	11	2	875072262
1	13	5	875071805

Figure 1. An example of a training data.

- Three training data will be provided: 'u1.base', 'u2.base', and 'u3.base'
- File format for a test data

[user_id]\t[item_id]\t[rating]\t[time_stamp]\n

[user_id]\t[item_id]\t[rating]\t[time_stamp]\n

[user_id]\t[item_id]\t[rating]\t[time_stamp]\n

[user_id]\t[item_id]\t[rating]\t[time_stamp]\n

...

- Row: a record that needs to be predicted by using your algorithm

■ Example:

1	61	4	878542420
1	62	3	878542282
1	64	5	875072404
1	65	4	875072125
1	67	3	876893054

Figure 2. An example of a test data.

- Three test data will be provided: 'u1.test', 'u2.test', and 'u3.test'
- Output file format

- You must print an output file for each test data

- File format for the output of 'u#.test'

- 'u#.base_prediction.txt'

[user_id]\t[item_id]\t[rating]\n

[user_id]\t[item_id]\t[rating]\n

[user_id]\t[item_id]\t[rating]\n

[user_id]\t[item_id]\t[rating]\n

...

- 'u#.base_prediction.txt' should contain all user-item pairs in the test data and ratings that were predicted for the pairs by using your algorithm

- Supposed to follow the naming scheme for the output file as above

4. Evaluation measure

- Compute the difference between each predicted data (u1~u3.base_prediction.txt) and each test data (u1~u3.test)
- Test method
 - For testing, we will use a measure called RMSE (Root Mean Square Error) defined as follows

$$RMSE = \sqrt{\frac{\sum_{i=1}^n (p_i - a_i)^2}{n}}$$

(p_i : predicted rating for item i , a_i : original rating for item i , n : the number of ratings)

- Because RMSE indicates error rates, the bigger value indicates that the ratings are predicted more incorrectly

5. Note

- This is a *competition project*
- If the accuracy of your model is higher, you will get a higher score
 - We will first give a minimum score at least 75 if (1) you submit your program before the deadline, (2) your program is correctly performed without any errors, and (3) all requirements for this project are satisfied.
 - Then, we will assign the additional scores from 0 to 25 based on your rank.

6. Submission

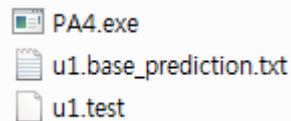
- Please submit the program files and the report [to eCampus](#)
 - Report
 - File format must be *.pdf
 - Guideline
 - ✓ Summary of your algorithm
 - ✓ Detailed description of your codes (for each function)
 - ✓ Instructions for compiling your source codes at TA's computer (e.g.

screenshot) (*Important!!*)

- If TAs read your instructions but cannot compile your program, you will get a penalty. Please write the instructions carefully.
- ✓ Any other specifications of your implementation and testing
- Program and code
 - An executable file (.exe or .py)
 - ✓ If you are not in the following two cases, please submit alternative files (e.g., .py file or makefile)
 - ✓ You MUST SUBMIT instructions for compiling your source codes. If TAs read your instructions but cannot compile your program, you will get a penalty. Please, write the instructions carefully.
 - All source files

6. Testing program

- Please put the following files in the same directory: Testing program (PA4.exe), your output files (u1.base_prediction.txt), given test file (u1.test)



- Execute the testing program with one argument (input file name)

```
C:\Users\User\Desktop\PA4>PA4.exe u1
```

- Check your RMSE for each input file

7. Penalty

- This assignment does *not allow late submission!!*
- Significant penalty up to 30% will be given when the requirements are not satisfied