

Final Project: Recommender System Challenge

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Group Category

Group

Group Name

Group 30

Instructions

General Info

- **Deadline:** June 1st, 11:55 PM
- **Late Penalty:** 5% deduction per day
- Submissions made after **June 7th, 23:55 PM** will receive **0 points**
- **Submission Format:** (Submit by Group)
 - **[Through Kaggle]** A CSV file with top-10 recommendations per user (see detailed submission format in the Kaggle link).
 - **[Through Brightspace]** A zip file with executable code and README file.
 - **[Through Brightspace]** A technical report (PDF) describing your methodology, trade-offs, and error analysis (Maximum 8 pages without reference).
- **Kaggle Link:**
<https://www.kaggle.com/t/187997f011b64c5e9d67fde04aded7d8>

!!! There is no retake option for the Assignments. Please manage your time wisely.

Task

In this final project, you are required to design and implement a complete recommender system using a unified user-item interaction dataset. Your model will be evaluated on **ranking-based metrics** using a hidden test set. All students/teams will compete on a **public leaderboard** hosted on Kaggle.

You are encouraged to explore and combine a variety of modern recommendation techniques. Your focus should be on both **model performance and engineering rigor** – from preprocessing to inference and analysis.

Learning Objectives

- Apply and integrate key recommendation algorithms (collaborative, sequential, graph-based, neural, hybrid)
- Practice end-to-end model development: preprocessing, modeling, training, inference, and evaluation
- Analyze trade-offs, identify model weaknesses, and communicate results clearly

Project Requirements

1. Modeling Flexibility:

Use any combination of techniques or propose your own models. Examples include:

- Matrix factorization (e.g., NMF, SVD)

- Neural Collaborative Filtering (NCF)
- Graph-based methods (e.g., LightGCN)
- Transformer-based models (e.g., BERT4Rec)
- Hybrid and content-aware recommenders

2. Reproducibility:

Your entire pipeline must be executable and reproducible by instructors.

Evaluation Breakdown

Component	Weight	Description
Leaderboard Ranking	30%	Based on public leaderboard score using Recall@10
Technical Quality	30%	Assesses code structure, modeling rigor, and efficiency
Technical Report	40%	Evaluates depth of understanding and analysis quality

1. Leaderboard Ranking (30%)

Your team's performance on the public leaderboard will contribute to your final score.

Leaderboard Rank Score Contribution

Top 10%	100%
11–30%	90%
31–50%	80%
51–70%	70%
71–100%	60%

2. Technical Quality (30%)

Sub-Criterion	Description
Code Completeness	Code runs from end-to-end with clear README/instructions
Efficiency	Resource usage is reasonable; training/inference time is optimized where possible
Code Readability & Style	Code is well-structured, modular, and uses consistent naming
Modeling Technique	Chosen methods are justified, and demonstrate a clear understanding of recommender system concepts
Engineering Rigor	You perform sensible evaluation, model selection, and tuning

3. Technical Report (40%)

Your report should be **clear, concise, and demonstrate analytical thinking**. It should be structured with the following components:

Section	Description
1. Dataset Preprocessing	Explain how you handled missing values, timestamps, duplicates, etc.
2. Model Design	Describe your architecture(s), embedding strategy, loss functions, hybrid structure, etc.

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|-----------------------------------|--|
| 3. Training Procedure | Describe training process: data splits, sampling strategies, negative sampling, etc. |
| 4. Inference Pipeline | Explain how top-k items are ranked for each user efficiently |
| 5. Hyperparameter Analysis | Show your tuning process and rationale for final settings |
| 6. Performance Analysis | Analyze evaluation results, failure cases, and possible reasons for poor performance |
| 7. Reflections | What worked well? What would you try next? |

Due on 01 June 2025 23:55

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