

Intelligent Recommender Systems: Final Project for Data 612

Saloua Daouki — Summer 2025



Course & Goal

- Data612 focused on **building, evaluating, and comparing**

recommender systems.

- Matrix factorization + LLM-based generation and cloud

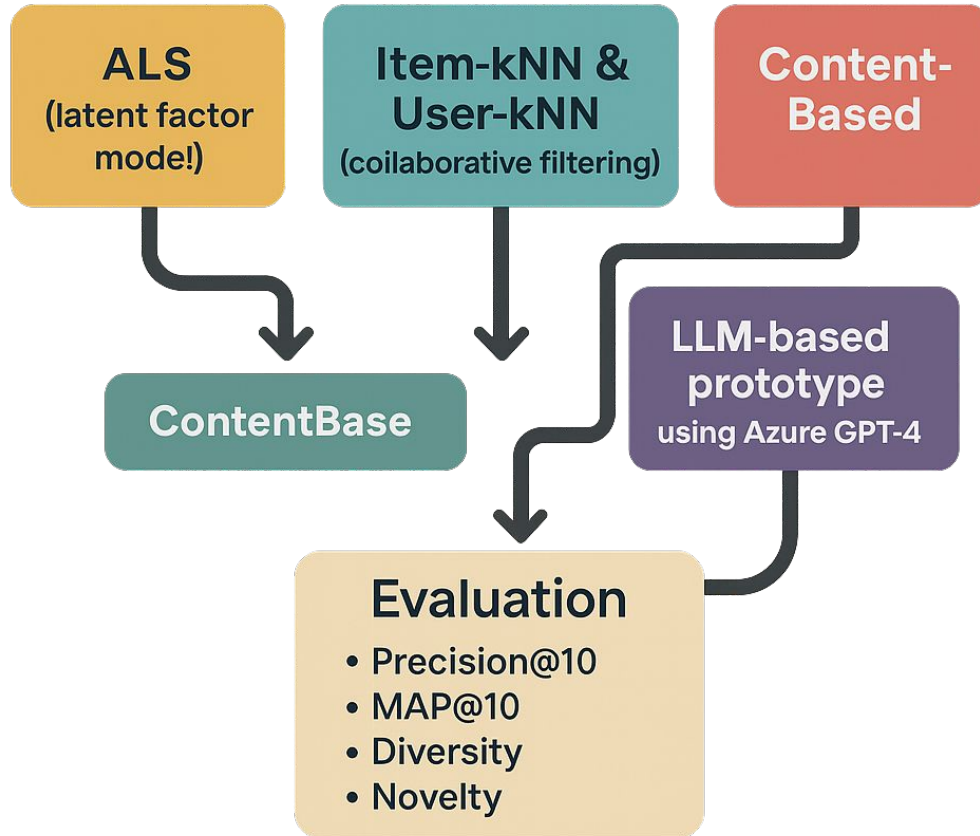
deployment (Azure OpenAI)

- Goal: prototype an **explainable hybrid recommender** for future use.

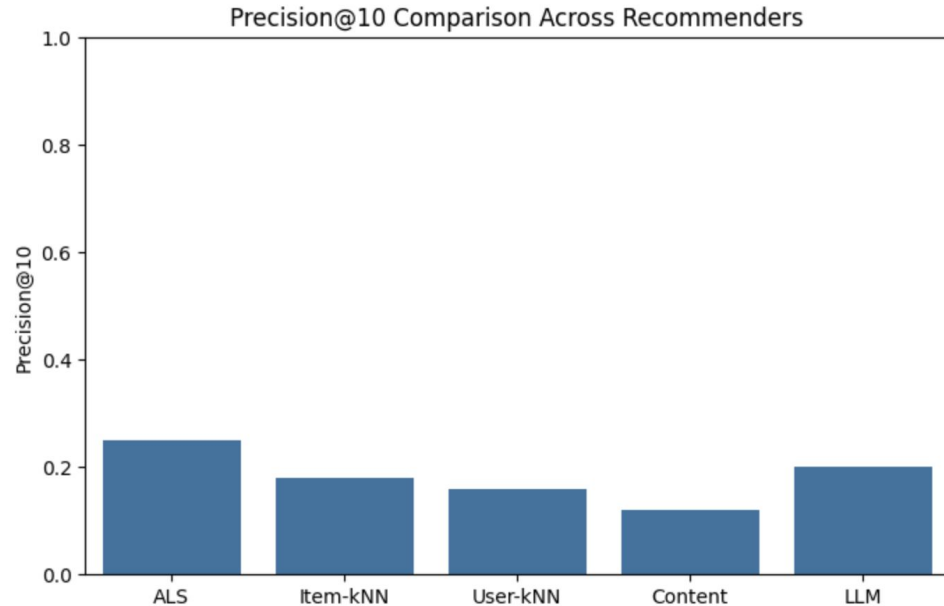
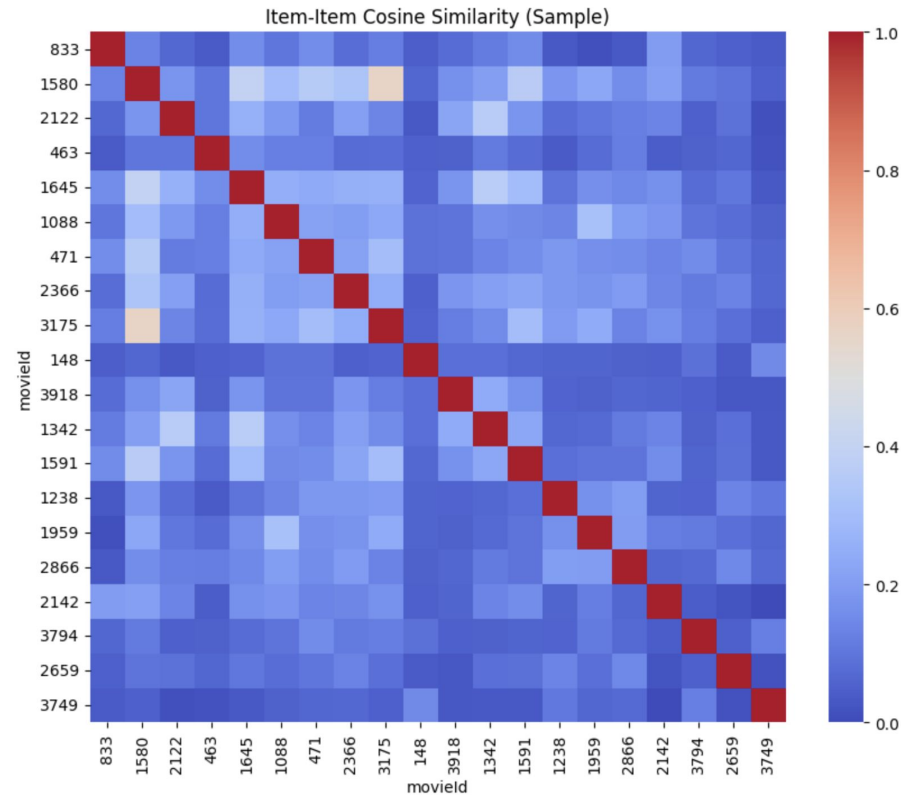
Combines matrix factorization, cloud deployment, and LLM-based generation for an explainable hybrid recommender.



Methods Compared



Key Results



- ALS scored highest **Precision@10** ≈ 0.25 .
- kNN & Content moderate.
- LLM shows potential but limited match rate due to dataset coverage.
- Novelty & Diversity explored.

LLM & Cloud Integration

- Used Azure OpenAI to generate natural language movie suggestions.
- Combined user liked movies + scraped taglines.
- Matched free-text output back to MovieLens IDs for evaluation.

The screenshot displays the MLflow Trace UI interface. At the top, there's a navigation bar with 'MLflow Trace UI' and a 'Learn More' link. Below this, a search bar is visible. The main interface is divided into several sections. On the left, there's a 'Trace breakdown' section with a 'Filter' button and a 'Completions' tab. Below this is a 'Model Trace Explorer' button. The central part of the interface is a 'Chat' section, which is currently active. It shows a conversation with the system and a user. The system message says: 'You are a helpful movie recommender.' The user message says: 'User likes the following movies: Titanic (1997) (Nothing On Earth Could Come Between Them.), Back to the Future (1985) (He was never in time for his classes. He wasn't in time for his dinner. Then one day...he wasn't in his time at all.), Aladdin (1992) (Imagine if you had three wishes, three hopes, three dreams and they all could come true.), Awakenings (1990) (There is no such thing as a simple miracle.), Big (1988) (Have you ever had a really big secret?). Suggest 10 similar movies.' The assistant's response is: 'Based on the movies you enjoy, it seems you like films with emotional depth, fantastical or time-bending elements, heartfelt stories, and a touch of wonder. Here are 10 movie recommendations that capture similar themes and tones: 1. **The Notebook (2004)** - A heartbreaking and romantic story about enduring love that resonates with the emotional depth of *Titanic*. 2. **The Time Traveler's Wife (2009)** - A romantic drama with a sci-fi twist, exploring time travel and the challenges it brings to love, similar to *Back to the Future*. 3. **The Princess Bride (1987)** - A whimsical and enchanting fairy tale filled with romance, adventure, and humor, akin to the magic of *Aladdin*.' There are also buttons for 'See less' and 'Assessments'.

MLflow Trace UI [Learn More](#)

Summary Details & Timeline

Search

Trace breakdown Filter

Completions

Model Trace Explorer

Chat Inputs / Outputs Attributes Events Assessments

Messages

System

You are a helpful movie recommender.

User

User likes the following movies: Titanic (1997) (Nothing On Earth Could Come Between Them.), Back to the Future (1985) (He was never in time for his classes. He wasn't in time for his dinner. Then one day...he wasn't in his time at all.), Aladdin (1992) (Imagine if you had three wishes, three hopes, three dreams and they all could come true.), Awakenings (1990) (There is no such thing as a simple miracle.), Big (1988) (Have you ever had a really big secret?). Suggest 10 similar movies.

See less

Assistant





Based on the movies you enjoy, it seems you like films with emotional depth, fantastical or time-bending elements, heartfelt stories, and a touch of wonder. Here are 10 movie recommendations that capture similar themes and tones:

1. **The Notebook (2004)** - A heartbreaking and romantic story about enduring love that resonates with the emotional depth of *Titanic*.
2. **The Time Traveler's Wife (2009)** - A romantic drama with a sci-fi twist, exploring time travel and the challenges it brings to love, similar to *Back to the Future*.
3. **The Princess Bride (1987)** - A whimsical and enchanting fairy tale filled with romance, adventure, and humor, akin to the magic of *Aladdin*.

Key Insights: Which Recommender is Best?

- ✓ The ALS model gave the highest accuracy in my experiments, with a **Precision@10 around 0.25**, meaning its top 10 recommendations matched user preferences better than the other models.
- ✓ The kNN and content-based models did reasonably well, but not as strong in precision.
- ✓ The LLM-based prototype had *low measured precision* within MovieLens, but it added *high novelty* and *explainability* — because it freely suggests creative titles using world knowledge and movie taglines.

Next Steps & Future Vision

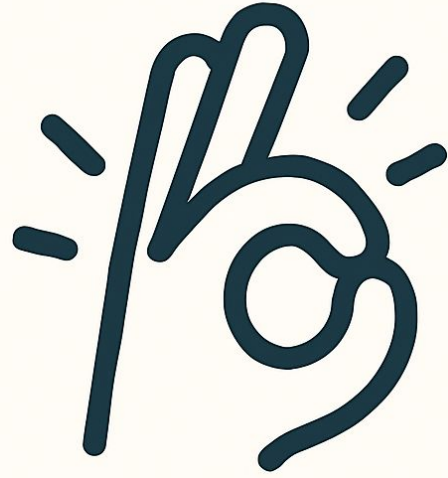
-  Expand catalog (IMDB, TMDB APIs).
-  Combine LLM output with structured ranking.
-  Hybrid: matrix factorization + LLM explanations.
-  Inspired to develop **Intelligent Classroom Recommender System** as **Capstone**.
- Pilot data collection starts **2025–2026**: “two birds, one stone”.



Challenges & Limitations

- LLM may recommend movies not in dataset.
- Matching free text to IDs needs richer metadata.
- Hybrid models needed to boost precision.
- Cloud integration added complexity but enables scale.





**Thank
You**