Counterfactual Explanation for Group Recommendation

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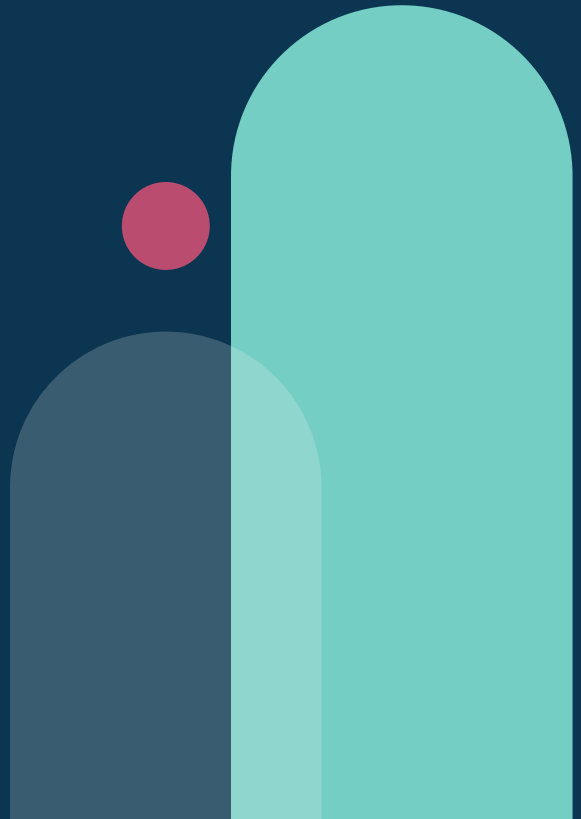
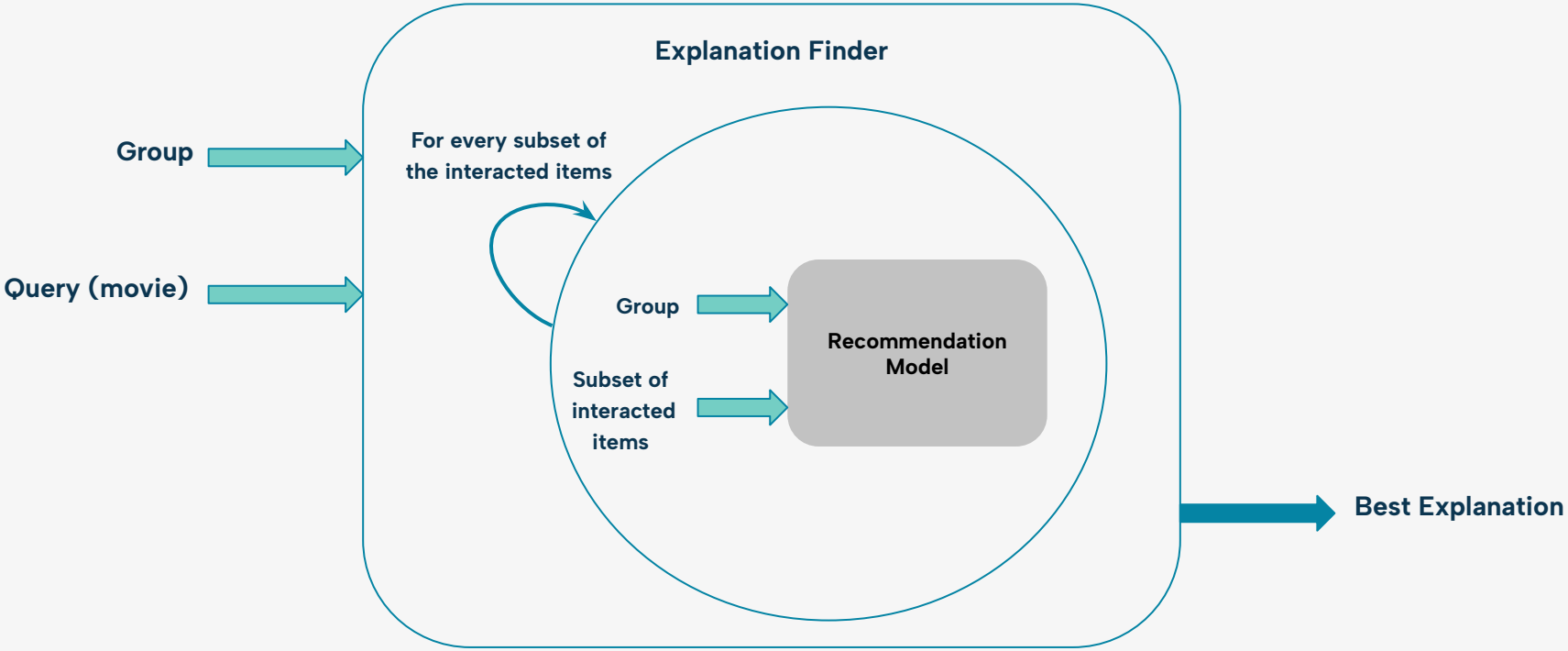
01

Background



Counterfactual Explanation



Metrics

$$ItemIntensity(i) = |u \in G; i \in U(i)|$$

$$UserIntensity(u) = |i \in E; u \in I(u)|$$

$$Popularity(E) = \frac{\sum_{i \in E} ItemIntensity(i)}{|E|}$$

$$Fairness(E) = max(UserIntensity(u)) - min(UserIntensity(u))$$

$$Conciseness(E) = \frac{1}{|E|}$$

02

Proposed Method

Problems

Explanation Scoring

If there were multiple explanations found for a query, which one is a better explanation for the group?

High Complexity

Checking all subsets for the set of the interacted items has exponential complexity and takes a lot of time

$$O(2^n)$$

Solutions

Explanation Scoring

If there were multiple explanations found for a query, which one is a better explanation for the group?

High Complexity

Checking all subsets for the set of the interacted items has exponential complexity and takes a lot of time

Scoring Method

Limit the Search Area

$$ExplanationScore(E) = \frac{1}{3} \cdot \left(\frac{Popularity(E)}{|G|} + \frac{Fairness(E)}{|E|} + Conciseness(E)\right)$$

Population & Intensity Filtering

Only keep preferences with good global popularity and group intensity

Movie Clusters Filtering

Only keep preferences inside the same cluster as the query

Movie Clustering

Movie Features

The textual tokens from **Genres** and user **Tags**

106782.
Wolf of Wall Street, The (2013)

Tags

Leonardo DiCaprio
Martin Scorsese
Stock Market
Wall Street

Genres

Comedy
Crime
Drama

comedy crime drama leonardo dicaprio martin scorsese stock market wall street

Movie Clustering

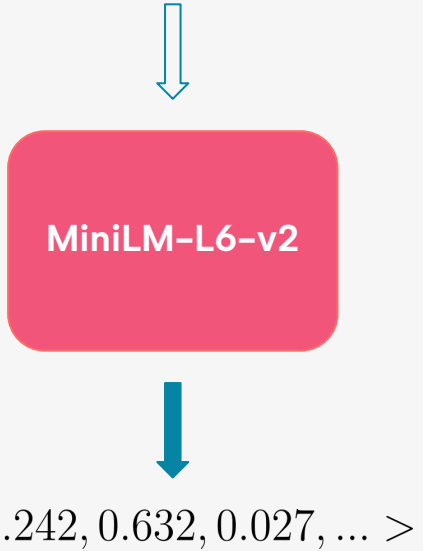
Movie Features

The textual tokens from **Genres** and user **Tags**

Movie Encoding

Encoding from **MiniLM-L6-v2** model.

comedy crime drama leonardo dicaprio martin scorsese stock market wall street



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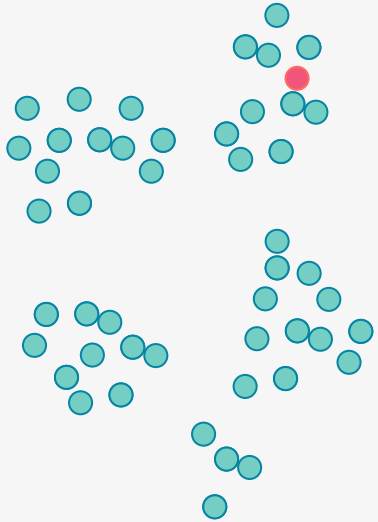
Clustering

Unsupervised clustering using **HDBSCAN**.



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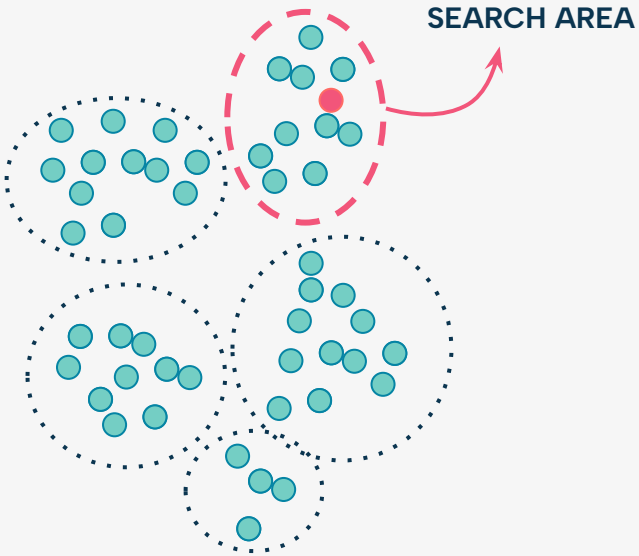

03

Results

Group:
[280, 528, 251, 43, 237, 149, 372, 114, 360, 366]

Recommendation:
[6016, 2985, 48774, 1573, 2617, 2000, 6365, 6934, 6333, 786]

Why 786?

Preferences

641 Interacted Movies by the group

Search Area

10 movies (subset of the preferences)

64 Explanations found in **less than 20 seconds**
The chosen explanation based on scoring method:
[172, 1488, 1515, 1626]

Thanks!

Do you have any questions?

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