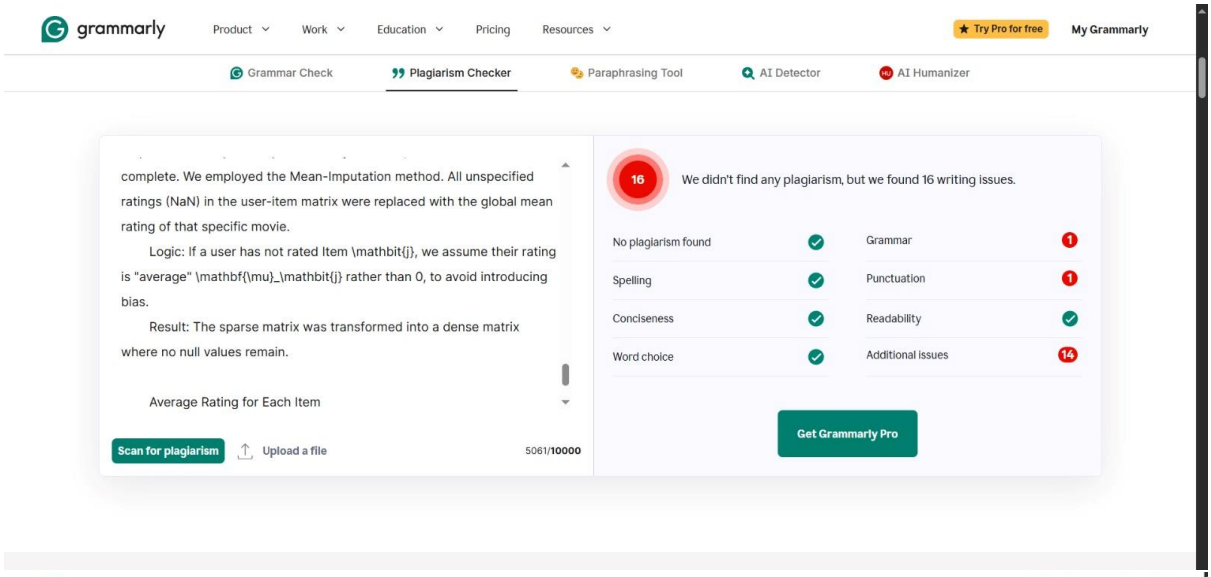
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complete. We employed the Mean-Imputation method. All unspecified ratings (NaN) in the user-item matrix were replaced with the global mean rating of that specific movie.
Logic: If a user has not rated Item \mathbit{j}, we assume their rating is "average" \mathbf{\mu}_\mathbit{j} rather than 0, to avoid introducing bias.
Result: The sparse matrix was transformed into a dense matrix where no null values remain.
Average Rating for Each Item
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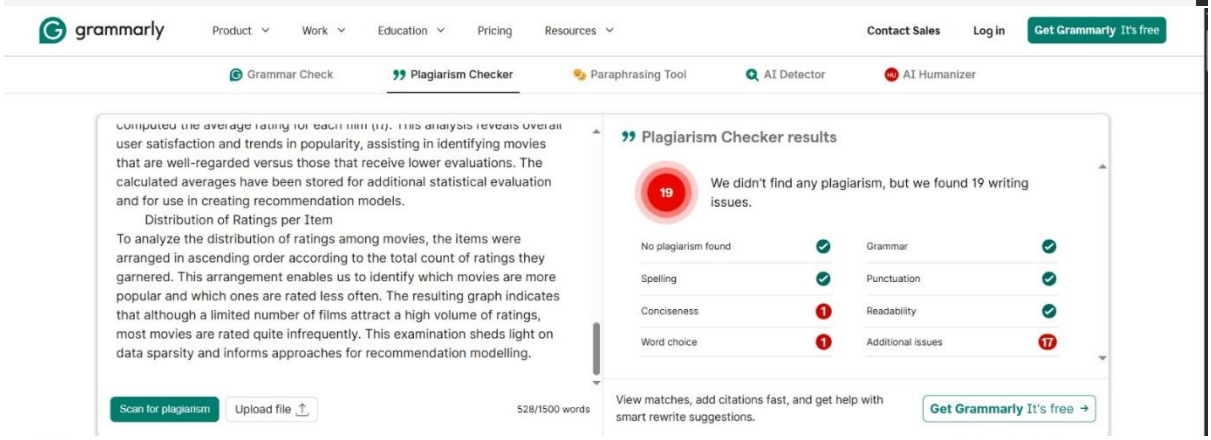
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user satisfaction and trends in popularity, assisting in identifying movies that are well-regarded versus those that receive lower evaluations. The calculated averages have been stored for additional statistical evaluation and for use in creating recommendation models.
Distribution of Ratings per Item
To analyze the distribution of ratings among movies, the items were arranged in ascending order according to the total count of ratings they garnered. This arrangement enables us to identify which movies are more popular and which ones are rated less often. The resulting graph indicates that although a limited number of films attract a high volume of ratings, most movies are rated quite infrequently. This examination sheds light on data sparsity and informs approaches for recommendation modelling.
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Conciseness
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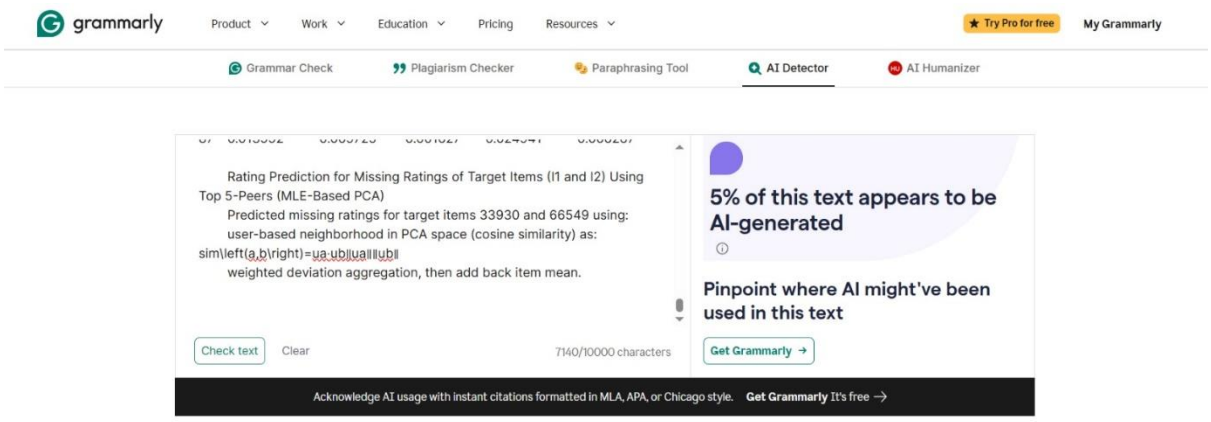
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Rating Prediction for Missing Ratings of Target Items (I1 and I2) Using Top 5-Peers (MLE-Based PCA)
Predicted missing ratings for target items 33930 and 66549 using:
user-based neighborhood in PCA space (cosine similarity) as:
sim\left(a,b\right)=ua.ub||ua||ub||
weighted deviation aggregation, then add back item mean.
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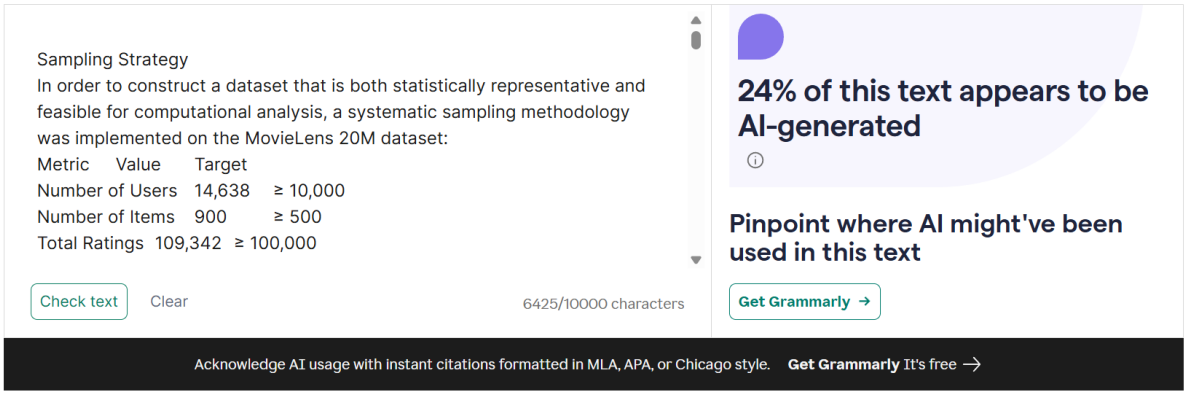
Sampling Strategy
In order to construct a dataset that is both statistically representative and feasible for computational analysis, a systematic sampling methodology was implemented on the MovieLens 20M dataset:
Metric Value Target
Number of Users 14,638 ≥ 10,000
Number of Items 900 ≥ 500
Total Ratings 109,342 ≥ 100,000
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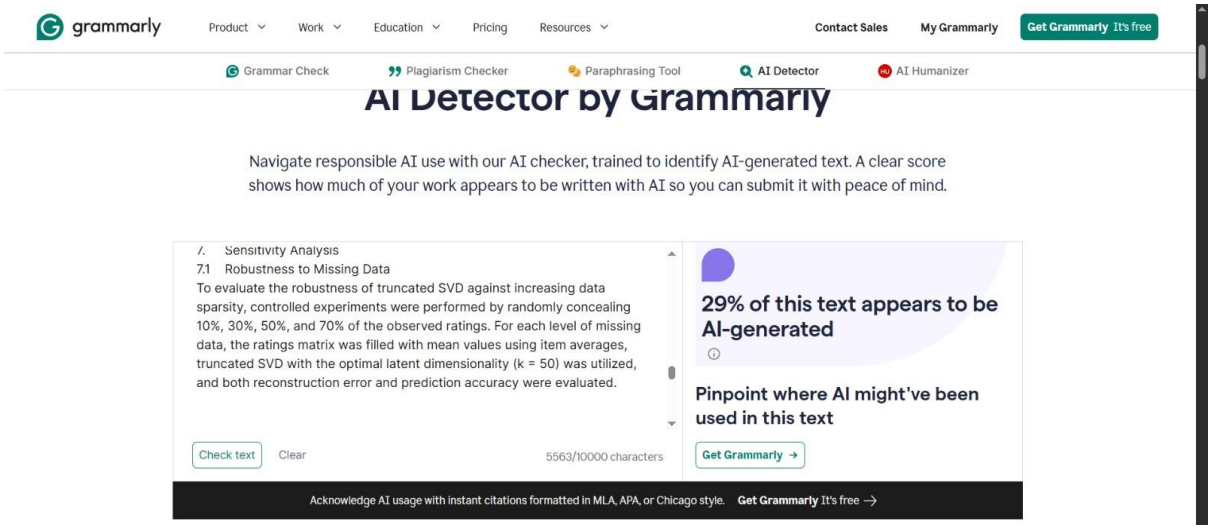
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7. Sensitivity Analysis
7.1 Robustness to Missing Data
To evaluate the robustness of truncated SVD against increasing data sparsity, controlled experiments were performed by randomly concealing 10%, 30%, 50%, and 70% of the observed ratings. For each level of missing data, the ratings matrix was filled with mean values using item averages, truncated SVD with the optimal latent dimensionality (k = 50) was utilized, and both reconstruction error and prediction accuracy were evaluated.
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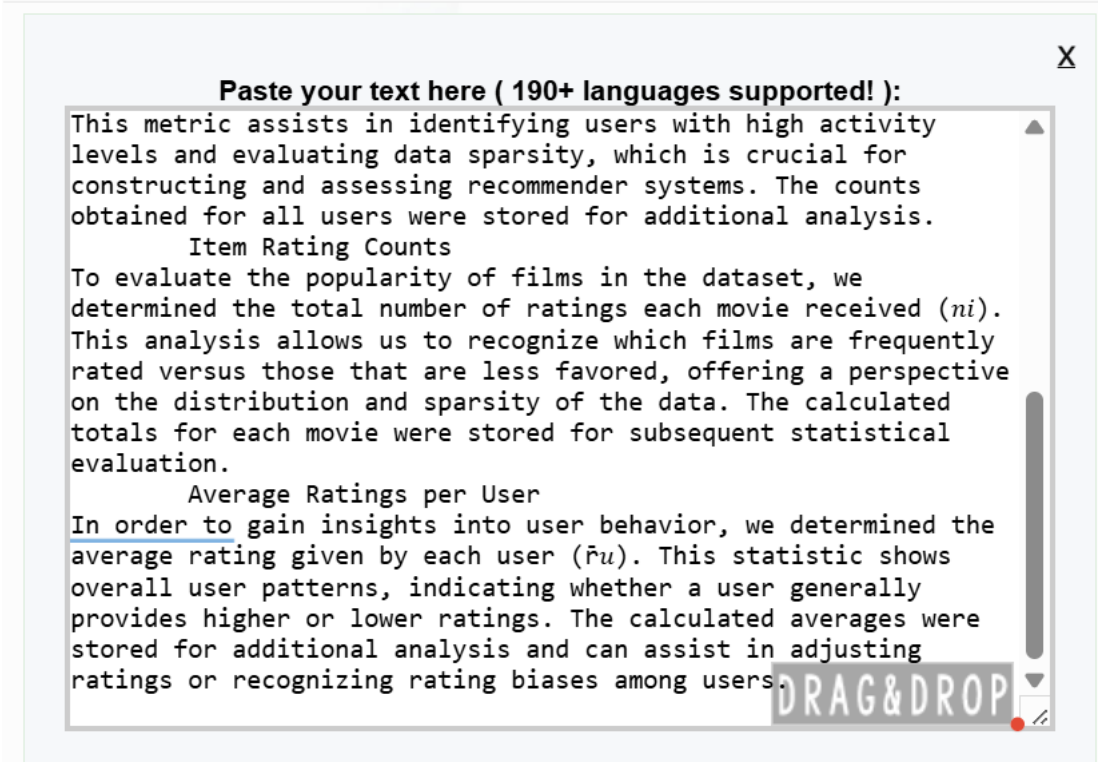
X
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This metric assists in identifying users with high activity levels and evaluating data sparsity, which is crucial for constructing and assessing recommender systems. The counts obtained for all users were stored for additional analysis.
Item Rating Counts
To evaluate the popularity of films in the dataset, we determined the total number of ratings each movie received (ni). This analysis allows us to recognize which films are frequently rated versus those that are less favored, offering a perspective on the distribution and sparsity of the data. The calculated totals for each movie were stored for subsequent statistical evaluation.
Average Ratings per User
In order to gain insights into user behavior, we determined the average rating given by each user (r̄u). This statistic shows overall user patterns, indicating whether a user generally provides higher or lower ratings. The calculated averages were stored for additional analysis and can assist in adjusting ratings or recognizing rating biases among users.
DRAG&DROP

100% Unique

Total 1876 chars , 277 words, 14 unique sentence(s).

Results	Query	Domains (original links)
Unique	The dataset contains ratings on a 0.5 to 5 scale	-
Unique	To standardize the data for statistical analysis and subsequent recommendation algorithms, the ratings were rescaled	-
Unique	R_new= ((R_old- 〖Min〗_old)/(〖Max〗_old- 〖Min〗_old))×(〖Max〗_new- 〖Min〗_new) 〖Min〗_new R_new= ((R_old-0.5)/4.5)×(4) 1 This transformation ensures that all ratings are	-
Unique	The rescaled ratings now have a minimum value of 1 and a maximum value of	-
Unique	Statistical Analysis Before conducting dimensionality reduction, a comprehensive statistical analysis was carried out to gain	-
Unique	User Rating Counts To gain insight into user behavior within the dataset, the total amount	-
Unique	This metric assists in identifying users with high activity levels and evaluating data sparsity, which	-
Unique	The counts obtained for all users were stored for additional analysis	-
Unique	Item Rating Counts To evaluate the popularity of films in the dataset, we determined the	-
Unique	This analysis allows us to recognize which films are frequently rated versus those that are	-
Unique	The calculated totals for each movie were stored for subsequent statistical evaluation	-