## Performance Metrics Comparison Report

**1. Introduction**

This report summarizes the performance of various machine learning models evaluated for the restaurant recommendation system. The objective is to compare the models based on different performance metrics and select the most suitable model for deployment.

**2. Evaluation Metrics**

* **Mean Squared Error (MSE):** Measures the average squared difference between predicted and actual ratings. Lower values indicate better performance.
* **Root Mean Squared Error (RMSE):** The square root of MSE, providing a more interpretable measure of error in the same units as the target variable.
* Mean Absolute Error (MAE): Measures the average absolute difference between predicted and actual 1 ratings.
* **R-squared:** Represents the proportion of variance in the target variable that is explained by the model. Higher values indicate better model fit.
* **Precision@K:** Measures the proportion of recommended items among the top-K recommendations that are actually relevant.
* **Recall@K:** Measures the proportion of relevant items that are included in the top-K recommendations.
* **F1-score:** The harmonic mean of precision and recall, providing a balanced measure of both.
* **Normalized Discounted Cumulative Gain (NDCG):** Measures the ranking quality of the recommendations, giving more weight to highly relevant items ranked higher.

**3. Model Comparison**

| Model | MSE | RMSE | MAE | R-squared | Precision@10 | Recall@10 | F1-score | NDCG@10 | |---|---|---|---|---|---|---|---| | K-Nearest Neighbors | [Value] | [Value] | [Value] | [Value] | [Value] | [Value] | [Value] | [Value] | | Linear Regression | [Value] | [Value] | [Value] | [Value] | [Value] | [Value] | [Value] | [Value] | | Random Forest | [Value] | [Value] | [Value] | [Value] | [Value] | [Value] | [Value] | [Value] | | [Model 4] | [Value] | [Value] | [Value] | [Value] | [Value] | [Value] | [Value] | [Value] | | ... | ... | ... | ... | ... | ... | ... | ... | ... |

* **Note:** Replace the "[Value]" placeholders with the actual performance metrics obtained during model evaluation.

**4. Analysis**

* Analyze the performance of each model based on the chosen metrics.
* Consider the specific goals of the recommendation system (e.g., maximizing user satisfaction, improving engagement, discovering new restaurants).
* Identify the model that best balances accuracy, coverage, and diversity.