**Recommendation Engine:**

**Product Recommendations**

**Business Use Case:**

Recommending the right products to customers based on their past behaviour can increase customer loyalty and boost cross-selling opportunities.

**Approach:**

● Algorithm:

Matrix Factorization

● Steps:

1. Data Preprocessing: Preparing the data and handling sparsity in the customer-product matrix.

2. Model Building: Implementing the recommendation algorithm and generating product recommendations.

3. Evaluation: Measuring the effectiveness of recommendations using metrics like Precision and Recall.

**Data Understanding:**

* Data Source: This dataset is created using faker.

**Key Data Dictionary:**

1. **Customer ID:** A unique identifier for each transaction, allowing tracking and reference.
2. **Interaction Date:** The date when the interaction occurred.
3. **Product ID:** A unique identifier for each product.
4. **Product Name:** The name of different banking products.
5. **Interaction Type:** If purchased or viewed or clicked.

**Data Preparation:**

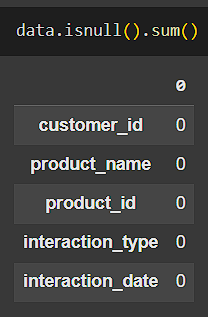
Packages: NumPy, Pandas, Matplotlib, Seaborn, Sklearn.

**Data Cleansing:**

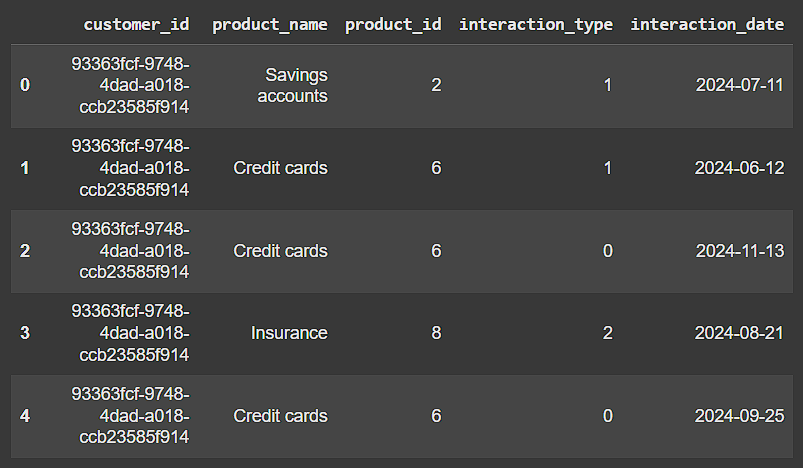
* There are no null values in the data.

**Preprocessing:**

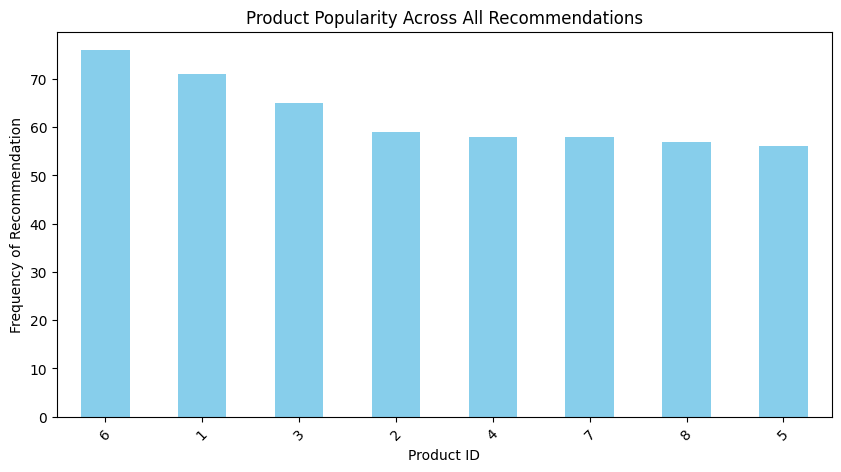
**Null value**

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**Label Encoding**

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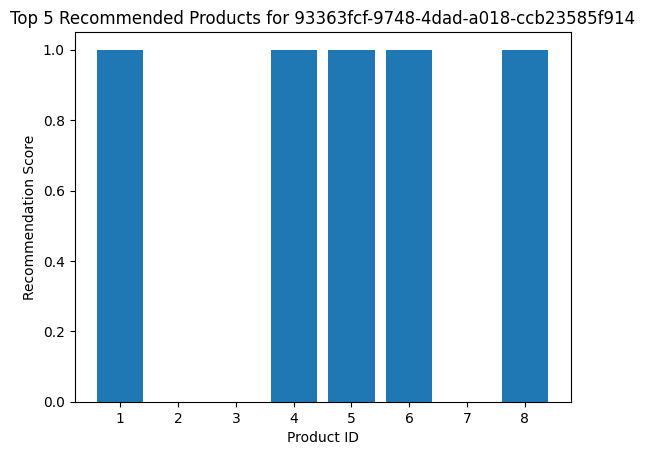
**Product Popularity**



**Model:**

**Matrix Factorization**

Matrix factorization is a mathematical technique used extensively in recommendation systems, particularly collaborative filtering methods. It works by breaking down a large matrix (e.g., user-item interaction matrix) into smaller matrices to reveal latent patterns, enabling better predictions of user preferences.

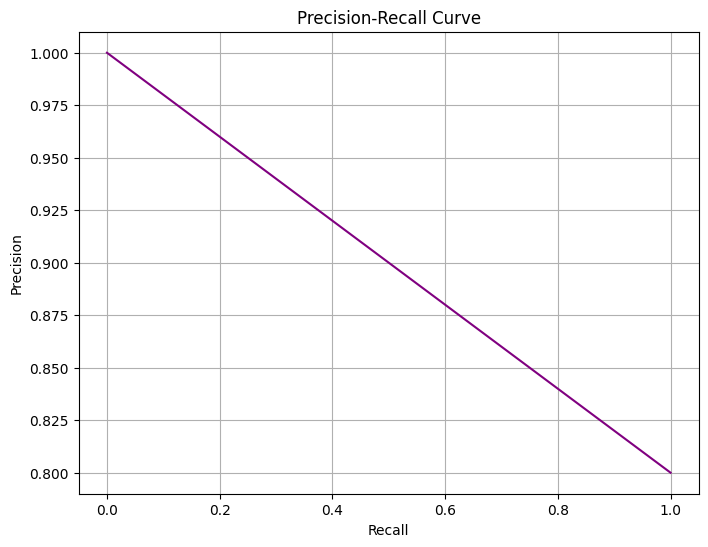


**Model Evaluation:**

**Precision and Recall**

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**Precision and Recall curve**



In this curve:

* Precision decreases as recall increases. This pattern might be expected in many models, as a higher recall usually means predicting more positives, including false positives, thereby reducing precision.
* A PR curve closer to the top-right corner indicates better performance, with both high precision and high recall.