# **Assignment: Building and Evaluating a Recommendation System**

### Objective

The goal of this assignment is to build, evaluate, and improve a recommendation system using a dataset of your choice. You will implement different types of recommendation algorithms, compare their performances, and tune their parameters to achieve the best results.

**Task 1: Data Preprocessing**

1. **Load the Dataset**
2. **Explore the Dataset**
3. **Preprocess the Data**

**Task 2: Implement Recommendation Algorithms**

1. **Popularity-Based Recommendation (Mandatory)**:
   * This is a good starting point and a baseline for comparison.
2. **Collaborative Filtering (Mandatory)**:
   * **User-Based Collaborative Filtering**
   * **Item-Based Collaborative Filtering**
3. **Content-Based Recommendation (Optional)**:
   * If your dataset includes content features, implement this to understand how content-based systems work.
4. **Matrix Factorization (Mandatory)**:
   * Implement Singular Value Decomposition (SVD).
   * (Optional) Explore other matrix factorization techniques such as Alternating Least Squares (ALS).
5. **Hybrid Recommendation System (Optional)**:
   * Combine collaborative filtering with either popularity-based or content-based recommendations.

**Task 3: Evaluation**

1. **Evaluation Metrics** (Mandatory)
2. **Cross-Validation** (Mandatory)
3. **Compare Performance** (Mandatory)

**Task 4: Hyperparameter Tuning**

1. **Tune Hyperparameters** (Mandatory)
2. **Evaluate the Best Model** (Mandatory)

**Task 5: Reporting**

1. **Document Your Process** (Mandatory)
2. **Visualization** (Mandatory)
3. **Conclusion** (Mandatory)

**Extra Credit (Optional)**

* Implement a recommendation system using deep learning techniques.
* Deploy your recommendation system as a simple web application using Flask or Streamlit.

**Submission**

* Jupyter notebook or Python script
* Report in PDF format
* Additional files