Experiment 12 — Design a Content Recommendation System using Google Cloud Platform (GCP)

Aim

To design and implement a Content Recommendation System using Google Cloud Platform (GCP) services that recommends personalized content to users based on their preferences and past interactions.

Description

A content recommendation system suggests relevant content (like videos, articles, or products) to users using machine learning algorithms. In this experiment, GCP services such as BigQuery, AI Platform, Cloud Storage, and Vertex AI are used to build and deploy a simple recommendation model. The system uses user-item interaction data, processes it using BigQuery, trains a Machine Learning model (such as collaborative filtering or content-based filtering), and then serves recommendations through a web or notebook interface. This setup demonstrates the integration of data analytics, machine learning, and cloud deployment — key components in modern AI-driven systems.

Prerequisites

• GCP account with billing enabled
• Basic knowledge of Python, SQL, and ML
• Familiarity with recommendation algorithms
• Access to BigQuery, Cloud Storage, and Vertex AI
• Dataset containing user interactions (user_id, item_id, rating)

Procedure — Step by Step

Step 1: Create a Project in GCP
1. Sign in to Google Cloud Console and create a new project.
2. Enable BigQuery, Vertex AI, and Cloud Storage APIs.

Step 2: Upload Dataset to Cloud Storage
1. Create a bucket and upload CSV dataset (user_ratings.csv).

Step 3: Load Data into BigQuery
1. Create a BigQuery dataset and table.
2. Load CSV data from Cloud Storage.
3. Define schema: user_id STRING, item_id STRING, rating FLOAT.

Step 4: Explore and Prepare Data
Use SQL in BigQuery:

```
SELECT user_id, item_id, AVG(rating) AS avg_rating FROM dataset.table
GROUP BY user_id, item_id;
```

Step 5: Train Recommendation Model using Vertex AI
1. Open Vertex AI Workbench and create a Jupyter notebook.
2. Load data using BigQuery client library.
3. Build a collaborative filtering model using cosine similarity.
4. Generate top recommendations for a user.

Step 6: Deploy Model (Optional)
Use Vertex AI Model Registry and create endpoint for online prediction.

Step 7: Visualize Results
Display recommended items for each user using a notebook or web app.

Expected Result

The system analyzes data using BigQuery, trains a model using Vertex AI, and generates recommendations. Optional deployment enables serving predictions via API.

Verification Checklist

■ Dataset uploaded
■ BigQuery analysis done
■ Model trained
■ Recommendations generated
■ Results visualized

Result

A Content Recommendation System is successfully designed and implemented using Google Cloud Platform integrating BigQuery, Vertex AI, and Cloud Storage.