oneAPI

AMRITA VISHWA VIDYAPEETHAM | Coimbatore Campus | anokha 2024

# MAVERICKS

## Problem Statement

## GEN −AI Based Ecommerce Personalized Recommendation System:

The field of recommendation systems is intriguing and continuously advancing within this track. Your task involves creating a chatbot capable of: (1) Engaging in goal-oriented conversations with users, comprehending their requirements, and expressing them in a specialized query language. (2) Integrating the query from step (1) into a recommendation system, and subsequently presenting the user with pertinent product recommendations.

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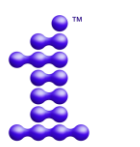
# Solution:

- Firstly, leveraging deep learning inference capabilities, pre-trained models for natural language understanding will be deployed, enabling intent recognition and entity extraction.
- These models can be fine-tuned as necessary or integrated with third-party NLU libraries for enhanced performance.
- Next, we develop a specialized query language parser using data processing and analytics capabilities, efficiently extracting relevant information from user queries such as product categories, price ranges, and brand preferences.
- Later, we train and deploy machine learning models for recommendation, implementing collaborative filtering, content-based filtering, or hybrid recommendation algorithms tailored to the dataset.
- To ensure scalability and performance optimizations, we utilize distributed computing features. In real-time interaction, we deploy NLU and recommendation models as services, optimizing their performance for low-latency inference, especially for edge devices or cloud environments with Intel® processors.
- We also implement asynchronous communication protocols for real-time interaction with users.
- For privacy and security, we leverage secure provisioning and authentication mechanisms to safeguard user data and access control mechanisms to ensure data privacy and security throughout the system. Finally, we integrate the various components into a cohesive system architecture and deploy the solution for seamless and personalized ecommerce recommendations

## Method:

**Step 1:**

- Understanding User Preferences

Utilize Intel® Distribution of OpenVINO™ Toolkit for Natural Language Understanding (NLU).Use pre-trained models or train custom models for intent recognition and entity extraction. Implement a parser to process user queries and extract relevant information.

**Step 2:**

- Designing Specialized Query Language

Design a domain-specific language (DSL) for expressing shopping preferences. Define syntax and semantics for the query language. Implement parsers and interpreters using Python to parse user queries.

**Step 3:**

- Developing Recommendation Engine

    Utilize Intel® oneAPI AI Analytics Toolkit for recommendation model development. Train recommendation models using TensorFlow. Optimize models for inference using Intel oneAPI AI Analytics Toolkit.


**Step 4:**

- Real-time Interaction:

    Deploy the system on hardware platforms optimized with Intel technologies. Use Intel® Distribution of OpenVINO™ Toolkit for optimizing inference performance. Implement asynchronous communication mechanisms for real-time interaction.

**Step 5:**

- Privacy and Security

Implement privacy-preserving techniques using Intel® Software Guard Extensions (SGX). Protect sensitive user data during inference using SGX. Ensure secure device provisioning and authentication using Intel® Secure Device Onboard (SDO).

**Step 6:**

- Integration and Deployment

Integrate all components into a cohesive application and deploy it using containerization. Use Docker for containerization and deployment. Ensure compatibility with various hardware platforms, including Intel CPUs, GPUs, FPGAs, or VPUs.

**Step 7:**

- Testing and Evaluation

    Test the system for effectiveness, performance, and user experience. Evaluate the quality of recommendations, response time, and usability. Gather feedback from users and iterate on the system based on their input.

**TOOLS USED:**

- OpenVINO Toolkit, Python, TensorFlow(for training models) - Natural Language Understanding (NLU)

- Python - domain-specific language (DSL) for expressing shopping preferences

- oneAPI AI Analytics Toolkit, TensorFlow - privacy-preserving techniques

- OpenVINO Toolkit - Deploy the system on hardware platforms

- Intel SGX, SDO - Integration and Deployment

- Intel® Distribution of OpenVINO™ Toolkit - Testing