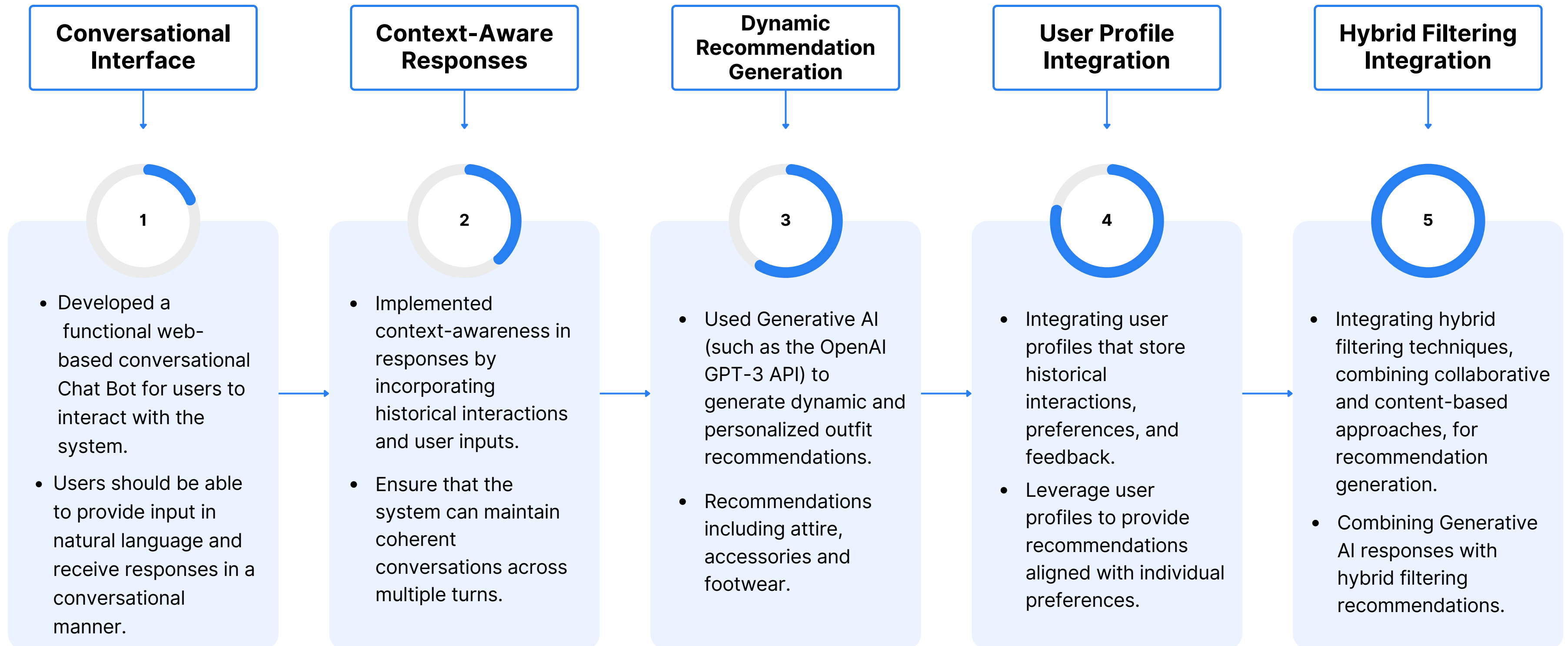**Flipkart**

GRID
5.0

Problem Statement Title: Conversational Fashion Outfit Generator powered by GenAI.

Team Name: Team Aarambh

Team members details

Team Name	Team Arambh		
Institute Name/Names	Rajiv Gandhi University of Knowledge Technologies,Basar		
Team Members >	1 (Leader)	2	3
Name	Sheik Javeed	Vignesh Dusa	Prathyaksh Malligari
Batch	2024	2024	2024

Deliverables/Expectations for Level 2 (Idea + Code Submission)

Conversational Interface

1

- Developed a functional web-based conversational Chat Bot for users to interact with the system.
- Users should be able to provide input in natural language and receive responses in a conversational manner.

Context-Aware Responses

2

- Implemented context-awareness in responses by incorporating historical interactions and user inputs.
- Ensure that the system can maintain coherent conversations across multiple turns.

Dynamic Recommendation Generation

3

- Used Generative AI (such as the OpenAI GPT-3 API) to generate dynamic and personalized outfit recommendations.
- Recommendations including attire, accessories and footwear.

User Profile Integration

4

- Integrating user profiles that store historical interactions, preferences, and feedback.
- Leverage user profiles to provide recommendations aligned with individual preferences.

Hybrid Filtering Integration

5

- Integrating hybrid filtering techniques, combining collaborative and content-based approaches, for recommendation generation.
- Combining Generative AI responses with hybrid filtering recommendations.

Glossary

Attributes: Distinguishing traits in clothes like fabric, colors and patterns, printed, plain, checks. Styles like trending, latest, vintage, modern and old. User characteristics include age, body type, Gender, Region. User Preference like Occasion, formal, casual, party wear.

Embeddings: A translation of a high dimensional vector to a lower dimensional space, here we generate embeddings composed of attributes from the higher dimensional images. It include Text Embeddings, Categorical Embeddings and Image Embeddings.

Model: An ML/DL agent which after training returns predictions on unseen data, here we have used LangChain Model for chat bot.

Chromadb: open-source embedding database that makes it easy to build LLM apps by making knowledge, facts, and skills pluggable for LLMs

CPU: Central Processing Unit.

GPU: Graphics Processing Unit.

P0, P1, P2: Prioritization levels (such as Priority 0, Priority 1, Priority 2)

API: Application Programming Interface.

CSV: Comma-Separated Values (a common file format)

JSON: JavaScript Object Notation (a data interchange format)

LLM: Large Language Models

Use-cases

P0 **Conversational Outfit Suggestions**

Users can have interactive conversations with the AI to describe their preferences, occasions, and style, and receive detailed outfit recommendations in response.

P1 **Personalized Trend Recommendations**

Utilize a user's past search history and social media trends to recommend outfits that align with their demonstrated preferences and the latest fashion trends.

P2 **Multiple Iterations**

Users can iterate through multiple versions of the generated outfit, refining each element based on their preferences and feedback.

P3 **Social Media-Driven Styles**

Utilize a user's past search history and social media trends to recommend outfits that align with their demonstrated preferences and the latest fashion trends.

P4 **Occasion-Centric Chats**

Users can have conversations centered around specific occasions (e.g., weddings, parties) and receive outfits tailored to those events.
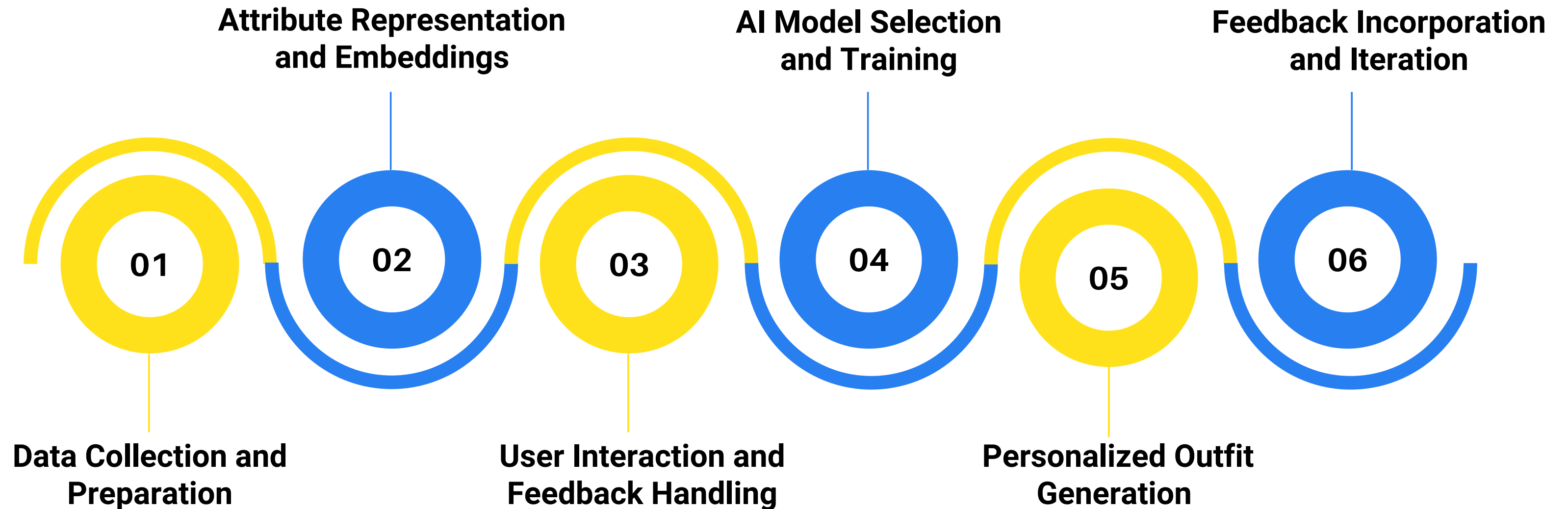
P5 **Age-Appropriate Styling**

Taking into account the user's age, the AI suggests outfits that are age-appropriate, ensuring a balanced and fashionable look.

Solution statement/ Proposed approach

We have dissected the problem statement into six distinct subproblems and formulated corresponding solutions for each.

Attribute Representation and Embeddings

AI Model Selection and Training

Feedback Incorporation and Iteration

01

02

03

04

05

06

Data Collection and Preparation

User Interaction and Feedback Handling

Personalized Outfit Generation

Solution statement/ Proposed approach

Problem   **Solution**

1. **Data Collection and Preparation** → Gathered a diverse dataset of clothing items, accessories, images, user preferences, and contextual information (age, location, occasion) over 1000. web scraped using Beautiful Soup from flipkart with attributes like product id, product name, product description, product price, brand, color, fabric , occasion and Image.

2. **Attribute Representation and Embeddings** → Converted categorical attributes (styles, colors, clothing types) into numerical representations (embeddings). Dataset is embedded and vectorstored using chromadb, categorical embedding layers, and image embeddings to effectively represent different attributes.

3. **User Interaction and Feedback Handling** → Designed an interactive conversation interface using React where users can input preferences, provide feedback, and engage in conversations. Developed a chatbot system that generates recommendations and allows users to provide feedback during the conversation using OpenAi API call.

Solution statement/ Proposed approach

Problem   **Solution**

4. AI Model Selection and Training → We Choose OpenAI(finetuned GPT Model) as AI model that handle text-to-text generation, image generation, and multimodal interactions. Trained model using the prepared dataset. Which acts as a Generative AI model.
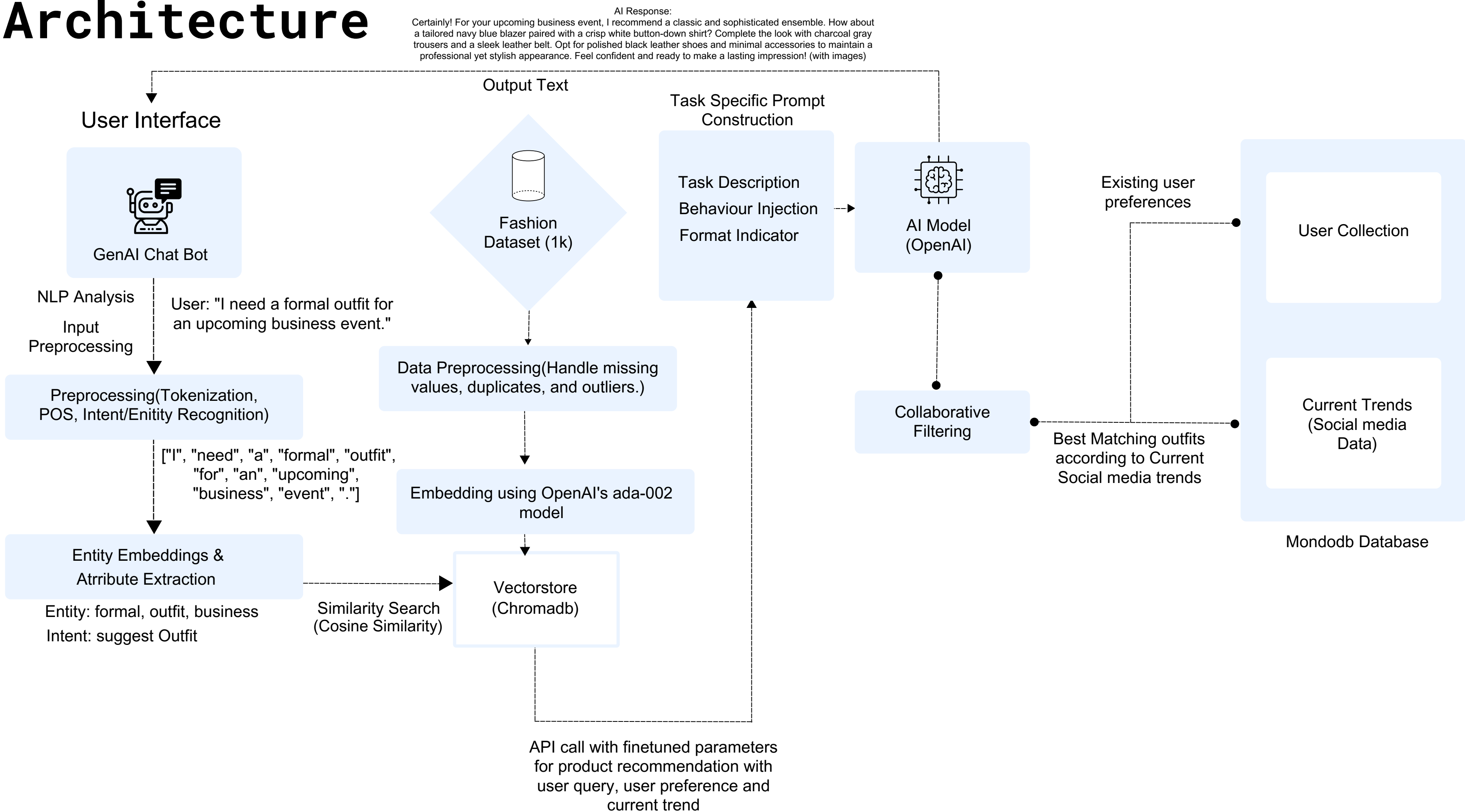
5. Personalized Outfit Generation → Using OpenAI keys that consider user preferences, contextual attributes (occasion, body type), and region to generate personalized outfit recommendations. Incorporate conditional attributes, fine-tune models with user-specific data, and optimize recommendations using reinforcement learning.

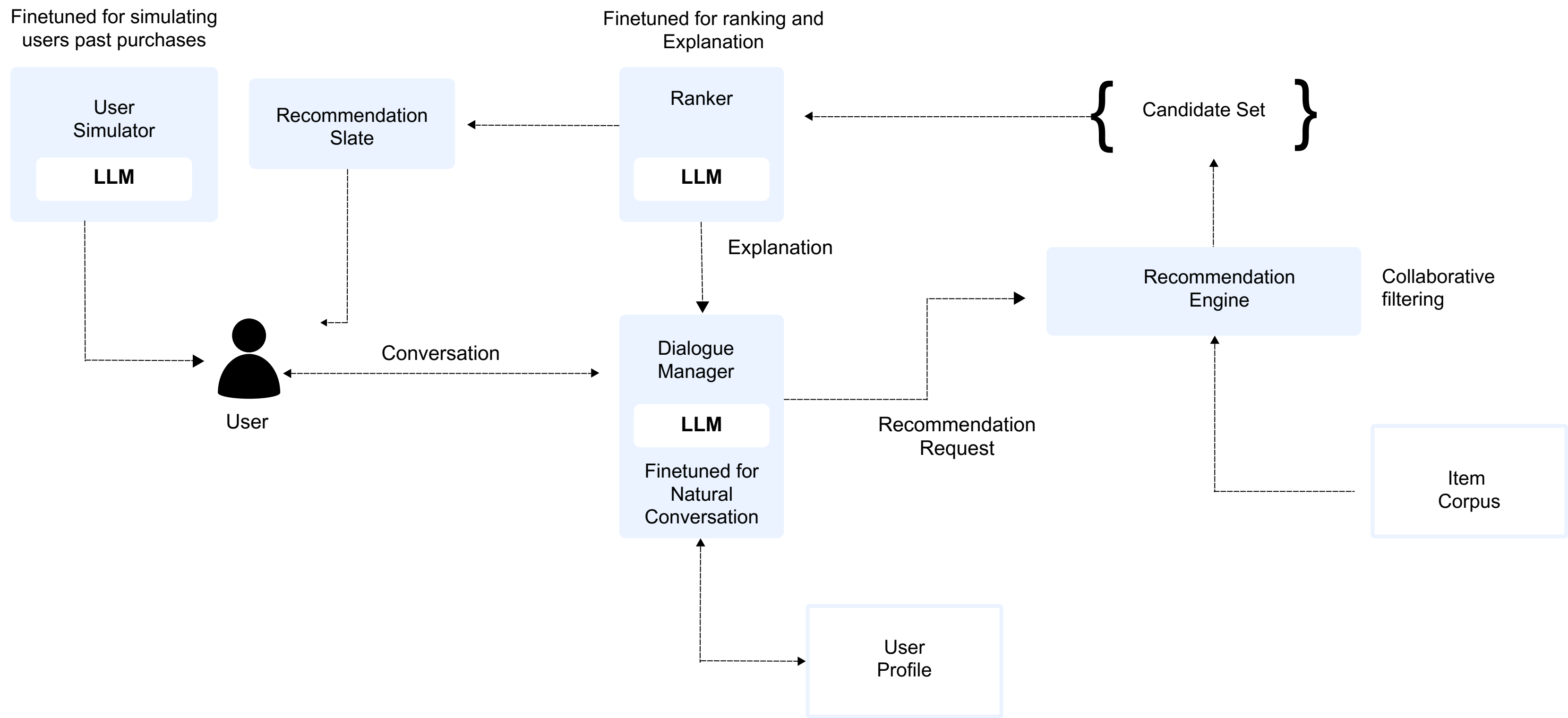**6. Feedback Incorporation and Iteration** → Integrate user feedback into the system to enhance recommendation quality over time. Implement reinforcement learning to adapt the model based on user feedback. Allow users to modify outfit elements during conversations and track user preferences for iterative improvement.

Architecture

AI Response:
Certainly! For your upcoming business event, I recommend a classic and sophisticated ensemble. How about a tailored navy blue blazer paired with a crisp white button-down shirt? Complete the look with charcoal gray trousers and a sleek leather belt. Opt for polished black leather shoes and minimal accessories to maintain a professional yet stylish appearance. Feel confident and ready to make a lasting impression! (with images)

Output Text

User Interface

GenAI Chat Bot

NLP Analysis

Input Preprocessing

User: "I need a formal outfit for an upcoming business event."

Preprocessing(Tokenization, POS, Intent/Enitity Recognition)

["I", "need", "a", "formal", "outfit", "for", "an", "upcoming", "business", "event", "."]

Entity Embeddings & Atribute Extraction

Entity: formal, outfit, business
Intent: suggest Outfit

Similarity Search (Cosine Similarity)

Fashion Dataset (1k)

Data Preprocessing(Handle missing values, duplicates, and outliers.)

Embedding using OpenAI's ada-002 model

Vectorstore (Chromadb)

Task Specific Prompt Construction

Task Description
Behaviour Injection
Format Indicator

AI Model (OpenAI)

Collaborative Filtering

Existing user preferences

User Collection

Current Trends (Social media Data)

Mondodb Database

Best Matching outfits according to Current Social media trends

API call with finetuned parameters for product recommendation with user query, user preference and current trend

Architecture

Due to less resources we have used OpenAI as LLM, the second approach which could be possible by using multiple LLM's is

Finetuned for simulating users past purchases

Finetuned for ranking and Explanation

User Simulator
LLM

Recommendation Slate

Ranker
LLM

Candidate Set

Explanation

Recommendation Engine

Collaborative filtering

User

Conversation

Dialogue Manager
LLM
Finetuned for Natural Conversation

Recommendation Request

Item Corpus

User Profile

Limitations

1
Limited Training Data

The lack of diverse examples might result in generated outfits that do not adequately cover various styles, colors, or categories.

2
Low GPU and CPU Resources

The lack of diverse examples might result in generated outfits that do not adequately cover various styles, colors, or categories.

3
Highly Expensive Datasets

We have worked with smaller subsets of data, potentially impacting the diversity and accuracy of the outfit recommendations.

4
Limited Automation

Automating data collection, preprocessing, and training processes are challenging with limited resources.

5
Unforeseen User Preferences

Users might have unique or unexpected fashion preferences that the model wasn't explicitly trained on, might lead to unsatisfactory recommendations.

6
Model Hyperparameters

Fine-tuning model hyperparameters for optimal performance might require extensive experimentation, which could be limited by computational resources.

Future Scope

1 **Enhanced Model Architectures:**

As computational resources improve, we can explore more advanced model architectures like GANs, Transformers, or even custom models tailored to fashion outfit generation. These architectures could generate more realistic and diverse outfits.

2 **Multi-Modal Generation:**

Combine multiple data modalities (text, images, user preferences) for generating outfits. Incorporating images of individual clothing items and their combinations could lead to more accurate and appealing recommendations.

3 **Real-Time Outfit Generation:**

Developing the capability to generate outfit images in real time, allowing users to see visualizations of the suggested outfits using stable diffusion.

4 **Hybrid Filtering:**

Implementing Hybrid filtering techniques to recommend outfits by combining Collaborative and Content based filtering.

5 **Virtual Outfit Visualization:**

Implementing a feature that overlays generated outfit images onto user-uploaded photos or avatars.

6 **Voice Interaction Model:**

Allowing users to interact with the system as speech to speech model as like Alexa and Siri applications using GenAI.

Future Scope

Complete and well-coordinated, including clothing, accessories, and footwear etc.

CLASSIC *navy* LACE

RHINESTONE DROP EARRINGS
ANNE KLEIN

VINE BRACELET
NADRI

STRAPPY SANDALS
BADGLEY MISCHKA

PEARL CLUTCH
GLINT

EMBELLISHED LACE DRESS
ELIZA J

DRESS FOR THE WEDDING

Flipkart

GRID
5.0

Thank You