**Proof of Concept (POC) for Real-Time Visual Search Engine**

**1. POC Idea**

**Objective:** To determine the feasibility of developing a real-time visual search engine that allows users to upload images and find visually similar images or products based on visual features.

**What the POC Aims to Achieve:**

* Validate the technical feasibility of using deep learning models, specifically InceptionV3, for feature extraction in visual search.
* Demonstrate the efficiency of FAISS for fast similarity searches in a large dataset.
* Assess whether the system can provide accurate and real-time search results.

**2. Scope of the POC**

**Evaluation Scope:**

* The POC will focus on creating a system that can:
  + Accept an image input.
  + Extract features using a pre-trained InceptionV3 model.
  + Compare the extracted features with those in a pre-built dataset using FAISS for similarity measurement.
  + Return the top N visually similar images with minimal latency.

**Limitations:**

* This POC will use a limited dataset to ensure quick evaluation.
* The focus will be on technical feasibility, not on the user interface design or large-scale deployment.

**3. Success Criteria**

**Use Cases:**

* Successful feature extraction from images using the InceptionV3 model.
* Accurate retrieval of visually similar images using FAISS, with a target precision of at least 80% in similarity searches.
* Real-time performance, defined as search results being returned within 2 seconds for an average query.

**Success Metrics:**

* Precision and recall of search results.
* Latency of search operations.
* System scalability with increasing dataset size.

**4. Involved Team**

**Key Team Members:**

* **Ifza Shad (Team Lead and CV Engineer):** Oversees the POC process, coordinates the team, and contributes to the development of the computer vision aspects.
* **Adil Arshad (CV Engineer):** Works on model selection, training, and implementation of the feature extraction pipeline.
* **Muhammad Maaz (CV Engineer):** Assists in refining and optimizing the model for better accuracy and performance.
* **Fiza Asmat (CV Engineer):** Focuses on data preprocessing and to enhance model generalization.
* **Hammad Shah (CV Engineer):** Handles integration of the model with the FAISS similarity search engine.
* **Abdullah (CV Engineer):** Supports the team in evaluating and fine-tuning the search algorithm.
* **Laiba Khan (Frontend Developer):** Works on the user interface design for image upload and results display.
* **Noor (Frontend Developer):** Assists in the implementation of front-end features like drag-and-drop image upload and result filtering.
* **Irfan Ali Khan (Backend Developer):** Develops and manages backend services to handle image uploads, feature extraction, and communication with the frontend.

**5. Time Duration**

**Estimated Timeline:**

* **Data Collection and Preprocessing:** 3 days
* **Model Implementation and Feature Extraction:** 2 day
* **FAISS Integration and Similarity Search Development:** 1 day
* **Testing and Evaluation:** 1 day

**Total Duration:** 1 week

**6. Evaluation Process**

**User Feedback:**

* Gather insights from team members and stakeholders during the POC development to refine the process.
* Test the system with a small group of users to assess the accuracy and relevance of search results.

**Team Insights:**

* Review the performance metrics and adjust the model or search algorithm as needed.
* Identify any technical or logistical issues that could impact full-scale development.

**7. Proposal for Next Steps**

**If Successful:**

* Proceed to develop a prototype with an expanded dataset and enhanced user interface.
* Begin planning for full-scale development, including optimization for scalability and deployment on cloud platforms.
* Consider user testing with a broader audience to gather feedback on usability and functionality.

**If Unsuccessful:**

* Identify specific challenges (e.g., model accuracy, search speed) and explore alternative approaches or models.
* Reassess the technical approach and resources needed to address the identified issues before moving forward.