Hackathon Problem Statements

Project Submission Guidelines

- Presentation to be submitted in pptx or pdf format. Though not a hard limitation but max 10 to 12 slides.
- Prototype to be developed in the language of participants choice.
- Include a demo video of the prototype as well,demonstrating how the solution works
- Github link for the codebase.

Theme 1

"ShopSmarter: AI-Powered Personal Shopping Assistant for E-Commerce"

Background

Online shopping is evolving rapidly, but customers still face challenges in discovering products that match their preferences, especially when trying to describe what they are looking for. Users often wish they could simply show an item — a picture from social media, a snapshot of an outfit they saw, or an image of a product — and instantly receive personalized recommendations.

Leveraging the power of AI in computer vision and recommendation systems, we envision a Personal Shopping Assistant that can analyze image inputs and deliver tailored product suggestions across an e-commerce platform.

Statement

Design and develop an **AI-powered Personal Shopping Assistant** that personalises the shopping experience for an e-commerce website and also automates the process.The system should understand visual inputs (such as apparel, accessories, home decor, gadgets, etc.) and suggest similar or complementary products available in the store

The assistant must:

- Accept image uploads as the primary input.
- Analyze the uploaded image to identify key features (e.g., color, texture, category, style, brand-like attributes).

- Recommend visually similar products and/or complementary products available on the platform.
- Personalize suggestions based on user preferences, behavior history, or optional style choices (if available).
- Users should be able to use prompts to interact with the agent and suggest further modifications or share any other inputs, based on which the agent should be able to resolve the queries.
- It can also be able to automate the checkout process.
- Provide a seamless and intuitive user interface experience.

Project criteria to consider

- Accuracy and relevance of recommendations.
- User-friendliness of the upload and recommendation process.
- Innovation and trying something new which doesn't exist in the market.
- Scalability and performance of the system.
- Use of different technologies to solve the problem and make it market ready.

Example Use Cases

- A user uploads a photo of a jacket they saw on Instagram → gets 10 similar jackets available on the platform.
- A user snaps a photo of their living room and gets recommended matching lamps and decor.
- A user uploads a photo of sneakers and is shown similar sneakers along with matching socks and athletic wear.

Technical Possibilities

- **Implement impactful AI -** Use of machine learning/computer vision models (e.g., CNNs, Vision Transformers), agentic ai.
- **Real-World Feels** – E-commerce relevance is huge; relatable and instantly testable.
- **Creative Freedom** – Students can personalize fashion, home decor, electronics, or any category.
- **Beginner to Pro Friendly** – Easy to start, with deep AI/ML or UX layers to explore.
- **Scalable Backend** - Backend services that can retrieve and rank product recommendations efficiently.
- **Multimodal Challenge** – Multi-modal recommendations (combining image and text search) and also can augment with natural language input (e.g., "show me similar jackets" after uploading a picture).

Suggested Tools

Note: These are just suggestions and you are free to use any tools/technologies for building the application

Area	**Tools / Frameworks**
Image Input	OpenAI CLIP, Google Vision API, YOLOv8, CLIP Interrogator
NLP Interaction	OpenCV, PySceneDetect, scikit-learn, spaCy
Recommendations	LangChain, OpenAI GPT APIs, Hugging Face Transformers, LlamaIndex
Frontend	axe-core, WAVE, Lighthouse
Frontend Development	HTML, CSS, JavaScript, React, Vue.js, Angular, ARIA roles
Backend Development & Databases	Flask, Firebase, Nodejs, Spring Boot, PostgreSQL, MariaDB, SQLite
AI/Cloud Services	AWS AI Services, Google Cloud AI Platform, Azure Cognitive Services
Checkout Automation	Puppeteer (for demo automation), Stripe (for mock checkout), Paypal

Theme 2

"Access for All: Building AI-Powered Tools to Make the Web Inclusive"

Background

The internet has become an integral part of modern life, yet a significant portion of the population, individuals with disabilities, faces substantial barriers in accessing and navigating the digital world. Current web accessibility standards are often inadequately implemented, resulting in websites that are difficult or impossible to use for people with visual, auditory, motor, or cognitive impairments. This necessitates the development of innovative solutions to bridge the digital divide and create a truly inclusive online experience.

Statement

According to an analysis done in the year 2023, 96.8% of the top million website homepages contain detectable WCAG failures. Build an AI-powered accessibility tool that helps solve many accessibility-related issues and can be deployed in real-world applications. The aim should be to build tools which can accept voice, images, and videos as inputs and help specially abled users to navigate the website seamlessly.

The assistant must:

- Accept input from various sources, including voice commands, image uploads, and video content.
- Analyze the input to understand user intent, identify accessibility barriers, or extract relevant information.
- Provide intelligent assistance for web navigation, such as voice-controlled browsing or image descriptions for screen readers.
- Offer solutions to common accessibility issues, like suggesting alternative text for images or identifying insufficient color contrast.
- Personalize the accessibility experience based on individual user needs and preferences.
- Provide a user-friendly interface for interaction and feedback

Example Use Cases

- A user with a motor impairment uses voice commands to fill out a web form.
- A visually impaired user uploads an image and receives an AI-generated audio description.
- A user uploads a video and the AI automatically generates captions and transcripts.
- A user needs help navigating a complex website layout using only their voice.
- A developer wants to check website accessibility and gets AI-powered suggestions for improvements.
- A user with dyslexia finds text hard to read and uses an AI tool to simplify the layout and font.
- A user with low vision struggles with color contrast and the AI suggests accessible color combinations.

Technical Possibilities

- **Implement impactful AI** - Utilize machine learning models for speech recognition, natural language processing, computer vision, and potentially reinforcement learning for personalization.

- **Real-World Feels** – Addresses a critical societal need with direct and measurable impact on users' lives.

- **Creative Freedom** – Projects can focus on various accessibility challenges and target different user groups.

- **Beginner to Pro Friendly** – Offers accessible entry points while allowing for advanced exploration of AI and accessibility techniques.

- **Scalable Backend** – (Optional) Design backend services to support user data, preferences, and complex AI processing.

- **Multimodal Challenge** – Integrates multiple input modalities (voice, image, video) for a comprehensive accessibility solution.

Project criteria to consider

- Effectiveness in addressing specific accessibility barriers.
- Accuracy and reliability of AI-driven accessibility features.
- Usability and intuitiveness of the user interfaces.
- Innovation in applying AI to enhance web accessibility.
- Potential for real-world implementation and scalability.
- Use of different technologies to solve the problem and make it market ready.

Suggested Tools

Note: These are just suggestions and you are free to use any tools/technologies for building the application

Area	**Tools / Frameworks**
Voice Input/Output	Web Speech API, Speechly, Kaldi, Vosk
Image Analysis	Google Cloud Vision API, TensorFlow.js, OpenCV, Hugging Face Transformers (CLIP)
Video Analysis	OpenCV, PySceneDetect, Hugging Face Transformers
NLP Interaction	LangChain, OpenAI GPT APIs, Dialogflow, Rasa, scikit-learn, spaCy

Accessibility Audit	axe-core, WAVE, Lighthouse
Frontend Development	HTML, CSS, JavaScript, React, Vue.js, Angular, ARIA roles
Backend Development	Python (Flask, Django), Node.js (Express), Firebase, PostgreSQL
AI/Cloud Services	AWS AI Services, Google Cloud AI Platform, Azure Cognitive Services