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**Batch 26**

**Enrollment- E23CSEU2451**

**CSET301: Artificial Intelligence and Machine Learning**

**Project Milestone 1**

**Title:**

**ChromaVision: AI-Powered Video Enhancement & Object Detection**

**Description:**

ChromaVision is an advanced AI-driven video processing tool designed to enhance video quality and user interaction. It utilizes deep learning techniques to **colorize black-and-white videos**, **improve video resolution**, and **detect faces/objects in real time**. A key innovation of ChromaVision is its **interactive navigation feature**, allowing users to click on detected faces or events to quickly locate key moments within a video. This technology aims to revolutionize video restoration and content interaction, making video analysis more efficient and engaging.

**Source of Project:**

This project draws inspiration from AI advancements in video processing and competitions such as:

* **Kaggle Challenges** (Video Super-Resolution & Object Detection)
* **Infosys AI Competitions** (AI for media enhancement)
* **Microsoft AI Initiatives** (Deep learning for video analysis)
* **Smart India Hackathon (SIH)** (Video restoration & navigation challenges)

**Project Application:**

ChromaVision has diverse applications across multiple industries:

1. **Content Creators & Filmmakers:** Enhance video quality for storytelling and media production.
2. **Historians & Archivists:** Restore historical footage by adding realistic color and improving resolution.
3. **Law Enforcement & Surveillance:** Analyze security footage with better clarity and faster navigation.
4. **General Users:** Enjoy better-quality videos with smart interaction features.

**Description and Dataset:**

**Core Features:**

* **AI-Powered Colorization:** Converts grayscale videos into realistic, colorized versions.
* **Super-Resolution Enhancement:** Upscales low-resolution footage for better clarity.
* **Real-Time Object & Face Detection:** Identifies people and objects dynamically.
* **Interactive Navigation:** Users can click on detected elements to jump to specific moments in a video.

**Datasets Used:**  
To train the AI models, ChromaVision utilizes open-source datasets:

* **YouTube-8M** (Large-scale video dataset for training recognition models)
* **Open Images Dataset** (Annotated images for object detection)
* **DAVIS Dataset** (High-quality videos for super-resolution tasks)
* **Flickr Faces HQ (FFHQ)** (Facial recognition training data)

**Evaluation Metrics for Success:**

* **Color Accuracy:** Realistic and natural-looking colorized footage.
* **Resolution Improvement:** Enhanced video sharpness and clarity.
* **Detection Precision:** Accurate identification of faces and objects.
* **User Experience:** Smooth, intuitive interaction with the system.
* **Performance:** Optimized for real-time processing with minimal lag.