Title

AI-Driven Character Consistency and Prompt Optimization in Video Generation

Abstract

This project explores the integration of AI video generation with automated character consistency evaluation and prompt optimization. The goal is to assist content creators in generating coherent and visually consistent videos by analyzing character drift and refining prompts accordingly. The project combines video generation APIs, facial embedding analysis, and heuristic-based prompt tuning to build a modular Python-based tool.

Introduction

AI-generated videos are transforming digital storytelling, but creators face challenges in maintaining character consistency and generating longer coherent clips. This project aims to address these issues by developing a tool that evaluates character consistency and optimizes prompts to reduce visual drift.

Problem Statement

Content creators using AI video tools often encounter character drift across frames and scenes, limiting the quality and coherence of generated videos. Additionally, prompt tuning is manual and time-consuming, lacking automated feedback mechanisms.

Objectives

1. Integrate AI video generation via API.
2. Analyze character consistency using facial embeddings.
3. Generate visual and numerical reports on consistency.
4. Implement a basic prompt optimization loop based on drift feedback.

Methodology

The project is divided into modular components:

- API Integration: Connect to AI video generation services.

- Frame Analysis: Extract frames and compute facial embeddings.

- Consistency Evaluation: Measure drift using cosine similarity.

- Prompt Optimization: Modify prompts based on drift scores.

- Report Generation: Visualize results and provide feedback.

Tools & Technologies

- Python

- OpenCV

- DeepFace / ArcFace

- Matplotlib / Plotly

- Streamlit (optional)

- Requests / API SDKs

Project Timeline

Week 1:

- API integration and video generation

- Frame extraction and face detection

Week 2:

- Consistency analysis and report generation

- Prompt optimization loop

- UI development (optional)

Expected Outcomes

- A working Python tool that generates AI videos and evaluates character consistency.

- Visual and numerical reports highlighting character drift.

- A basic prompt optimization mechanism to reduce drift.

Future Scope

- Support for non-face character consistency using object detection.

- Integration with multiple video generation platforms.

- Advanced prompt optimization using reinforcement learning.

- Motion and audio consistency evaluation.