**Project Documentation: Social Media Short Content Automation**

**1. Introduction**

* **Project Name:** Social Media Short Content Automation
* **Objective:** Automatically generate short clips, captions, and highlights from long-form content to optimize social media engagement.
* **Scope:**
  + Convert long-form videos into short, engaging reels.
  + Generate thumbnails automatically with customization options.
  + Develop a FastAPI backend to expose these functionalities.
  + Provide a Python script to access these APIs via the command line.

**2. Features & Functionalities**

**2.1 Video to Reels**

* Extract short clips from long-form content.
* Allow customizable overrides (e.g., duration, aspect ratio, text overlay, filters).
* AI-powered highlight detection based on key moments.

**2.2 Video to Thumbnail**

* Auto-generate thumbnails from video frames.
* Provide customization options (e.g., text overlay, branding, filters).
* AI-assisted selection of the best frame.

**2.3 FastAPI Backend**

* Exposes APIs for video processing.
* Endpoints:
  + /generate\_reel – Convert video to short-form content.
  + /generate\_thumbnail – Create thumbnails from video.
* Supports authentication, request validation, and async processing.

**2.4 Command-Line Python Script**

* Interacts with FastAPI endpoints.
* Allows users to generate reels or thumbnails via CLI.
* Configurable parameters for overrides.

**3. Technology Stack**

* **Backend:** FastAPI (Python)
* **Processing:** OpenCV, MoviePy, FFmpeg, PIL
* **AI/ML:** Lang Chain, Google GenAI (for captions/highlights)
* **Database (if needed):** PostgreSQL/MySQL/MongoDB
* **Storage:** AWS S3 / Local storage
* **Frontend (if applicable):** React/Vue.js (optional for dashboard interface)

**4. Workflow & Architecture**

1. **User uploads a video (via API or CLI).**
2. **System processes video:**
   * Extracts key moments for reels.
   * Generates thumbnails based on AI selection.
3. **Customizable overrides applied (if any).**
4. **Final output provided (Reels/Thumbnails).**
5. **User downloads the processed content.**

**5. Challenges & Solutions**

* **Challenge:** Processing large video files efficiently.
  + *Solution:* Use asynchronous processing with FastAPI + Celery.
* **Challenge:** Ensuring high-quality thumbnail selection.
  + *Solution:* Implement AI-based frame scoring.
* **Challenge:** Accurate highlight detection.
  + *Solution:* Leverage AI/ML models for sentiment analysis and key moment extraction.

**6. Future Enhancements**

* Add text-to-speech for voiceover generation.
* Implement a web-based UI for easier user interaction.
* Support for multiple social media aspect ratios.

**7. Conclusion**

This project aims to simplify social media content creation by automating reels and thumbnail generation using AI-powered processing, exposed through FastAPI with CLI integration. The system is designed to be scalable, customizable, and efficient for content creators.