2D to VR180 Depth Full Video Conversion - Project Documentation

# 1. Introduction

This project is a Streamlit-based application that converts standard 2D videos into VR180-like depth videos. It uses the MiDaS v2.1 Small (256) model for monocular depth estimation, processes each frame of the video, and applies side-by-side rendering to create a stereoscopic effect suitable for VR180 playback.

# 2. Features

Key features of this project include:

- Upload and process video files in 2D format.

- Perform monocular depth estimation using MiDaS v2.1 Small (256) model.

- Normalize and apply color mapping for depth visualization.

- Convert 2D frames into VR180-like side-by-side views.

- Preview processed frames in the Streamlit app.

- Download the final VR180 depth-enhanced video.

# 3. Requirements

The following dependencies are required to run the project:

- Python 3.8+

- Streamlit

- OpenCV (cv2)

- NumPy

- Torch

- torchvision

- Pillow (PIL)

- pathlib

# 4. Installation

Follow these steps to set up the project environment:

1. Clone the project repository or copy the code files.

2. Create a virtual environment:

python -m venv myenv

3. Activate the virtual environment:

- Windows: myenv\Scripts\activate

- Linux/Mac: source myenv/bin/activate

4. Install dependencies:

pip install -r requirements.txt

# 5. Model Setup

The project uses the MiDaS v2.1 Small (256) model for depth estimation. Download the model weights file (midas\_v21\_small\_256.pt) from the official MiDaS GitHub repository and place it in the project root or models/ directory. The application will automatically load this model during execution.

# 6. Application Workflow

The workflow of the application is as follows:

1. User uploads a 2D video file via the Streamlit interface.

2. The application loads the MiDaS model for depth estimation.

3. Each frame is processed:

- Frame is resized and transformed.

- Depth map is predicted using the model.

- Depth map is normalized and color-mapped.

- VR180-like stereoscopic frame is generated.

4. Processed frames are previewed in the app.

5. The final VR180 video is saved and made available for download.

# 7. Usage

Run the application with the following command:

streamlit run app2.py

Steps to use:

1. Open the Streamlit app in the browser.

2. Upload a video file using the upload widget.

3. Wait for the frames to be processed.

4. Preview the depth frames.

5. Download the final VR180 video.

# 8. Project Structure

A typical project structure looks like this:

project\_root/  
│── app2.py  
│── midas\_v21\_small\_256.pt  
│── requirements.txt  
│── output/  
│ └── processed\_video.mp4  
│── docs/  
│ └── project\_documentation.docx

# 9. Future Improvements

- Support for higher resolution MiDaS models.

- Real-time video processing via webcam.

- Integration with VR headset players.

- Optimization for faster processing using GPU acceleration.

# 10. Conclusion

This project demonstrates the application of depth estimation models in enhancing 2D videos for VR experiences. By leveraging MiDaS depth estimation and Streamlit, the app provides an interactive and user-friendly way to create VR180-like depth-enhanced videos.