**3D Eyeglass Frame Augmentation on Camera Feed**

**Overview**

This project demonstrates how to overlay a 3D glasses model on a live webcam feed using Python, OpenCV, and MediaPipe. The code captures a video stream from the webcam, detects facial landmarks, calculates the required rotation and position for the glasses, and overlays the glasses onto the detected face.

**Prerequisites**

1. Create a Conda Environment

* Use the following command to create a new environment:
* conda create --name main python=3.11

2. Install Libraries

* Use the attached YAML file to install the required libraries, or you can manually install them using pip:
* pip install numpy opencv-python matplotlib Pillow trimesh mediapipe

**Files**

* glasses.obj: 3D model file for the glasses (ensure this file is in your working directory).
* main.py: Python script for the project.

**How It Works**

1. Load and Render 3D Glasses Model

* The glasses.obj file is loaded, and a 3D scene is created.
* The scene is rendered to a PNG image, which is then processed to extract the glasses region.

2. Face Detection and Glasses Overlay

* The webcam feed is captured.
* Face landmarks are detected using MediaPipe.
* The rotation angle and position for the glasses are calculated based on the eye landmarks.
* The glasses image is resized, rotated, and overlaid onto the face in the webcam feed.

3. Display

* The result with the glasses overlay is displayed in a window.
* Press 'q' to exit the window and stop the video capture.

**Running the Script**

1. Ensure that you have the `glasses.obj` file in your working directory.

2. Run the script:

python main.py

3. The webcam feed will open, and the glasses will be overlaid on detected faces.

**Code Explanation**

* Loading 3D Model: Uses trimesh to load and render the 3D glasses model.
* Processing Rendered Image: Converts the rendered image to grayscale and extracts the glasses region.
* Face Detection: Utilizes MediaPipe to detect face landmarks.
* Calculating Rotation and Position: Determines the angle and position to overlay the glasses based on eye landmarks.
* Overlaying Glasses: Adjusts the glasses image and blends it with the face image in the webcam feed.

**Troubleshooting**

* + Ensure that your webcam is working and accessible.
  + Verify that `glasses.obj` is correctly placed in your working directory.
  + If the glasses do not align correctly, you may need to adjust the resizing and rotation parameters.