DIY Video Filter for Jetson Nano

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Abstract

This project explores the implementation of video filters on the Jetson Nano platform using OpenCV, OpenCV Zoo, and PP Human Segmentation. The objective is to create dynamic video effects, including background blur, background replacement, face distortion, and face replacement. The project leverages the computational capabilities of Jetson Nano to run these filters in real-time.

Introduction

The primary objective of this project is to leverage the computational power of the Jetson Nano to apply real-time video filters akin to those popularized by social media platforms like Instagram. Filters have become a ubiquitous feature in image-based applications, enhancing visual aesthetics and enabling users to express their creativity through personalized and stylized content. The Jetson Nano, with its GPU acceleration and parallel processing capabilities, provides an ideal platform to explore the implementation of such filters at the edge.

**Project Objectives:**

Implementation of the following filters and running them in real-time on the Jetson Nano

1. **Background Blur**:

Focus on the subject and blur the background.

1. **Background Replacement**:

Replace the background with an image or video stream, creating a dynamic environment.

1. **Face Distortion**:

Apply facial landmarks detection and manipulation to distort facial features in a humorous or artistic way.

1. **Face Replacement**:

Identify and replace the face in the video stream with a different image or video.

1. **A creative filter of our choosing:**

We decided to replace the background with moving artefacts or a GIF.

Methodology

**Tools and Technologies**

1. Jetson Nano Kit

* 1 x Jetson Nano 4GB Board
* 1 x Power supply
* 1 x Picam
* 1 x HDMI cable
* 1 x USB WiFi adapter
* 1 x 64 GB micoSD card

1. Jetpack OS

* Customized Ubuntu OS
* A Python 3.6.9 virtual environment
* OpenCV 4.5.3 (cuda enabled)
* YoloV5 (revision 5.0)
* TeamViewer (remote desktop application)
* Example OpenCV and Yolo scripts
* A python script to connect to eduroam
* **Tools and Technologies**

1. Software used

**Setup**

1. Connect the

System Design

**Architecture**

**Modules**

System Design

Results