Elevate Labs Internship Project Report

Face Mask Detection with Live Alert System

Introduction

Face Mask Detection with Live Alert System is a computer vision project that aims to automatically detect whether individuals are wearing a face mask in real-time using a webcam. The purpose of this project is to promote public health and safety by encouraging mask usage through AI-powered monitoring systems. It uses machine learning to classify faces with or without masks and provides instant visual alerts.

Abstract

This project implements a real-time face mask detection system using a Convolutional Neural Network (CNN) model trained on images of people with and without masks. The model processes live video feed from a webcam and uses OpenCV for face detection. TensorFlow is used for training and inference, while the system provides instant alerts when no mask is detected. The project demonstrates the application of artificial intelligence and computer vision to solve a real-world health and safety problem in a simple and effective way.

Tools Used

- **Python 3.10.11** – Programming language for the entire project
- **TensorFlow 2.11.0** – Used to build and train the CNN model
- **OpenCV 4.12.0.88** – For face detection and real-time webcam integration
- **NumPy 1.25.0** – For numerical operations and data preprocessing
- **scikit-learn 1.1.3** – For splitting dataset into training and testing sets
- **VS Code** – Code editor used for development
- **Webcam** – Used for live video input for detection

Steps Involved in Building the Project

1. **Dataset Collection**
   Downloaded a public dataset of images containing people with and without face masks. The dataset was organized into two folders: “with_mask” and “without_mask”.
2. **Data Preprocessing**
   Images were resized to 100x100 pixels and normalized. Labels were assigned (1 for mask, 0 for no mask). The data was split into training and testing sets using scikit-learn.

3. **Model Building and Training**
   A Convolutional Neural Network (CNN) was built using TensorFlow/Keras. The model was trained for 5 epochs to classify mask and no-mask images.

4. **Model Saving**
   The trained model was saved as “mask_detector_model.h5” for use in real-time detection.

5. **Real-Time Detection**
   OpenCV was used to access the webcam and detect faces using Haar cascades. The model predicted whether the face had a mask, and visual alerts were shown on the screen with colored rectangles and labels.

Conclusion

The Face Mask Detection project successfully demonstrates how artificial intelligence can be used to address public health challenges. By combining a trained CNN model with real-time video processing, the system accurately detects face masks and provides immediate alerts. This project showcases the power of machine learning and computer vision in creating practical and impactful solutions, and also serves as a valuable learning experience in AI model training and deployment.

Name: NROUPSINH KALPESHSINGH GOHIL

Date: 20 July 2025