SOCIAL DISTANCING PROJECT USING COMPUTER VISION AND DEEP LEARNING

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ABSTRACT

This report presents a methodology for social distancing using computer vision and deep learning with Intel's OpenVino Toolkit. The proposed approach evaluates the distance between individuals in a video feed to mitigate the impact of the coronavirus pandemic. By utilizing an object detection pre-trained model, the system detects people in the video frames and alerts them to maintain a safe distance. The method was validated on a pre-recorded video, demonstrating its ability to accurately determine social distancing measures. The developed technique holds potential as a real-time detection tool.

INTRODUCTION

When the novel coronavirus (Covid-19) pandemic emerges, the spread of the virus has left public keep anxiety if they do not have any effective cure. The public were told to maintain social distancing between them to prevent the virus from spreading. So, to see if the people are maintaining social distancing or not, we can use technology to make it easier and faster. That is where we can use computer vision and deep learning technology to detect the same.

MOTIVATION

The COVID-19 epidemic has brought to light the urgent necessity for efficient social isolation policies to protect the population. The creation of an automated system to track and enforce social distance is necessary given our society's growing reliance on technology. The Intel Unnati program provided us with the opportunity to leverage the power of the OpenVINO toolkit and address this pressing challenge

PRIOR WORK

We reviewed the existing methods for social distancing monitoring using computer vision and deep learning. Most methods use object detection models to detect people and compute their distances, but they have some drawbacks such as occlusions or distortions. Some methods use a bird eye view perspective, which can avoid some of these problems, but they need a fixed camera and a clear view of the people. We will use OpenVINO toolkit to optimize and speed up a YOLO-based object detector and implement a social distancing monitoring system. We will test our system on various videos and compare it with other methods.

OUR APPROACH

We implemented our social distancing solution using Intel's OpenVino Toolkit and developed a methodology for evaluating the distance between people in a video feed. The approach involves the following steps:

Model Initialization: We used Intel's pre-trained person detection model, loading it with the OpenVino runtime for inference.

Detection and Tracking: The model was applied to video frames to detect people by drawing bounding boxes around them.

Distance Estimation: By calculating the distance between the centroids of the detected bounding boxes, we estimated the physical distance between individuals.

Social Distancing Violation Detection: If the distance between two people fell below a predefined threshold, it was flagged as a violation of social distancing.

Visualization and Output: Violations were highlighted with red bounding boxes in the video frames.

Our method was tested on a pre-recorded video, demonstrating its ability to accurately determine social distancing measures between individuals.

RESULT

Performance Metrics: Include relevant metrics such as average inference time, frames per second (FPS), or processing time per frame to evaluate the efficiency of your solution.

Detection Accuracy: Report the accuracy of the person detection model in identifying individuals in the video frames.

Distance Estimation: Highlight the accuracy of the distance estimation algorithm used to calculate the physical distance between individuals.


Inference time: 31.1ms (32.2 FPS)


Inference time: 27.9ms (35.9 FPS)

References:

Overview of OpenVINO™ Toolkit Intel's Pre-Trained Models — OpenVINO™ documentation — Version(2022.3)

Social Distance C++ Demo — OpenVINO™ documentationCopy to clipboardCopy to clipboardCopy to clipboardCopy to clipboardCopy to clipboard — Version(2022.3)

openvino_notebooks/notebooks at main · openvinotoolkit/openvino_notebooks · GitHub

Open Model Zoo Demos — OpenVINO™ documentation

Link of Solution:

GitHub Link:

swarup03/intelunnati_Intellicons (github.com)

Model Link:
open_model_zoo/models/intel/person-detection-0202 at master · openvinotoolkit/open_model_zoo · GitHub

open_model_zoo/models/intel/person-reidentification-retail-0287 at master · openvinotoolkit/open_model_zoo · GitHub