

CS 330: Homework 0

Minh Tran

September 26, 2021

Abstract

Using complicated object detection models gives real-time processing speed and considerate performance compare to human operator for CCTV camera. However, sometimes simple image processing algorithm can already track down the scene change in CCTV camera and display these changes. This report demonstrates that adding a background subtraction pre-process step to zoom into the region of interest can improve the visualization of scene changes for human operator. In the later part, we will explore how this method will also increase the performance of detection models on CCTV camera.

1 Problem Description

Suppose that you're in charge of implement an image processing functions to track the pixel different between two consecutive images and then zoom in the region of interest of the image where there is highest difference. You will be provided helper functions to read a stream of video, to de-noise an image, and to feed an image into an object detection model. You will be asked to implement the function to compare pixel to pixel of each image, and the function to zoom in the largest pixel blobs. You do not need to know anything about object detection algorithms, but if you want to, you can read the Appendix A.

Pipeline Diagram:

- + streamImage (provided)
- + denoise
- + subtract n filter
- + zoomin
- + sendImage(provided)
- content random

Helper functions:

- + void streamVideo(string videoPath)
- + void sendImage(string image)

Needed functions:

- + Grid<int> denoiseImage(Grid<int> inputImage)
- + Grid<int> compareImage(Grid<int> prev, Grid curr)

+ Grid|int_i zoomIn(Grid|int_i difference)

2 Solutions and Test Cases

- + Solution 1:
- + Solution 2:

3 Problem Motivation

- + Concept coverage
- + Personal significance

4 Concept Mastery and Common Misconceptions

- + Concept mastery
- + Misconception

5 Ethics Reflection

- + My project
- + Article and Ethics Question

References

- [1] Alexey Bochkovskiy, Chien-Yao Wang, and Hong-Yuan Mark Liao *YOLOv4: Optimal Speed and Accuracy of Object Detection*. <http://arxiv.org/abs/1207.0016>.

6 Appendix