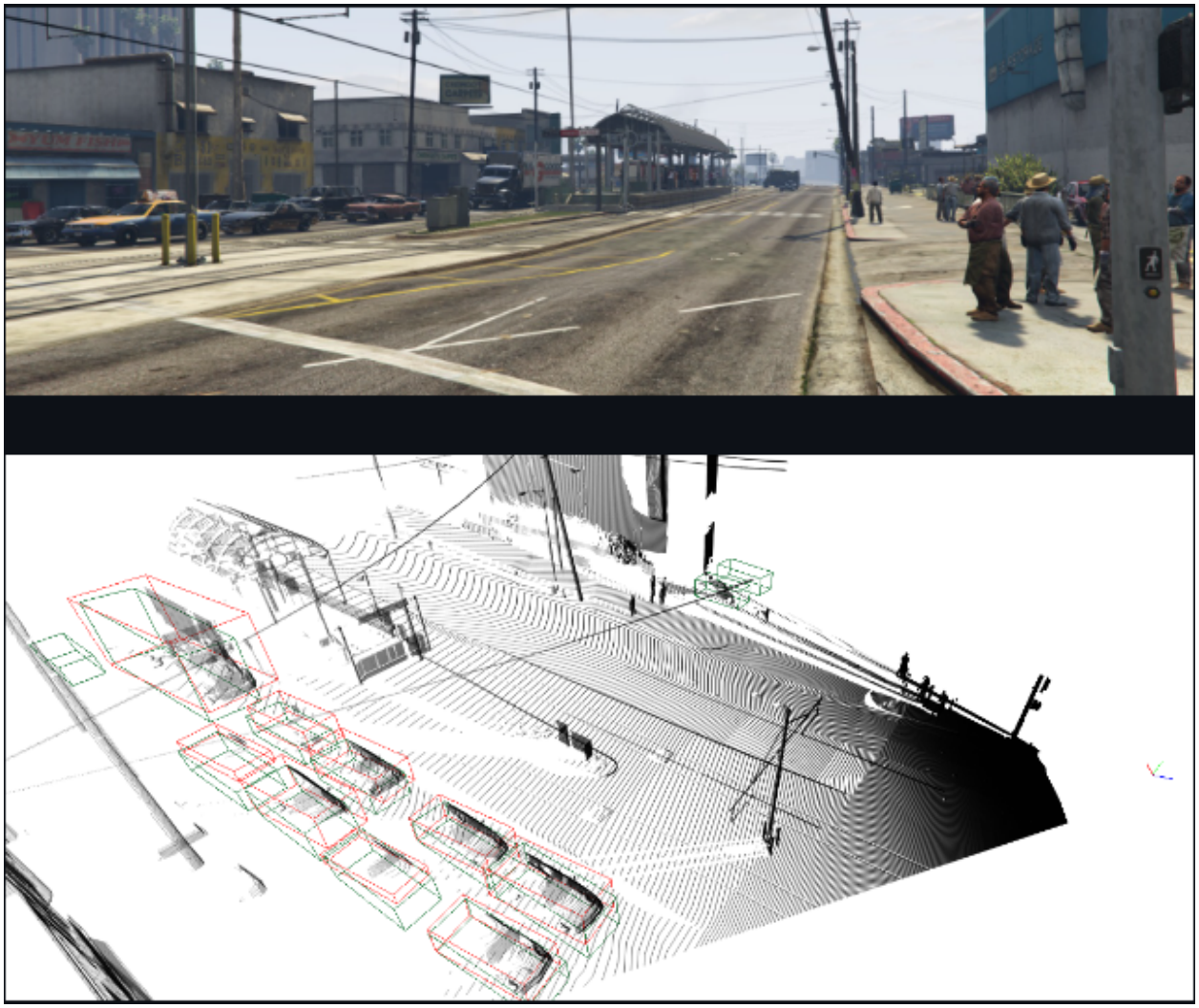
CS 577–01-02-CX

Names: Andrick Mercado



3D Object Localization using TensorFlow

14th October 2022

OVERVIEW

There are many games out there in the world. Still, sometimes we want automation in all sorts of industries and places, such as in the real world with car manufacturing and many other human inventions being automated. With this said it would be great if we could automate player

movement, but how do we implement that in a way that the logic is clever and the automation engine can actually play a game and produce an acceptable outcome, or even auto-farming of a specific in-game mechanic such as Minecraft cutting trees. Well to even begin to imagine these scenarios, we need to design Artificial Intelligence vision, also known as computer vision, with this said a good way to begin is with a dataset, in this case, I will use a dataset of GTAV images, all random images taken from the game, and with this 55GB dataset, we can train the AI's image recognition using computer vision and convolutional neural networks.

MOTIVATION

1. In terms of why anyone would research this, is the same reason why game companies use AI players to test their games, and make sure there exist no bugs and or exploitable mechanics in a game, and with this type of technology, one can do the same as well as use it for player automation. Here player automation can be used for the mechanics explained above as well as for others, which doesn't necessarily align with the games companies goals, which is to exploit the game, not necessarily cheat as this tool will and can be used for research purposes of AI in games.

APPROACH

1. This would take me months to make, but since the internet exists we have amazing tools such as TensorFlow, RoboFlow, and PyTorch to help make this task to fruition in a faster period of time, we will use these tools. With this said we still are going to need data cleaning for the images and for this need to properly re-size images as Neural Networks need images of the same dimensions, but to get to the point we need resizing, squishing, padding, as well as data augmentation for the images, that's just so we can properly train our Neural Network

DATASETS

Number of Records

This dataset contains 55GBs of images which I will only use approximately 10% of for the training, especially since we need to gather all 3D images only of GTAV..

Number of Columns

Columns don't apply for this dataset, but what does apply is the vehicle types, for this case, GTAV has 21 types of cars boats, planes, helicopters, bicycles, motorcycles, compact cars, sedans,

coupes, station wagons, muscle cars, sports cars, supercars, classic cars, SUV, off-road, vans, trucks, utility, service, emergency, military, and trailers. In this case, I will only use regular four-wheel cars.

Column Data Types

A dataset of 2D imagery, 3D point cloud data, and 3D vehicle bounding box labels all generated using the Grand Theft Auto 5 game engine. The dataset contains image and depth map data captured at 1680x1050 resolution and oriented 3D bounding box labels of all vehicles. It is 55GB in total.

REFERENCES

Automated game testing using computer vision methods

https://2021.ase4games.quest/papers/paper1.pdf

3D Object Localisation with Convolutional Neural Networks

https://github.com/oscarmcnulty/gta-3d-dataset/blob/master/3D-object-localisation-with-cnns.pdf