Abstract

The goal of this project is to build a programmable environment that mirrors the physical world. Specifically, it is focused on replicating the buildings and roads. This project is the foundation for future applications that will allow AI to extract data about events in the physical world. The app takes a picture and captures GPS, compass, and gyroscope data. Then the data is passed to a server that hands this information over to Blender to create a dynamic model with the same field of view as the picture. The Blender model is processed through three.js to create a WebGL scene that is shown to the user. By capturing the physical world in a digital format through a camera, the app should be able to upload and render a 3D model that the user can interactively view. The bigger picture being the ability to understand the physical world through the lens of an AI.

Architecture

Android Application:
- Camera Kit was used to model the android application while recording data needed for processing the models.

Database:
- All data about image files and processing was stored using a PostgreSQL database.

Processing:
- Open Street Map, Blender, and Blender-osm addon were used for the modeling.
- Back-end processing was coded in Python in order to connect front-end data to the server.

Web Display:
- glTF exporter was used to convert the blender files.
- Three.js WebGL displays the files to the user.

Impact

The aim of Street Lens is to be a starting point for the visualization of the physical world through AI. Currently video is heavily underutilized as a data resource. This is still a relatively new market with a host of new possibilities. The end goal is to be able to use machine learning in conjunction with videos and images to help understand situations and analyze the data in them. This starts with creating simulations in a virtual world that can mimic a real scene. So our application allows users to model those scenes through their own camera. The focus of this project was to mimic the buildings and roads. With continued progress on the project, the possibilities and applications are endless.

Results

Android camera application view

Photo comparison with 3D model

Summary

The android application allows the user to take a photo outdoors, in which the UI will display coordinates such as: latitude, longitude, compass orientation, and altitude. This data will be stored on the database to use for processing.

The back-end will utilize the data along with Blender and OpenStreetMap to produce a 3D rendering of the area the user took a picture of. The file will then be presented on the Web for the user to view.

Performance

Weekly Task Completion Rate: 100%
Team stayed on schedule and always completed weekly tasks.
Mentor Feedback: Impressed by our ability to execute. When challenges came up, we always found a way to solve for them. Great communication and teamwork with each other.
Overall, functional requirements were accomplished. Expectations for the project were well met.