Team No: 22

Team Members: Zack Khazraeinazmpour, Chase Odgers, Brandon Wheat, William Starks, Ian Hierl

Project Name: PyScan

Project Synopsis:

Generating 3D point clouds from images of objects to develop a 3D model of the object, then applying machine learning models to those point clouds for object recognition or generation.

Project Description:

This project is being undertaken to learn how 3D models can be generated from a point cloud put together from a series of 2D images. Then, after developing a sufficient system for generating and interpreting the 3D models and point clouds, machine learning can be applied to see if it's possible to automatically generate a 3D model from 2D images or even just by describing the object.

Recreating 3D models from 2D images has applications in machine vision and remote sensing applications. For instance, drones and other autonomous vehicles must be able to gauge proximity within environments to navigate safely. Moreover, object recognition of the perceived environment is also important for safe navigation as well as task completion, as such machines become more independent of human controllers.

Ideally the end result of the project would be a program that can take a series of images and convert them into a 3D model, then, if given enough data for a particular object, use machine learning to predict what the object is based on its point cloud representation and potentially generate its own point cloud based on that prediction.

Project Milestones

First Semester	Second Semester
Practice generating 3D models from existing point cloud datasets - **10/16/2020**	Research best machine learning models and methods for our goals - **First 2 weeks of February**
Scanning/Image capture device completed and image taking process automated - **10/23/2020**	Apply machine learning model to existing point cloud data - **Last 2 weeks of February**
Automated image processing completed - **11/6/2020**	Apply machine learning model to our data - **Third month of second semester**
Point Cloud generation from images completed - **11/20/2020**	Fine tune ML model and continue to make adjustments as necessary - **Fourth month of second semester**

Project Budget

- Cloud AI computing service - $50-100 over the full year
- Cameras, sensor components and device body - $100-150
- Arduino Microcontroller - $25

Gantt Chart Below

GOAL	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY
RESEARCH POINT CLOUD DATA TECHNIQUES	███	█						
CHASE, IAN								
GENERATE 3D MODELS FROM EXISTING DATASETS		███						
CHASE, IAN								
RESEARCH/ORDER HARDWARE COMPONENTS	███	█						
ZACK, CEDRIC, BRANDON								
BUILD SCANNING DEVICE		███						
ZACK, CEDRIC, BRANDON								
AUTOMATE DATA CAPTURE			███					
ZACK, CEDRIC, BRANDON								
AUTOMATE IMAGE PROCESSING			███					
CHASE, IAN								
COMPLETE POINT CLOUD GENERATION PIPELINE				█				
EVERYONE								
EVALUATE PROGRESS/FURTHER RESEARCH				███				
EVERYONE								
RESEARCH RELEVANT ML TECHNIQUES					███			
EVERYONE								
TRAIN ML MODEL ON PREEXISTING DATASETS						███		
EVERYONE								
EVALUATE MODEL ON GENERATED DATASETS						███	█	
EVERYONE								
FINE TUNE MODEL								███
EVERYONE								