

## **CSCI 5622 : Machine Learning Project Milestone 1**

### **1. Group members and name**

- a. Team name: Vision Guided Picker
- b. Members
  - i. Young Il Joe
  - ii. Cameron Mattson
  - iii. Venkata Janakirama Pradyumna Gudluru

### **2. Motivation**

A vision guided robot (VGR) is a robot equipped with one or more cameras to sense surroundings and give feedback to the robot. Robots are already widely adopted in the manufacturing industry for tasks such as welding, painting, assembly, disassembly, packaging and labeling, palletizing, product inspection, and testing. Traditional industry robots have predefined algorithms and specialized sensors which sense data in real-time and act upon it. This limits the number of possible robotic applications. Due to recent advancements in computer vision algorithms, more robots are equipped with these algorithms to sense their surroundings. And visual information allows robots to be more adaptable and capable while lowering the manufacturing and operating costs compared to other robots equipped with more specialized sensors such as lidar and radar.

Computer vision is an integral part of vision guided robotics since visual information has an overwhelming amount of information about a robot's surroundings in a 2D projected form. To demonstrate the capabilities of vision guided robots, an autonomous vision guided fruit picking robot will be implemented in a simulated environment. Combining an instance segmentation technique and a depth camera (such as Intel RealSense or Microsoft Kinect), a robot can locate a particular fruit in 3-dimensional space with respect to the camera, plan a path, reach the target, and pick the fruit.

### **3. Data/Data plan**

- a. We plan to employ COCO 2017 dataset.
- b. The data we plan to use will be pictorial. Some interesting features include shape, size, and color since we plan to classify different fruits. However, we plan to implement deep learning models to extract features from these pictures.
- c. The number of samples that are available total 123,287 images. This includes both positive and negative examples of fruits and vegetables, where positive examples contain a picture of a fruit or vegetable and negative examples do not.
- d. A custom training dataset can be prepared manually using VGG Image Annotator with images taken in the real world or a simulated environment if required.