

Innovation – GoCartAI - Driving AI into everyday life

Introduction

With the resurgence of artificial intelligence and deep learning, one of the most promising disruptions taking place is in the automated driving market. Projected to be a \$200 billion opportunity by Piper Jaffrey in 2021, the field has attracted numerous organizations, automakers, and startups. However, there are practical limitations to seeing the deliverance of a minimum viable product in the next five years as purported by the media. Verification and validation of safety critical systems like cars, and government laws, will apply a brake on the acceleration of these concepts. However, like any great invention leading to the creation of multiple industries, one must acknowledge that machine learning (or AI) can be used to solve mundane repetitive tasks that are too cumbersome for everyday life, without being life-threatening. I proposed a concept to use machine learning to solve simple problems like self-driving shopping carts, self-cleaning refrigerators, automatic loading luggage carts at airports and many more. AI based human services market is expected to open up opportunities of the order of \$ 10 billion, within the next five years. Home automation at different levels has already begun and bridging the gaps in between, at workplace, school, shopping and travel is the natural niche that I am trying to capitalize on, with a purported market share of 15% (\$150 million).

Problem

There are many tasks that can be accomplished by machines that can make human life easier and allow us to concentrate on more interesting/important tasks and improve the quality of our lives. The first one that I came across was pushing grocery carts at Costco: not only was it a hindrance to a great shopping experience, but it was also a load to haul all the way to the car to offload the luggage. In airports, the problem is compounded. Carrying hefty luggage and placing it on a cart is not only tiresome, but sometimes impossible and even hazardous to health safety. At a smaller scale, an annoying and impossible task is to keep a refrigerator updated all the time. Foods spoil and expire posing a health hazard if not attended to immediately. Who would not love to have a shoe organizer that arranges shoes automatically, when we get home? These and many more tellurian tasks can be solved partially using robotics and AI providing much needed relief to mundane life.

Solution

I proposed a simple system which consists of a robotic controller attached to the base of every grocery cart controlled by the sensors in our mobile phones. All modern mobile phones are capable of determining our speeds, orientations using inbuilt accelerometers, compass and gyroscopes. A function of these can be transmitted to the robotic base to have the cart follow you around in the shopping arena and then back to the car. In addition, these carts will be equipped with intelligence to drive themselves back to the docking areas. The cart will have knowledge of the aisles visited by people and can (using a display) provide information about the products available. In addition, they can docket the customer visits to different sections of the shop for data analytics research that can improve customer satisfaction.

Further thinking established that mounting a passive data rich sensor like a camera to such a cart could enhance the capabilities significantly, including obstacle avoidance and navigation.

An extension of such a system will be deployed in airports as well where the carts will also be capable of self-loading using a robotic platform. Carts can be auto loaded from stations with robot arms (similar to a garbage truck). The luggage and the cart need to be taken to a station, where the arms on the station will load the luggage on the cart, using a vision based position controlled algorithm.

A vision based system residing in the refrigerator would classify food items as fresh/stale and automatically move them to a garbage slot appropriately, which can then be disposed of in an eco-friendly manner.

A camera mounted lazy Susan can be used to organize shoes and sandals at home. A deep learning based classifier classifies shoes by appearance with high accuracy. Never again search for the right pair of shoes or worry about keeping them in the same location everyday. Let the AI take care of it for you.

Result and Impact

I am working with Dr William Kaigler from the Swartz Center for Entrepreneurship to further scale and develop the conceptualizations. Our team is being trained for the AlphaLab Gear Hardware Cup for early stage startups. We have submitted two patents with the USPTO in August 2017. We have conducted a prototype trial with Costco Wholesale at Santa Clara and Mountain View. We have also been approached by venture capitalists in the Bay area, California, through our participations in Plug and Play (Sunnyvale) and Y-combinator. The concept is currently being verified by using simulated data and openai.gym. This has allowed us to accelerate prototyping for early reference requests and demos. My knowledge and use of deep learning for the venture idea has resulted in partnerships with the open source communities supporting AI (namely tensorflow, caffe2, openai.gym and others).

The webpage for the startup being formed is here: <https://gocartai.com/>

The impact of bringing AI and robotics into everyday life allows for a better quality of life. In addition it helps businesses grow and cater better to customer needs by using mobility, connectivity and data analytics. Automation of tasks that humans tend to forget or be incapable of doing will make living safer, secure and more comfortable. People will be able to spend more time with family and friends, rest and relax as we let the machines serve us.