Convolutional Neural Network Application: Integration of AI

Markeilia Cassis | **Dr. Thomas Liu** | **Napoleon Santana** |
New Jersey City University

Abstract

The topic of inquiry for this experiment was convolutional neural networks (CNN) and their application to daily life activities such as driving. The research's purpose was to prove if reinforced learning (RL) is an efficient way to utilize artificial intelligence (AI). In specific, is it possible to simplify neural networks for broader use in companies and the daily life of consumers with minimal source code alteration? By using Linux and the program's terminal, the Donkey Car's Raspberry Pi was accessed; hence, the car's autonomous functions (including steering) were available to the programmers. The results proved that the Donkey Car 2.0's source code can open-source AI and allow a CNN to be scalable to other vehicle types. Additionally, the car was able to learn a course simply from image recognition. In essence, CNN can be user-friendly for broader use; however, unclear image recognition can skew data-processing and hurt the efficiency of RL.

Introduction

Rational: Autonomous vehicles like regular automobiles was the inspiration for this research. The objective of our project was to successfully transfer neural networks in order to promote neural networks becoming a streamlined process.

Hypothesis: If utilizing the Donkey Car 2.0 source code, an open-source AI, the neural network should become scalable to different vehicle types.

Research Question: Is it possible to simplify neural networks for the broader use in companies and subsequently daily life for consumers? If neural networks can be simplified, can they be transferred to various vehicles with minimal source code alteration?

Method

To gain access to the Raspberry Pi, we used Linux and the program terminal to access the Raspberry Pi's Wi-Fi. Following that, we entered the computer to see the data on the car, then ran the car's autonomous functions in along with its drive functions to steer the car.
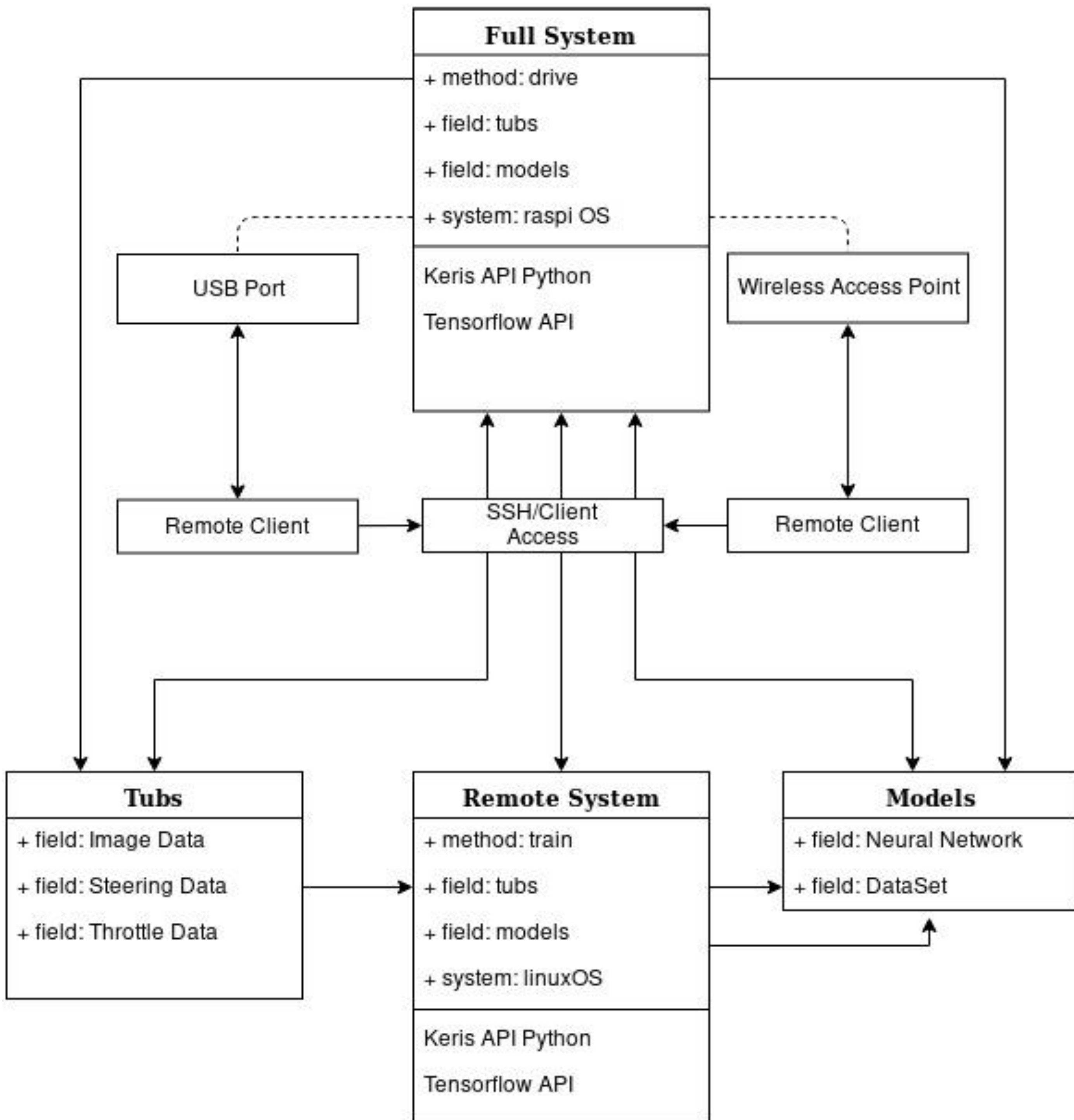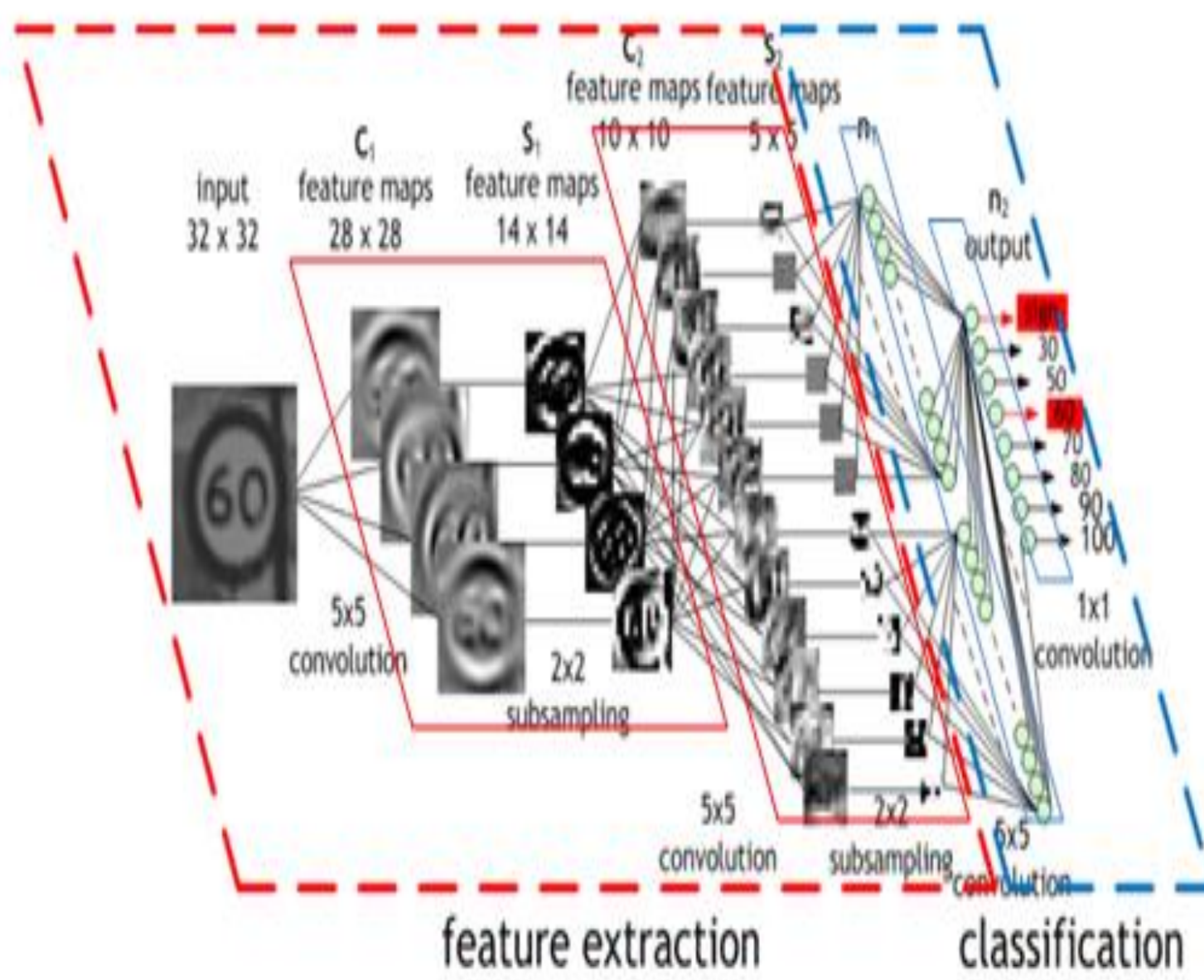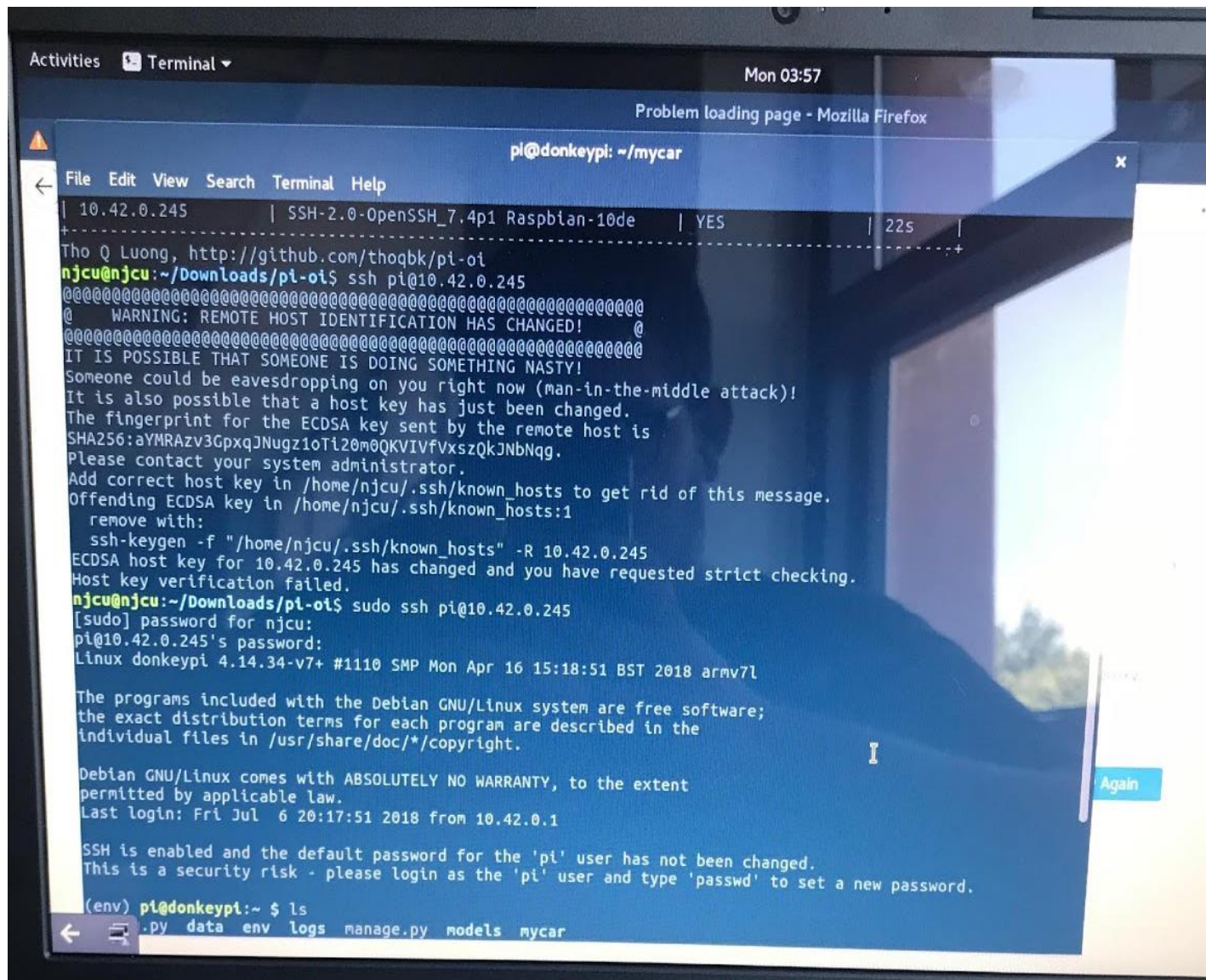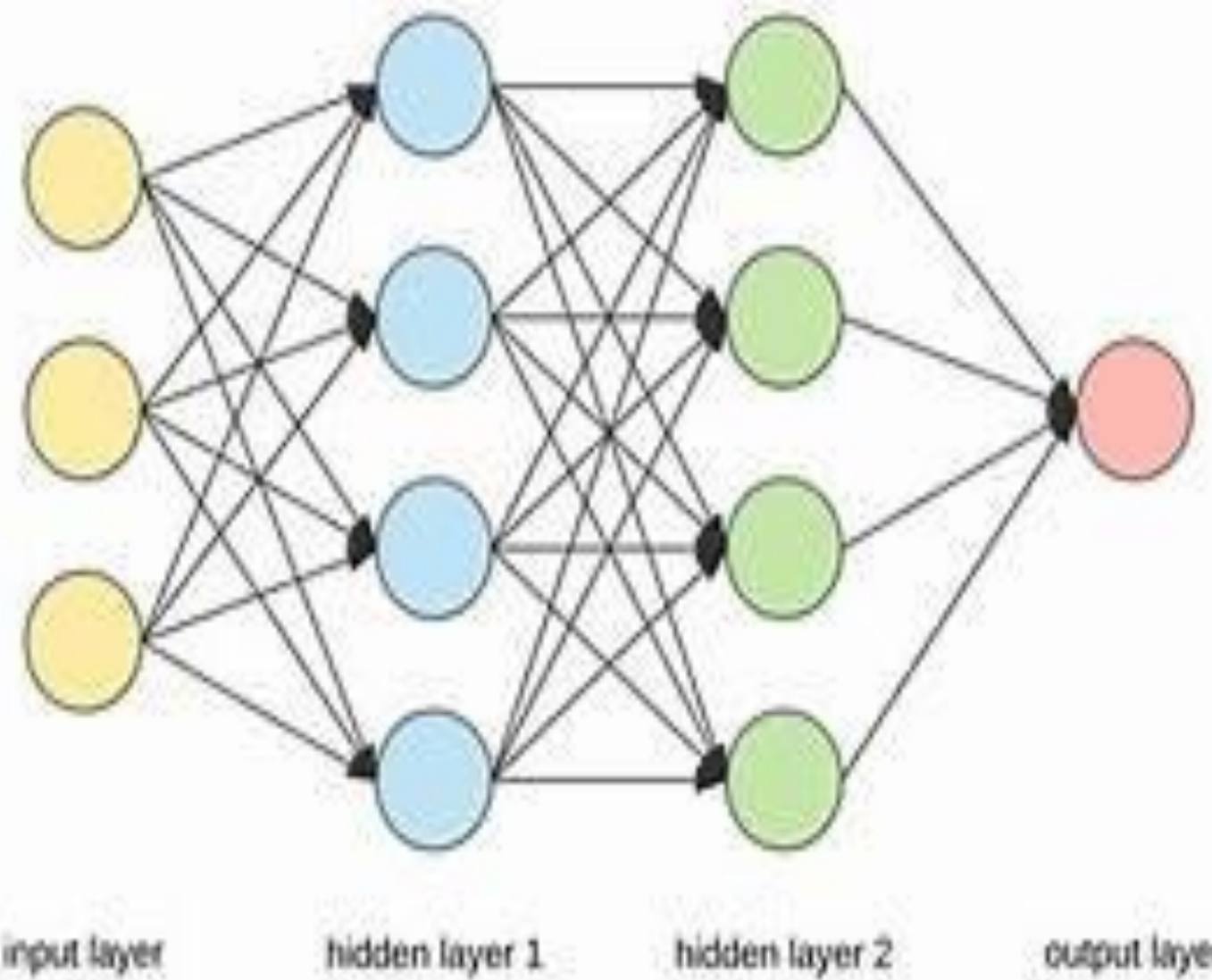
Results

We were able to get the correct autonomous settings to control the car remotely. This paved the way for the car to drive around a simple track loop. It took several trials for the car to smoothly drive around the track without hitting any cones because minor pieces of skewed data that potentially added more variables to the neural network to solve. We used a convolutional neural networking in which pixels are used as input data for the neural network to make decisions from video recording (via the onboard camera). This research has helped expand the uses of neural network technology in applications such as assisted driving while integrating AI into everyday life.

Results

We were able to prove that the Donkey Car 2.0 source code can open-source AI and allow a neural network to become scalable to other vehicle types. Nonetheless, there are still a couple of issues that need to be resolved. The impactful research conducted during these weeks have outweighed the challenging process because it allows technology to be increasingly accessible to everyone. The Donkey Car software efficiently operates a smaller scale car and demonstrates that there is so much more to explore in AI. With that said, the benefits and wider range of use for AI is awaiting to be discovered.

Resources Used

1. **Donkey Car. (n.d.).** Retrieved from http://www.donkeycar.com/Donkey Car. (n.d.). Retrieved from http://www.donkeycar.com/

2. **Na, Taesik, and Saibal Mukhopadhyay**. "Speeding up Convolutional Neural Network Training with Dynamic Precision Scaling and Flexible MultiplierAccumulator." *ACM Digital Library*, ACM New York, NY, USA ©2016, 8 Aug. 2016, delivery.acm.org/10.1145/2940000/2934625/p58-na.pdf?ip=

Acknowledgements