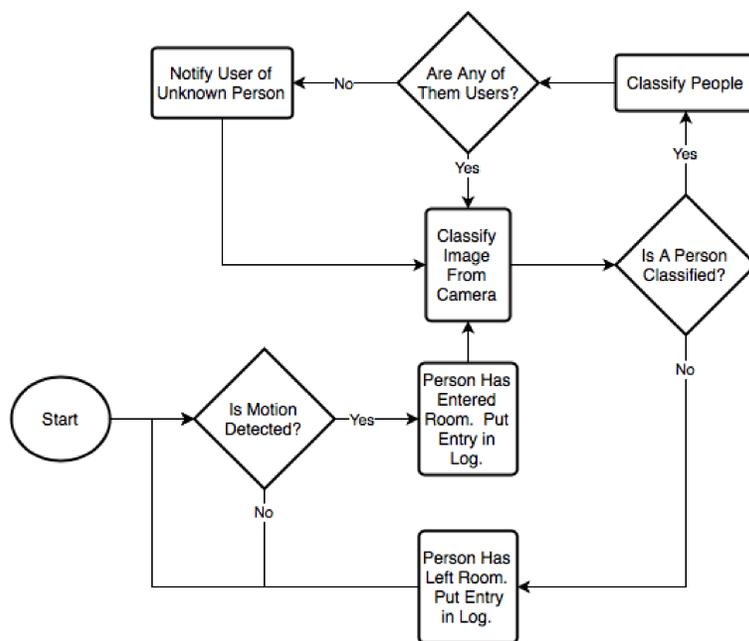


Open Eyes Smart Application

Object Recognition



The Open Eyes system relies on deep learning neural networks to recognize objects and people in the scene. This information is then interpreted and sent to the Alexa device for use in almost every Alexa response. The object classifying network recognizes objects such as people, cats, dogs, phones, tables, books, couches, TVs, cups, bowls, and much more.



Decision Process of Main Computational Program

Overview

Open Eyes is a smart home application that combines machine learning and computer vision techniques into an Alexa smart home app that works through your Amazon Echo device. The application will fulfill several purposes. It will notify the home user when unknown guests have entered, track commonly lost objects and communicate a catalog of objects detected. Open Eyes uses deep learning neural networks and computer vision to observe its surroundings and provide users with information they require. It is operated by simple voice commands such as "Who is in my living room?" or "Where is my phone?". The system should lay a basic framework for more smart home/computer vision type applications in the future.

Open Eyes integrates with an Amazon Alexa enabled device in order to provide an easy to use, hands free interface.

"Alexa, Open Your Eyes"

"What Is this?"

"What do you see?"

"Was anyone here this evening/afternoon/morning?"

"Where is my phone/cat/couch?"

"Help, I don't know what to say."



Motion Detection

Purpose:

- Allow computer to "rest" when no one is in the room
- Save energy

How it works:

- Motion is detected by taking the difference between a current frame and a previous one (see image 1)
- The difference is then thresholded; this is (see image 2)
- If the area of the thresholded image is great enough, it is classified as motion and the neural networks will start operating

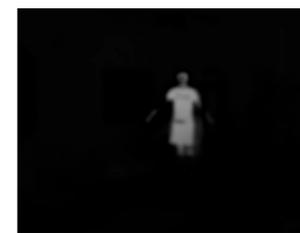


Image 1

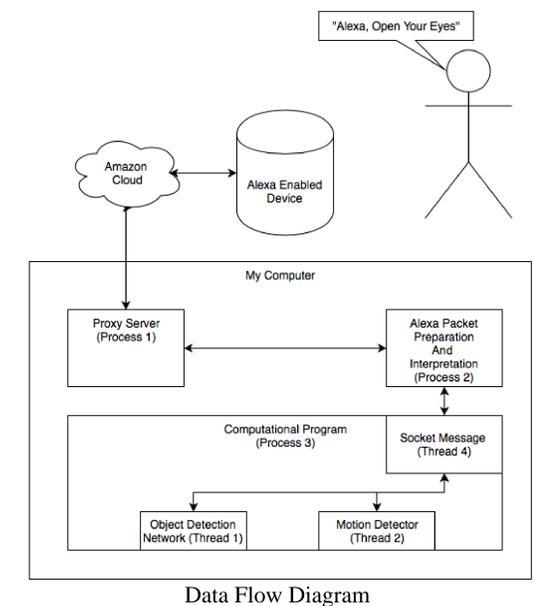


Image 2

User Recognition



Recognizing the user (in this case myself) is done using the same process as object recognition: neural networks. Data was collected and networks trained so that Open Eyes could effectively recognize the user of the system. This gives Open Eyes a personal feel and allows for a security aspect to be added. If Open eyes detects an unknown person in the room during a certain period of time without seeing the user, it has the potential to notify the user of the intruders.



Data Flow Diagram

Additional Features

Phrase Construction

A large variety of responses needed to be constructed to translate what the neural networks saw to the English language.

Modified Phrasing

When conversing Open Eyes is compatible with a variety of phrasing options; for example "Who is in my living room?" vs "Is anyone in the living room?"

Fast processing

Open Eyes utilizes a NVIDIA GeForce GTX 1080 GPU to ensure quick responses.

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Spring 2018

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