Capstone Project #3 - Proposal

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1. The Problem

1.1. Statement

Can the video camera of the AI toy robot Cozmo be leveraged for object detection using a keras convolutional neuron network (CNN) classification model built from scratch and run locally?

1.2. Context

Cozmo is a 5x10 cm AI robot that was first commercialized by Anki in 2016. Through a dedicated application, Cozmo is able to interact and play with people and pets, to detect and to identify faces, to explore the world without getting in trouble (e.g. fall off a table, hit objects) ...etc... The Cozmo SDK (aka. Software Development Kit) allows Python developers to control the robot and create new applications. There is a plethora of projects and educational curriculums available on the web involving Cozmo. Object detection projects mostly involved pre-trained model such as Google's Inception or cloud based storage and function.

2. Steps for Success

2.1. Criteria for success

Build a CNN model from scratch using Keras and images sampled by Cozmo that can achieve a prediction accuracy of at least 80%.

2.2. Scope of solution space

- ➔ Design a sample strategy which allows Cozmo to sample images consistently and efficiently.
- ➔ Build, train and validate a CNN model with Keras.
- ➔ Apply the model in real-time while Cozmo is looking around.

2.3. Constraints

Cozmo's video camera produces low resolution black and white images with 3 channels.

Risk of memory overload because the model is run locally.

2.4. Stakeholders

- ➔ Cozmo.
- ➔ My self-esteem.

2.5. Data Source

Cozmo collects the images using his video camera. There are no additional data sources.

3. The Approach

- ➔ Cozmo samples images of the four letters.
- ➔ The images are prepared and labeled by Keras preprocessing library.
- ➔ The model is trained then validated.
- ➔ Cozmo takes new images and send them to the model which sends back a prediction.
- ➔ Cozmo says what letter it is.