

Computers Aiding Impaired Vision

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Cognitively Impaired Vision

Cortical visual impairment, (CVI) is a form of visual impairment that is brought on by a problem in the brain rather than one in the eyes. It has a number of symptoms one being that sufferers can find it difficult to identify objects that do not have enough contrast to their surroundings. Therefore designing a safe home for those with CVI requires some thought. For example doors need to be in sufficient contrast the walls around them, and sinks, baths and toilets need to sufficiently stand out in their surroundings.



How can computers aid this problem?

The aim of the project is to create a piece of software that can take in an image and identify objects in that image that are likely to be difficult to be seen by someone with CVI.

Computer vision algorithms have improved dramatically in the last few years, with of course the introduction of using Deep Neural Networks. Some can identify objects and their locations at a rate of 40fps (YOLO V3). Others can produce 'masks' over the objects detected. These masks give a pixel by pixel map of where exactly the object occupies in the image. It is these masks that will help us with the problem.



How will this be implemented?

Many fully trained computer vision models are freely available and Google has published a plethora of them that work with TensorFlow. Taking an existing model and adapting it for your own purposes is called 'Transfer Learning'. Training a new model from scratch is very expensive and time consuming.

I have taken a model that produces masks, extracted the coordinates of those masks and run an edge detector on them. This gives me the exact pixels that outline the object. With this information I can now compare the contrast of the outline of the object with the surrounding area. This will hopefully provide a useful metric that can be used to identify household objects that may be a problem to sufferers of CVI.

