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Writing Assignment 1

The concept of computer vision has been around since the 1960s, but in recent years the field has exploded due to advanced algorithms and powerful computers. Computer vision is now a powerful tool which is transforming industries. Computer vision is helping improve the performance of self-driving cars, allowing Google Translate to do real time translations by pointing ones phone camera at text, and helping doctors with diagnoses by analyzing x-ray images.[1] In today's world there are cameras everywhere, from street corners to your doorbell, many of them accessible to the average person. All of these cameras pose an opportunity for computer vision to continue to grow and help more people. However, in order for an average person to harness the power of computer vision, they need experience with programming and an understanding of computer vision. Because many people do not have this experience, our Object Identifier will do the work for them.

Include transitionFor example, if a person has a doorbell with a camera, they might want to know if the person walking up to their door is the mailman. Using the Object Identifier, they would be able to train their camera to identify the mailman whenever he walks up to the door. Without the Object Identifier, the user would have to write code themselves to train a classifier, which the majority of people do not know how to do. The Object Identifier will also be helpful with security. A casino may believe that there is a person cheating in one of the games, but in a crowded casino it can be difficult to track what that person is doing or if they are even in the casino. A casino security team probably does not have someone with computer vision skills around, but with the Object Identifier they could train one of their security cameras to identify and track the person they are looking for. These are a couple instances where the Object Identifier would be useful, but there are examples of uses in almost every field and in everyday life.

Include transitions.The Object identifier will be simple to use. First the user will upload a video in which the object, or objects, they want to track appears. They will then label the object a few times so the algorithm will get an idea of what it is looking for. The model will be trained and show a few examples of where it found or did not find the object. The user will look through the examples and correct the model in the places it was incorrect. They will be able to add labels where the object was missed, remove labels that were incorrect, and adjust labels that were close. The model will then be retrained, and the correction process will repeat until the user is satisfied with the accuracy of their model. The user will then be able to use their model and it will also be stored in a database for future users to use if they are looking for the same object.

Transition.The biggest challenge for the project is the small dataset. For most computer vision projects the model is trained on hundreds or thousands of samples which improves the accuracy of the model. In our case, we know the user cannot label that many images on their own, so we will be working with a smaller dataset. Our plan for combating this problem is our iterative training approach. After the user labels a few images on their own, they will work with the Object Identifier to label more images. Because the user is only correcting labels generated by the system, they will be able to quickly create a larger dataset for the model to learn from. We will also be using the You Only Look Once (YOLO)

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[1] Marr, Bernard. "7 Amazing Examples Of Computer And Machine Vision In Practice." Forbes, Forbes Magazine, 8 Apr. 2019, www.forbes.com/sites/bernardmarr/2019/04/08/7-amazing-examples-of-computer-and-machine-vision-in-practice/#225cf11d1018.

algorithm to combat the issue. The YOLO algorithm is the fastest algorithm for learning and identifying objects, so the user will not have to wait between iterations of corrections.[2]

TransitionRight now, computer vision is immensely powerful and is being used for impressive applications in many fields, but it is not reaching its full potential because the technology is not accessible without the budget to hire a computer scientist. The Object Identifier will make the ability to use computer vision available to everyone and allow computer vision to expand to more areas of study and for everyday uses. You must also mention that you are seeking funding (see prompt).

[2] Joseph Redmon, Ali Farhadi, "YOLO v3:An Incremental Improvement", University of Washington 2018, https://pjreddie.com/media/files/papers/YOLOv3.pdf.