Semester Project for Guillaume

Goal: The company would like a computer vision tool to help us detecting substitutions in soccer. This requires detecting the presence of the substitution board, as well as reading the numbers on the board (also telling green vs red as well for incoming and outgoing player). The deliverable should be a standalone program, (in python or C++) which can perform the task above.

Approach: The tools should be a visual classifier, and will most likely use CNNs. Although python or C++ is fine, python will likely be much easier. The recommended library is Keras (easy and already used by the company), although if you would prefer to use another major library, then that would be fine as well. Since we generally know where to look for the substitution board, there is no need to do object locating, but only classification. Some recommended networks include mobilenet, resnet, or simpler classification networks like the ones used for MNIST.

After determining that the substitution board is present, we need to read the numbers. This can also be seen as a classification task where we want to output each digit as a 0-9 classifier. We can go into this in more detail after the first part is done. You can also look at some work on MNIST which is a digit classification task.

Data: When using company data (including any footage), you should be physically present in the Second Spectrum office. In order to start working on the project and to facilitate remote work, it’s recommended to use data available on google or Youtube as a start. Pictures of a soccer scoreboard can be easily found on google images, and negatives can be taken from Youtube videos of soccer matches to align with what we would see from our cameras. Once a basic classifier is working, it should be possible to bootstrap the data by trying to find new images of a scoreboard automatically, and then manually cleaning up the results.

After getting such a solution working on open source data, you can come to the office to gather training samples from our cameras (we already know all the videos where the substitutions occur).

Because samples with all possible numbers may not be available, we may need to look into data augmentation in order to train a classifier to detect the numbers on the board.