**Recognizing and Reading the Substitution Board during a Football Match**

Semester Project

**1 Organization**

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**2 Contents**

**2.1 Goal**

The goal of this semester project is to create a program that will be able to recognize when a substitution board is being held up, announcing a substitution, and to extract the numbers written on it. Therefore, this project is divided into two parts : the first one consists in noticing that a substitution is about to take place, and the second one is saying which player will come off (red) and which will come on (green).

**2.2 Context**

Second Spectrum has developed an algorithm tracking every player during a football match. However, when a substitution is made, this algorithm has to adapt. It must be aware of which player comes out, in order to stop tracking him, and of which player comes on and must be tracked instead. Until now, the algorithm was given this information by the engineers supervising the QA of the match. The program should be able to take care of this task.

The data used will be images and videos found on internet that show a substitution board being held to announce a substitution first, and then the videos from the cameras of Second Spectrum.

The tool will be a simple classifier and will not involve object locating since the event we are interested in always happens in the same place.

**2.3 Outline**

Thefollowing outline is proposed :

1. Learn how CNNs work and get familiar with the Keras library.
2. Detect when the substitution board is held in the specific area.
3. Recognize the digits and extract the information.
4. Analyze the results and the efficiency of the program.

**3 Miscellaneous**

Program : The program will be written in Python and will use Convolutional Neural Networks. The Keras library will be used.

Daily organization : The student will work on his computer for at least the first part, as long as the data from Second Spectrum is not involved. The student will come once a week to discuss with the Industrial supervisor. When data from Second Spectrum is used, the student will be at the office.

Deliverables : At the end of the semester, the student will deliver his program and a report explaining its functionality and how it was made.

Confidentiality : The student agrees to sign an NDA, and to be at the Second Spectrum office when he uses their data.

Intellectual Property : The student agrees that the program will be the property of Second Spectrum.

Project Duration : 21.02.2019 – 07.06.2019