1. List different examples of AI that are doing similar stuff and from which we could inspire.

The problem of rotation correction is similar to the problem of image or sound signal de-noising. To overcome this, de-noising algorithms such as autoencoders can be adapted for this task.

2. You will find in this directory some examples of raw data (t, x, y, z, where t is the timestamp in milliseconds and x, y, z are the three values of acceleration in units from -512 to 511) provided by the captor during a football game, already in the chosen convention. If ever, and it's not the mandatory way to proceed, we want to select our features manually, what properties of the leg movement can you use?

The movement of the leg during running or walking is cyclic and can be decomposed into several stages (depending on the precision of the decomposition one can find between 3 and 7 stages). If rotations on several axes are detected on the phase where the 2 feet are adjacent (and thus where the leg is vertical), an undesired rotation of the sensor will be perceptible.

3. Please describe what solution you would choose to create and train an algorithm to re-orient tracker's data. List the different libraries you may use.

The algorithm implemented is a convolutional autoencoder using CNN1D in order to exploit the temporality of the data. To realize it, the usual ML libraries such as Tensorflow, Pandas or Scikit Learn will be used.

4. Build yourself a training/testing dataset by applying random rotations to parts of the signals provided in the directory.

In order to make the rotations more realistic, in addition to the random number of rotations, the duration of the rotation is also random (between 3 and 10 TimeStamp). These have been realized thanks to the Scipy library.

5. Train the algorithm and present the results you obtained

The results of the algorithm seem to be imprecise and have difficulties in correcting the rotations. Although different combinations of parameters have been tested, none of them offers conclusive results.

6. Explain the limits and/or the ways of improving your algorithm.

The algorithm has great difficulty in correcting rotations, whether they are large or small. In addition, particular gestures such as falls or tackles are abnormal sensor movements that can be interpreted as sensor displacement. In order to improve the algorithm, it could be useful to use the properties of the leg by analyzing the acceleration cycles during a step.