Training and sports performance in trampoline and table tennis

Centre d’Alt Rendiment – CAR, Sant Cugat

Extended Abstract
In the scenario of sports analysis, different Computer Vision techniques have been recently applied in order to study particular poses and exercises related to athlete performance. However, given the difficulty of capturing accurate features from classical RGB cameras, recent research is focused on Multi-modal Computer Vision, where different visual modalities can be acquired, synchronized, and feature descriptors can be fused to obtain better discrimination rates when analyzing the performance of particular exercises. An advantage of using feature sets with complementary visual information is that most state-of-the-art inference approaches can be applied independently of the considered feature space. For instance, some actions/gestures in sports can have similar visual representations when looking with a classical RGB camera but they can be correctly identified when combining with depth maps, including an extra feature to the action/gesture representation. Thus, in some of these cases, the combination with proper data features from different sensors can increase the generalization capability of the system. Recently, with the arrival of the Kinect hardware/software to the market, the Depth map information has obtained much attention. The multi-sensor Kinect combines video information with a Depth map, allowing a new RGB-Depth representation.

In this master thesis, it is proposed in collaboration with CAR Sant Cugat to capture multi-modal RGB-Depth data obtained by means of the Kinect device, synchronize and align the captured modalities with a frame rate near 30FPS, and use the Computer Vision and Pattern Recognition software in order to extract relevant features and sports indicators useful for the purpose of training and sports performance in trampoline and table tennis. The master thesis tasks will be:

- Environmental specifications and biometry features (acquisition system setup), data acquisition and calibration and low-level feature extraction.
- Sport indicators will be defined based on coaches’ know-how and technical possibilities for both ping pong and trampoline in order to measure the athlete performance. As an example it will be computed the deviation in a jump with respect to the centre point of the trampoline while performing exercises, estimation of verticality, and the height of the jump.
- In the case of table tennis, it can be measured a frequency map of activity showing the percentage/density of activity of each player within and out the ping-pong table as well as the height of the hands during the game.

The student will have the support of Computer Vision Experts, physical experts from the CAR center, and also the use of their facilities during the development of the master thesis.

Further Information:
Jordi González (UAB) – jordi.gonzalez@uab.cat
Xavier Balius (Centre d’Alt Rendiment - CAR) – xbalius@car.edu