

# **Cinalysis: A New Software For Swimming Races Analysis**

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Since a few years, performance analysis during a sport event became a key point to understand and improve athletes' performance. Nevertheless, as during football and basketball games, these analyses are often statistical analysis. No kinematic data are collected. Performance analysis during swimming races also follows this trend. The most widely used software (swimwatch, ...) designed for swimming races analysis only provide data such as mean stroke lengths, mean stroke frequencies, start distance and turns distances. Moreover the collected data remain inaccurate and unfaithful.

Cinalysis is a new software which aimed to collect accurate kinematic data in real-time and markerless conditions. This software aim to be used by swimmers' coaches or scientists and aim to measure instantaneous swimmers position and velocity from the images collected with a single fixed or moving camcorder. Camcorder could be placed anywhere on the poolside, but should rather be located at the top of the bleachers. Specific algorithms have been developed in order to automatically track the swimmer head. An algorithm for single moving camcorder calibration has also been developed. This algorithm works with every kind of camcorder. Internal camcorder parameters are estimated at the beginning of the evaluation session using a simple planar calibration rig. The internal parameters must be constant during the whole analysis. External camcorder parameters are initially computed and refreshed for each image. Finally, a semi-automatic signal processing toolbox has also been included in the software.

A pilot study has been led during an international competition in 2008 (the French EDF meeting). The results' analysis of this study allows showing that cinalysis succeeded to collect classic data but also succeeded to collect accurate kinematic data. These data allow a complete analysis of the race strategy and allow identifying the velocity loss induced by technical mistakes. The software also allows realizing the many between swimmers comparisons.

Keywords : swimming race analysis; kinematic; software