Comparing speed climbing videos using direct manipulation techniques

Duration: 4-6 months
Team: Loki (Inria Lille – Nord Europe & CRIStAL)
Advisor(s): Bruno Fruchard & Stéphane Huot (bruno.fruchard@inria.fr, stephane.huot@inria.fr)

This internship is part of the PerfAnalytics project (ANR PIA-PPR 2020) that consist of a collaboration of various Inria teams, universities, and institutes such as INSEP (French institute for sport and performance), as well as several French sport federations. The student will collaborate with high-performance sport professionals and contribute an interactive tool that will facilitate performance analysis.

Description
Speed climbing became an Olympic sport at the 2020 Tokyo Olympics. Athletes race by two to reach the top of the wall as fast as possible. The world record is now 5.208 seconds for a wall of 15 meters high. One specificity of this climbing category is that the spatial layout of holds never changes. This offers great advantages to image recognition algorithms for identifying holds in space and computing the speed of athletes on specific areas on the wall, as well as categorizing mistakes made on particular holds.

Automatically analyzing athlete performances quickly reaches some limits, however, and requires a human expert analysis to categorize specific mistakes that are too challenging to tackle automatically (e.g., the position of fingers or the orientation of a foot on a hold). These experts need interactive tools that enable quick but efficient comparisons of several performances of the same or different athletes. We propose within the scope of this internship to design, implement, and evaluate the advantages offered by an interactive tool building on direct manipulation of video streams such as DimP [1] or Dragon [2]. Several strategies can be adopted to compare athlete performances. For instance, a "ghost" effect can be used to superpose two video streams and easily compare movements when reaching and leaving a given hold. The goal of the internship is to provide a robust and efficient tool to compare athlete performances to the French federation of mountain and climbing (FFME).

Objectives
- Design and implement an interactive tool (ideally built on web technologies) to quickly and efficiently perform a qualitative analysis of speed climbing athlete performances.
- Evaluate the efficiency of this tool through lab user studies to better understand advantages provided by such a tool, for instance, by comparing it to existing ones.

Candidate
The candidate must show interest in Human-Computer Interaction and demonstrate knowledge in web technologies (knowledge in React is welcome) and/or Python. They will have the opportunity to manipulate and apply related work on interaction techniques for direct manipulation of video streams, and will participate actively in the design of experiments and evaluation protocols established in HCI.

Références