Post-doctoral researcher in HCI

High Performance Video Annotation in Sport

Duration	: 24 months fixed term contract, starting August 1st, 2021
Team	: Loki (Inria Lille – Nord Europe & CRIStAL)
Gross salary	: ~2600 €/month
Direct collaborator(s)	: Stéphane Huot (stephane.huot@inria.fr), Sylvain Malacria (sylvain.malacria@inria.fr) & Géry Casiez (gery.casiez@univ-lille.fr)
Project	: Performance Analytics (PerfAnalytics, http://perfanalytics.fr/)

Video analysis can assist athletes in their performance development. However current video annotation tools are fully manual and suffer from interfaces limiting fast and efficient annotation. This project aims at developing new interactive tools for video annotation based on a mixed initiative approach. The researcher will study combinations of input and output methods for supporting this approach: manual or semi-manual annotations, validation/rejection of automatic annotations, real-time visualization of algorithms output, etc. Special care also has to be given to the adaptability of the proposed solution to different sports and users.

Description

The PerfAnalytics project

The PerfAnalytics project investigates how computing systems can better assist professional coaches (and athletes) in their performance development. More precisely, its ambition is to capitalize on the high throughput capability offered by in-situ video analysis. However, because of tedious manual annotation pipelines, the in-situ exploitation of video content by coaches and athletes is still limited nowadays to a qualitative assessment through simple playback visualization.

In this project, we will design innovative workflows, interactions and interfaces to ease the process of in-situ video analysis of athlete performance in order to facilitate the optimal adjustment of strategy and training programs with respect to the athlete's current state of performance. Notably, we will identify which level of human-machine partnership is recommended to bring the best of both worlds and combine semi-automatic rapid and precise video annotation and analysis, with efficient visual representation of performance.

The PerfAnalytics project involves several academic partners (Inria, INSEP, Univ. Grenoble Alpes, Univ. Poitiers, Univ. Aix-Marseille, Univ. Eiffel), as well as elite staff and athletes from different Olympic disciplines (Climbing, BMX Race, Gymnastics, Boxing and Wrestling).

Post-doctoral research project

Current professional or experimental solutions (e.g. Dartfish, Meta-Video) for video annotation are fully manual and thus very constrained and limited in terms of performance. They can only be used offline, since in most sports, there is a high number of features to annotate plus many events per minute or second. It results in 1 minute of video taking about 3 minutes to be annotated (for e.g., Boxing). These video sequencers also rely on standard graphical user interfaces (windows, menus, buttons) which are clearly limiting fast and efficient annotation, because of the high number of different features and events that require to repeatedly trigger many different actions. But it also prevents the adaptation and the adaptability of the system to the particularities of different sports, and also to the needs and specificities of coaches' practices. All in all, this situation partly explains the low adoption of video analysis by professional coaches and athletes.

Our goal is to design new interactive tools for video annotation based on a mixed initiative approach. The recent advances in machine learning allow robust identification of body parts from video. Especially with multiple viewpoints, most accessible solutions can predict human pose in terms of 3D location of joints centers. Partners of the project will study the adaptation of existing generic learning techniques to the requirements and context of the target disciplines. But this will also be a part of a larger interactive approach, in combination with manual scoring of actions from video.

This post-doctoral research project, within the Loki group, is thus about studying and designing the interaction techniques and paradigms that will successfully establish a strong partnership between expert users and learning algorithms, where both would improve their "skills" in order to reach a high level of efficiency for annotating videos. The researcher will study combinations of input and output methods for supporting this approach: manual or semi-manual annotations, validation/rejection of automatic annotations, real-time visualization of algorithms output, etc. Special care also has to be given to the adaptability of the proposed solution to different sports and users.

Candidate

The candidate must hold a PhD degree in Human-Computer Interaction or Information Visualization, or similar field. A solid track record of publications in top-tier HCI or Information Visualization venues (such as ACM CHI, UIST, CSCW, InfoVis) is expected, as well as a significant track record of design and implementation of interactive systems and GUIs.

Main activities and required expertise

- Review related work and expert practices (e.g., field studies, interviews, etc.)
- Design novel interaction techniques and visualization techniques for video annotation and performance analysis in sport with appropriate user-centered methodologies (e.g., participatory design)
- Implement demonstrators and/or applications that can be used to test these designs
- Design, run and analyze the results of controlled and/or field experiments
- Write project reports and scientific papers
- Contribute to coordination with project partners

Lab & Location

The Loki research group is looking for excellent and highly motivated post-doctoral candidates to contribute to the PerfAnalytics project. Loki is a dynamic world class Inria - CNRS - Univ. Lille research group in Human Computer-Interaction whose research aims at producing original ideas, fundamental knowledge and practical tools to inspire, inform and support the design of human-computer interactions. Members of Loki frequently publish in top-tier HCI conferences such as ACM CHI and ACM UIST. The selected applicant will work closely with Dr. Stéphane Huot, Dr. Sylvain Malacria and Prof. Géry Casiez, and also with the partners of the PerfAnalytics project (academics and sport federations).

Location

The Loki research group is located in the Lille - Nord Europe Inria research center, in the greater Lille area. Lille is at the northern tip of France and its metropolitan area is the 5th biggest in France. At the crossroads of northern continental Europe and thanks to its Eurostar train station, it is 35 minutes away from Brussels, 1 h away from Paris and 80 minutes away from London. With four international airports (including Paris Charles de Gaulle and Brussels Zaventem) less than one hour away by bus or train, it is of easy access from virtually anywhere in the world. A survey recently declared Lille as the French city offering the best salary/cost of living ratio. Lille is the third-biggest student city in France after Paris and Lyon, and in 2013, the University of Lille had more foreign students than any other university in the country. Overall, Lille is a very enjoyable city with a very nice old city center with lots of typical bars and restaurants, and cultural events.