LABORATOIRE HUBERT CURIEN
UMR • CNRS • 5516 • SAINT-ETIENNE

2 years Post-doc position

Semi-supervised anomaly detection in ski lift videos via active learning.

Context

Safety in ski lifts is a major concern for ski resort operators. To prevent possible accidents, it is necessary to detect dangerous situations on ski lifts as early (after boarding) as possible. The main goal of the **MIVAO project** is to develop a **machine learning and computer vision** system able to do real-time analysis of videos acquired by a camera fixed on one of the first pillar of the chair lift, and trigger an alarm when a problem (safety bar not in place, child alone one the chair, two many persons, child sliding under the safety bar, etc.) is detected. This cutting edge project is led by the BlueCime company (located in Grenoble, France) in partnership with the Hubert Curien Laboratory (Saint-Étienne, France), the Gipsa Lab (Grenoble) and an increasing number of ski resorts in the Alpes mountains.
The Post-doc candidate will join the working team of Mivao composed of three PhD students and more than 10 researchers and engineers. The candidate will be hosted in the **Hubert Curien Laboratory** in Saint-Étienne, working with and contributing to the supervision of 2 Ph.D. students.

Scientific objectives

The objective of this project is to propose new machine learning methods to analyze the acquired videos and trigger an alarm when an anomaly is detected. These methods will be based on deep convolutional networks which have shown outstanding performance on related applications but also on this specific dataset, in a supervised setting. Because the system can continuously acquire videos and because labeling those videos is expensive, the post doc will mainly focus on unsupervised, semi-supervised and active learning methods. The main issues to address will be:

1. Study, implement and test unsupervised methods in deep learning for anomaly detection
2. Propose new unsupervised and semi-supervised methods for anomaly detection
3. Propose new active learning methods with domain adaptation, to benefit from a few well-labeled examples to improve an existing system.

Required skills

We are searching for an outstandi*ng and highly motivated candidate* with:

- A PhD degree in machine learning with preferably some knowledge in computer vision and deep learning.
- A list of excellent publications (at reference journals and conferences in machine learning, pattern mining and/or computer vision) that demonstrates the expertise of the candidate
- Very strong programming skills in languages such as Python (and, ideally, an experience in Tensorflow). The candidate will need to show during the interview, examples of codes that he/she implemented.

Working environment

Saint-Etienne is a mid-size city (14th biggest city in France) and one of the cheapest in terms of living cost (accommodation, food). It is 70 km from Lyon (45 min by train) and in a middle of a splendid regional park where skiing, hiking, climbing, biking are possible. The hosting research group has established expertise in relevant domains including statistical machine learning, transfer learning, unsupervised learning and computer vision. The successful candidate will have the opportunity to work in synergy with two Ph.D. students. The **expected salary is 2193 euros NET per month** (gross salary: 2727 euros).

Application instructions

The application consists of a motivation letter, CV (with a detailed list of publications and links to e.g implementations on Github), names and contact details of two references. Applications should be submitted before *June 30th* via electronic mail to *the contacts below.*

Contact

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