Postdoctoral position - University of Rouen Normandy

Main subject: Stochastic Processes Applied to Eye-Tracking Problems

Places:

LMRS (https://www.lmrs.univ-rouen.fr/), University of Rouen Normandy, France.

CETAPS (http://staps.univ-rouen.fr/le-laboratoire-cetaps-191625.kjsp?RH=1379595481948), Faculty of Sport Sciences, University of Rouen Normandy, France.

Starting: 01/09/2021. Duration: 12 months.

Salary: 2264 €/month net of charge (indice 600).

Criteria of eligibility: to have a PhD in Statistics.

Context of the project

The *DynACEV – Eye Tracking* project is co-financed by the French National Agency of Research (ANR) and the Regional Council of Normandy. It combines knowledge and methodologies in the human movement sciences, computer sciences and applied mathematics. The primary aim is to investigate *visual-motor skill acquisition* in climbing task during a learning protocol where various performance contexts are tested: constant practice, variable practice where the rate of novelty is imposed by the experimenter and variable practice where the rate of novelty is chosen by the participant. During this protocol, we particularly focus on studying how vision guides action by tracking and mapping the visual fixation, the hip trajectory and the hands and feet location into the climbing wall plan.

Description of the work

The first objective of the present work is to model the sequence of 2D coordinates of the point of gaze of a climber and the scan path of his/her visual intake during ascension on an artificial climbing wall. Thanks to these models, the second objective is to understand how visual fixations succeed each other along an ascent, in order to investigate how vision guides climbing behaviours (e.g. route finding, grasping actions, postural regulation) of climbers during a 10 session learning

protocol where 3 groups are contrasted (i.e. constant practice, self-controlled variable practice, imposed variable practice).

Our purpose is to develop a mathematical methodology for these practical problems. Several directions will be considered:

- Application of multi-state modelling by means of Markov and semi-Markov processes;
- Taking into account the heterogeneity by means of non-homogeneous (semi-)Markov processes, drifting Markov or semi-Markov processes, hidden Markov or semi-Markov processes;
- Proposing different probabilistic/statistical techniques for comparing different learning methods;
- Proposing different clustering techniques;
- Developing a statistical methodology for analysing climbing (modelling, estimation).

Keywords:

Statistical inference, Markov and semi-Markov processes, statistics for stochastic processes, clustering techniques, eye-tracking problems

Profile of the candidate:

The candidate is requested to have a PhD in Statistics or Applied Statistics. More specifically, he/she needs to have strong skills in stochastic processes, associated statistical techniques, Markov and semi-Markov processes, asymptotic statistical methods, parametric and nonparametric statistics. Skills in computer programming are equally necessary. This is a research postdoctoral position in applied mathematics within a multidisciplinary project that involves researchers from different horizons: mathematics, computer sciences and human movement sciences. The work will be done in Rouen and supervised by Nicolas Vergne, Vlad Barbu and Ludovic Seifert from the University of Rouen Normandy.

To apply or for further information please contact:

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