

# Application of learning techniques for the automatic determination of mouse resolution

Duration : 6 months  
Team : [Loki](#) (Inria Lille – Nord Europe & CRIStAL)  
Advisor(s) : [Géry Casiez](#), [Mathieu Nancel](#) & [Sylvain Malacria](#) (gery.casiez@univ-lille.fr, mathieu.nancel@inria.fr, sylvain.malacria@inria.fr)  
Funding : internship gratification

Current systems are unable to determine the resolution of a computer mouse from classical events ("MouseEvents") or accessible system properties. The objective of this project is to develop a learning technique that allows to determine this resolution from the raw information sent by the mouse.

## Description

The resolution of a mouse is expressed in counts per inch (CPI) and can vary between 400 and 20,000 CPI depending on the model, some even being able to change this value by clicking a dedicated button. Very few models implement the HID standard that allows to expose this information to the system. However, the behavior of the mouse cursor is strongly influenced by this resolution, which has consequences on the performance of the users [1, 3] and prevents the optimal exploitation of their accuracy [2].

The objective of the project is to develop a machine learning algorithm able to determine the resolution of a mouse from the raw information received by the system (dx and dy displacements in counts). A first collection of data from mice of different resolutions has been done, and first encouraging results have been obtained with simple features and learning methods. The objective of the internship is to improve these results by collecting more general training data and by identifying other features and more advanced learning techniques.

## Objectives

1. State of the art of learning methods for temporal data
2. Additional data collection: different users, different uses, different resolutions
3. Implementation or adaptation of the most interesting techniques to the problem at hand
4. Evaluation of these techniques
5. Implementation of an on-line analysis demonstrator of the resolution
6. Writing a research paper on the results obtained

## Candidate

The candidate must have knowledge in machine learning; knowledge in Human-Computer Interaction is a plus. He or she must also be proficient in the Python language.

## References

1. Hanada, R., Masson, D., Casiez, G., Nancel, M. & Malacria, S. (2021). Relevance and Applicability of Hardware-independent Pointing Transfer Functions. In proceedings of the 2021 ACM Symposium on User Interface Software and Technology, 524–537. Association for Computing Machinery.
2. Roussel, N., Casiez, G., Aceituno, J. & Vogel, D. (2012). Giving a Hand to the Eyes: Leveraging Input Accuracy for Subpixel Interaction. In proceedings of UIST'12, the 25th ACM Symposium on User Interface Software and Technology, 351-358. ACM.
3. Casiez, G. & Roussel, N. (2011). No More Bricolage! Methods and Tools to Characterize, Replicate and Compare Pointing Transfer Functions. In proceedings of UIST'11, the 24th ACM Symposium on User Interface Software and Technology, 603-614. ACM.