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Project Proposal Draft

The dataset that intrigued me most was the *Interruption Dataset* with the psycho-physiological sensors. Therefore, I would like to do my research with this dataset.
The problem that I want to solve is the problem of unnecessary interruptions. Instead of trying to predict a measure of interruptibility, I would like to investigate whether it is possible to determine task switching events by using psycho-physiological sensors. In specific, I would like to shed light on the following questions:

- Can we detect the occurrence of task switches by analysing psycho-physiological data?
- How much (psycho-physiological) data is needed to effectively classify a task switch?
- Are there differences between task switches in terms of mental load, attention and interruptibility?

  Is it possible to classify/recommend the best moment for interruptions when a task switch occurs?
- Is it possible to classify task switches with a limited amount of sensor data, with the aim of proposing low-cost sensors that can easily and effectively be implemented in current SE working environments.

Specifically, I would like to focus my research around a proposition for software/hardware tools that can indicate whether a developer is changing tasks. In this perspect, interruptions can be planned when a task switch occurs, such that all interruptions can be presented to the user when *finishing* a task that needs full attention. This would then minimize annoyance or unnecessary interruptions *during* tasks. This proposition could then be developed into a tool.

This research would differ from other researches like [1] and [3], because it employs psycho-physiological sensors. There seems to be very little research on this field of study and all other studies employ either software-based sensors or other observational sensors, such as kinesiology-based or recording-based research. By investigating physiological sensors, this research could have a contribution to not only the understanding of human processes between tasks and during task switches, but also the feasibility of tools that can accurately classify such task switches.

I would like to take a very statistical and extensive approach in determining the efficiency of classifying task switches. I'm currently thinking about econometric regime-switching models with time varying transition probabilities such as the Markov switching model [5]. If this approach seems too difficult, I will resort to simple Logit/Probit regressions. I would also, if possible, like to complement this approach by using the ROC curve analysis for sensor-based estimates [4]. In addition, it would be interesting to construct a performance comparison between machine-learning algorithms and regime-switching models (but this might be out-of-scope). ■

References

[1] Fogarty, et al. (2005). *Examining Task Engagement in Sensor-Based Statistical Models of Human Interruptibility*. Take a Number, Stand in Line (Interruptions & Attention 1) April 2-7. Portland, Oregon, USA.

[2] Fogarty, et al. (2004). *Examining the Robustness of Sensor-Based Statistical Models of Human Interruptibility*. CHI Papers Volume 6, Number 1.

[3] Fogarty, et al. (2005). *Predicting Human Interruptibility with Sensors*. ACM Transactions on Computer-Human Interaction, Vol. 12, No. 1, March 2005, Pages 119146.

[4] Fogarty, et al. (2005). *Case Studies in the use of ROC Curve Analysis for Sensor-Based Estimates in Human Computer Interaction*. Proceeding GI '05 Proceedings of Graphics Interface 2005. Pages 129-136. Canadian Human-Computer Communications Society School of Computer Science, University of Waterloo, Waterloo, Ontario, Canada.

[5] Hamilton, et al. (2005). *Regime-Switching Models*. Palgrave Dictionary of Economics.