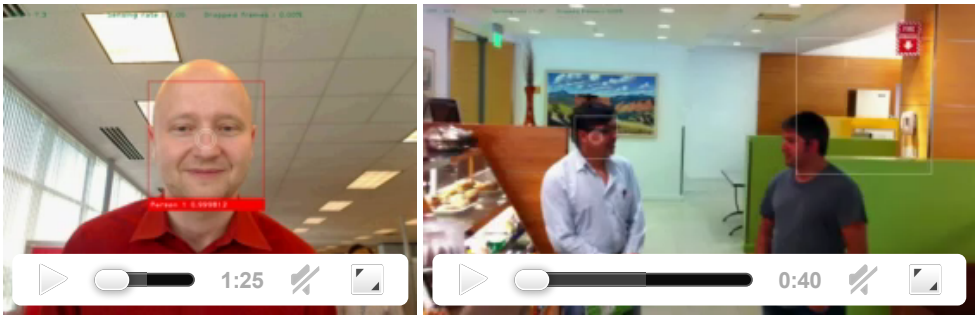
Large Scale Graph Based Recognition

Equipe: **SequeL** (Sequential Learning), INRIA
Responsable HDR: **Prof. Philippe Preux**
Encadrant: Michal Valko
Contexte: **Machine Learning** (Artificial Intelligence), MOCAD ou DAD
Problématique: **Large Scale Semi-Supervised Learning**

Description:

The project involves studying online (sequential) semi-supervised (only limited amount of information is provided) learning. Due to this minimal feedback, it is important to use indirect feedback such as the stream of unlabeled data. The target application is online face-recognition. Following videos show what is the algorithm currently capable of, if only 4 labeled faces are given as an input.



Plan of work:

This project will involve both research and programming. After specific idea, the applicant will evaluate it on some video dataset. Both the data and the startup code would be provided. Main topic is the following:

- **Large-scale classification:** This options involves scaling current approach to the size of web (> 1 million of images), for example using special data-structures, such *cover trees* or *spill trees* or using *parallel computing*.

The other ideas can be tackled too:

- **Life-long face recognition from the movies or TV series.** This will involve research in improving face recognition algorithm such that it could be reliably used for a long time. A typical application would be using long TV series, that were shot over the years. At the beginning, only a very few faces would be labeled and algorithm would need to keep recognizing facing over years, even with actors ageing and changing (glasses, beard, hair).
- **Comparison with commercial face recognizers:** This project will involve comprehensive comparison with other face recognition software, such as with Lambda labs.
- **Feature improvements:** Enhancing the classification with metric learning, special visual features.
- **Graph Quantization:** How to compactly represent a graph of faces without much loss in accuracy.
- Other idea can be considered.

References

- **Michal Valko**, Branislav Kveton, Ling Huang, Daniel Ting: *Online Semi-Supervised Learning on Quantized Graphs* in Proceedings of the 26nd Annual Conference on Uncertainty in Artificial Intelligence (UAI 2010) bibtex abstract Video: Adaptation , Video: OfficeSpace , spotlight poster
- Branislav Kveton, **Michal Valko**, Matthai Phillipose, Ling Huang: *Online Semi-Supervised Perception: Real-Time Learning without Explicit Feedback* in The Fourth IEEE Online Learning for Computer Vision Workshop in The 23rd IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2010 - OLCV) [best paper Google Award] bibtex abstract
- **Michal Valko**: *Adaptive Graph-Based Algorithms for Conditional Anomaly Detection and Semi-Supervised Learning* , PhD thesis, University of Pittsburgh (PITT 2011) bibtex abstract
- *Invited talk:* **Michal Valko**: *Adaptive Graph-Based Algorithms*, Presented on July 6th, 2011 at Microsoft Research Redmond (MSR 2011) video