Multiple Classification System in Dynamic Environments

Program: Ph.D. in Engineering

Funding: Financial support is available for the project's duration (maximum of 4 years).

Start date: September 2012

Project Description:

The pattern recognition is an important task for artificial intelligence (AI), in which machines learn to recognize different patterns after some training. Since 100% accuracy for pattern recognition is usually impossible, the accuracy improvement is always a central issue in AI. Ensemble of Classifiers (EoC) is one of the best known methods to improve pattern recognition accuracy, and in general the EoC achieves a better accuracy by generating multiple classifiers, selecting the best subset of them, and then combining them. However, the overall process implies a large complexity and substantial time cost.

Recently we developed a Single Classifier-based Multiple Classification Scheme (SMCS) that uses only a single classifier to generate multiple classifications. Our new method can improve classification accuracy without multiple classifier training, and consequently reduces the complexity embedded in EoC. Moreover, the SMCS enhances the pattern recognition accuracy with a different mechanism from that of the EoC, and the change caused by dynamic environments could be well taken into account by a specific pseudo data point generation mechanism.

The strength on its high adaptivity makes the SMCS a highly interesting avenue to pursue. The proof of concept had shown that the SMCS can have better or equal performances to those of the EoC. Still, the SMCS is recently conceived and not well explored. The goal of the proposed PhD project is to study several strategies on the exploration and the improvement of the SMCS. The performance of the proposed methods will be evaluated on synthetic and on real problems in the area of handwritten character recognition, signature verification, and surveillance systems.

Contact :
- Prof. Robert Sabourin (robert.sabourin@etsmtl.ca).
- Dr Albert Ko (drinkblue@gmail.com).