Machine Learning for Privacy-Friendly Visual Analytics

Due to the abundance and low cost of cameras, the amount of video generated by users, companies and governments is increasing rapidly. As of January 2017, YouTube alone receives an average of 300 hours of new video every minute! Efficient, automated analytics are needed to derive actionable intelligence from this vast amount of data. However, conventional visual analytics create numerous privacy concerns. For example, do you like the fact that Facebook tags your face in all images it receives? Many people don’t.

What makes conventional visual analytics vulnerable to privacy breaches is access to raw pixel data, on which they can run well-established computer vision algorithms to detect and recognize faces and objects. This project aims to address these privacy-related challenges by developing a set of tools for visual analytics without access to raw pixels. Analytics will run in compressed video domain, without full decoding. In order to perform computer vision tasks such as object or face detection on compressed video streams, machine learning will be utilized on compressed-domain features and codec syntax. The project will start with basic handcrafted features, while deep learning will be utilized later on to develop more sophisticated features.

This project is intended for a current SFU Engineering Science undergraduate student with a strong background in mathematics, signal and systems, MATLAB, and C/C++ programming. Experience with Linux and Python would be an asset. The successful applicant will work with a team of graduate students and will be exposed to state-of-the-art video compression systems such as High Efficiency Video Coding (HEVC) as well as the latest advances in machine learning and Deep Neural Networks.