Derivation of Video Key Performance Indicators (KPI) from encrypted traffic

Sandvine (ex Procera Networks) develops equipment used by major network operators to ensure high-quality connectivity for more than 1.7 billion users.

A large fraction of all traffic flowing through the networks of today are video traffic. A factor of considerable importance to the network operators is to understand how well the network is able to transfer this video data in relation to what each video flow needs in order to be played out without stalling or experiencing forced resolution changes. In this thesis work the student will get access both to packet traces from a large number of controlled experiments of video transfers during different conditions where packet traces have been collected together with information of resolution changes etc. The first part of this involves understanding the video behavior as seen in this available data from the controlled experiments. Secondly, the aim is to create a model that can be used on encrypted video traffic to try to infer KPIs such as the resolution of a video stream, resolution changes, buffer stalls and so on. This step will likely include machine learning techniques. The model should then be tuned and validated both with respect to the data from the controlled experiments, as well as on large amounts of actual network data that are available.

The proposed thesis work builds on foundations created by earlier thesis works which set up an infrastructure for processing the large data sets involved and used Machine Learning for video flow classification.

This thesis work is done with Sandvine, but much of the work will be done in Karlstad with a couple of visits to company premises in Varberg and Malmö. The work will be done using Python and associated libraries. Prior Python experience is not a requirement, but good general programming proficiency and willingness to learn Python is important. Previous Machine Learning experience is not required, but strong curiosity for the area is advantageous. This thesis work is the continuation of previous very successful thesis cooperation between Sandvine and KAU, where four previous KAU CivIng students already have successfully completed their thesis work using Python and Machine Learning techniques within this application area.

The technical work part of the thesis will be jointly supervised, with a Sandvine senior technical engineer and in close cooperation with KaU researchers active in the area.
The writing part of the thesis will be supervised by the KaU supervisor (i.e. one of the active researchers).

Monetary compensation will be provided from Sandvine for students participating in this thesis project.

For questions or more details, please contact Johan Garcia at johan.garcia@kau.se, or visit me at room 21F426.