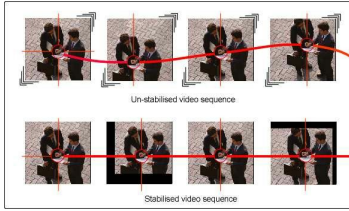# Master Thesis Project
Robust real-time digital video stabilization

Anyone who has ever taken a handheld video knows that medium's Achilles' heel: No matter how hard you try to hold your hand still, the frame shakes and pitches and generally nauseates anyone who tries to watch it.

Caitlin Dewey, Washington Post, August 2014

Background:

Video stabilization is used for compensating effects that camera motion has on a video stream. There are several techniques for video stabilization; optical, mechanical and digital stabilization, use of inertial sensors etc. This project aims at a pure data driven approach, relying on the video data alone and digital image processing for estimating and compensating for the camera motion.

The project is performed in collaboration with Protracer AB, the world-leading provider of ball tracking technology. Products include real-time analysis and graphics for TV broadcasts as well as personalized training feedback and gaming experience for golf ranges around the globe.

Project description:

To evaluate different methods for real-time digital video stabilization and to implement (presumably with the aid of publicly available libraries, such as OpenCV) a system for stabilization of live video footage. A possible output is https://en.wikipedia.org/wiki/File:Video_image_stabilization.ogv . Methods should aim to be applicable for real-time use, with a minimal time delay (i.e., not rely on knowledge of future data). Focus will be on robustness and precision of methods. Utilization of the processing power of the GPU is expected. We assume short shutter speeds, so compensation of motion blur is not a prioritized task.

The thesis work should include

- A survey of relevant literature and selection of one or two state-of-the-art methods.
- Planning of implementation and evaluation.
- Prototype implementation (e.g. in Matlab) and offline quantitative evaluation of the method(s).
- Improved implementation of selected method and live testing and evaluation.
- Writing of the thesis report.

Conditions:

The master thesis project will be carried out at Uppsala University. Good experience of programming is a requirement. Knowledge of GPU programming, computer graphics, image analysis and/or computer vision is a plus. The extent of the Master Thesis project is 20 weeks.

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