

Bachelor/Master Thesis

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Topics in the Field of Video Coding

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Background

With the increasing amount video traffic, there is a high demand for an efficient compression of this type of data. Video compression algorithms are able to decrease the transmitted data rate at acceptable quality loss. Today's compression systems make use of dependencies inside and between frames. By exploiting spatial and temporal dependencies, a so-called prediction signal is generated. However, the prediction signal is usually only a rough approximation and might contain specific artifacts like, for example, blocking. To reduce the impact of those artifacts, in-loop filtering is applied. Such filters may conceal typical artifacts and/or use additional information to increase the overall quality.

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The offered topics may change according to the current research. However, I am happy to give you a detailed overview about potential topics if you write me an e-mail. If you are interested in video/image processing, filter design, programming or maths, there might be a topic that fits your interest. Depending on the topic and your interests you might even get the option to implement your ideas into a real video encoder and evaluate the ideas in a realistic environment.

Research Areas



One frame of a coded video sequence with (right) and without (left) in-loop filters is shown here. There is a clear visual difference, which shows the importance of those filters. The goal of the offered topics is to develop on improvements of the current in-loop filtering scheme. Thereby, research can be done on finding and exploiting redundancies in the video stream in order to improve the filter, finding and evaluating different filter types and optimization algorithms and coding those filters efficiently.

Moreover, reasearch on developing a new prediction mode can be done. Prediction is an integral part of video coding. One example is the inter-prediction where we copy previously decoded blocks of a video and use them as initial estimates. This is much more efficient than encoding everything newly. However, we think that there is still potential to improve the existing prediction modes. Below, a picture depicting the prediction mode (color) and the motion vectors, i.e. the position of the predicted block in the previous frame is shown as an example.



Your Profile

- Interest in digital image/video processing
- Programming skills
- Mathematical skills

Desirable but not required are knowledge and experience with:

- Python
- Video-coding

Our Offer

Our institute offers a modern PC infrastructure with a remotely accessible cluster and a nice working atmosphere. Throughout the thesis you will be supervised with regular meetings and guidance. You will have the freedom to bring in your own ideas.