

Master Thesis (equiv. "Diplomarbeit (DA)")



Title	Master Thesis in Multimedia Database Systems
Subject	Real-Time MPEG-4 Video Conversion and Quality Optimizations for Multimedia Database Systems

Background Multimedia databases are designed to store and handle large MOs. Video streams are a typical representative but there exist many different compression formats that have quite different characteristics. The RETAVIC project (<http://www6.informatik.uni-erlangen.de/retavic/>) aims to provide data independence between the stored format in a multimedia database and client-side desired video formats. Consequently a format conversion process is required which has to meet real-time requirements and also should take QoS aspects into consideration. Of course it is desirable to support as many output formats as possible but considering that there exist a myriad of different formats while just very few of them are widely supported or even standardized at all, it's clear that mainly only those video formats can be supported that have wide application support and are recognized as international standards.

Meeting real-time requirements in video conversion has already been subject of related works, for example at the TU Dresden (h.261 implementation under DROPS, VERNER). However the results have shown that meeting real-time requirements in video conversion is a very difficult task with no fully satisfying solution proposed yet, especially when conversion efficiency and output quality should not be sacrificed, and when high resource usage is desired. In related works the real-time video conversion process is usually treated as an isolated task, however in a multimedia database framework aiming for format independence, the video conversion step is just one part of many others: Each video sequence that needs to be converted in real-time has already been processed before during an input/capturing step and has then been stored in the database along with meta information.

This work supports RETAVIC project (<http://www6.informatik.uni-erlangen.de/retavic/>).

Task In this thesis the output video conversion process should be treated as part of the whole data processing chain (input->storage->output) of a multimedia database. It should be researched how reusing information of earlier processing steps or modifications of these steps could help to improve the final real-time conversion process. As an ultimate goal, a novel solution to the real-time video conversion problem should be proposed that overcomes the limitations of other implementations. Since real-time video conversion often implies lower visual quality than an offline conversion, an additional task should be to propose strategies how a quality loss in real-time conversion can be avoided. Also because high visual quality is the most important goal in video storage and transmission, there should be some emphasis on how the perceived visual quality of the resulting output video can be optimized.

A prove-of-concept implementation of all important parts of the thesis should be provided to demonstrate their effectiveness. However since this is a rather 'high-level' work and reusability of concepts is important, the implementation should not

be specific to one multimedia database or one RT-OS. Rather the code created as part of the thesis should be reusable and an interface should be developed that allows for later integration into an actual multimedia database or RT-OS as part of a different work. To reduce the complexity of the whole topic, only MPEG-4 as output video format should be considered. Also with XviD (<http://www.xvid.org>) there is a powerful open source implementation available that could be used as a basis of the work.

Requirements good knowledge of English
 interest in multimedia area, especially in audio-video conversion
 good knowledge of "C" programming language

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