

## Ph.D. Thesis Review

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Date: 8.5.2013

### Review:

The thesis deals with the utilization of parallel architectures in Similarity Search, especially in Image retrieval engines. The Chapters 1 and 2 contains the introduction into the thesis and description of the parallel architectures.

The Chapter 3 describes the improvement of the Task Scheduler developed at the authors department. The improvement of the scheduler is based on the support of the Multi GPU architectures using OpenCL framework. The improvement was evaluated in the experiment and the improvement utilization of up to four GPUs was confirmed.

The Chapter 4 contains the most interesting parts of the thesis. First, the chapter describes the system of the Image retrieval that will be investigated in the thesis. Then a Signature Quadratic Form Distance function was described with the improvement and optimization designed especially for the GPUs. This topic is investigated into detail and many aspects and suggestion are discussed. Finally, many experiments were performed for confirmation of the suggested improvements and optimizations. I have only one comment to the experiment description – in Page 96 at the bottom an anomaly detected during experiments is described. Although, this anomaly is not anomaly but a fact known for many algorithms, it is not clearly visible from the plots and therefore it should be omitted or highlighted in the results by table or more detailed plot.

The Chapter 5 describes the first step of the Image Retrieval problem – creation of the feature vectors of the images. In this chapter a nice improvement of the K-means algorithm is suggested and the overall performance of the feature extraction is evaluated.

The thesis is well written and contains very interesting results which are very useful and valuable for the community. The one problem I found is missing list of the publications, which will help the reviewer its work, but the publication were mentioned in the Conclusion, but this problem is very small.

The author, RNDr. Martin Kruliš, demonstrates his ability of the independent research and publications and I recommend his work for acceptance.



Ing. Jan Platoš, Ph.D.