Future work and conclusions

Future work

Having as a goal an improvement of the efficiency of the implemented PCA algorithm in CUDA, it might be a good idea to implement the singular value decomposition algorithm. As it was mentioned, the library used in the study is no longer developed so it does not keep up with the newest CUDA changes. Moreover our new implementation might be optimized for specific data dimension. Apart from that some new functionality may be added to implemented PCA. Especially thresholding and smoothing the data which can be highly parallelized.

In the next step an implementation of sparse PCA algorithm is considered. It has been shown that sparse PCA can extract meaningful brain parcellations. For a higher model order it can present better results than Independent Component Analysis (ICA) [reference].

Conclusions

From the computational efficiency standpoint, a satisfactory speed-up was achieved. However still the implementation can be improved to get more speed-up. The key part to be optimized is Singular Value Decomposition.

References