# Outline for "An overview of performance improvements for commonly used optimization algorithms"

December 19, 2025

1. **Introduction**
   In this section I will explain why performance enhancement for optimization algorithms is important and outline which current software solutions are available to achieve these performance gains. This will be structured similarly to a related work section.
2. **Performance Tweaks of Various Optimization Algorithms**
   In this section I will categorize and differentiate between (a) modifications to the underlying mathematical models (e.g., regularization and normalization) and (b) approaches that exploit the hardware in order to improve performance.
3. **GPGPU Exploitation for Performance**
   In this section I will introduce the first hardware-based performance enhancement. I will describe and demonstrate how CUDA and OpenCL use GPGPUs to accelerate optimization algorithms and improve overall performance.
4. **Multithreading for Performance Optimization**
   In this section I will introduce a second hardware-based performance enhancement. I will describe and demonstrate how multithreading (for example using multi-core CPUs) can be used to parallelize optimization algorithms and improve performance.
5. **Experimental Results**
   In this section I will apply the different performance enhancement techniques to various optimization algorithms such as integer programming and gradient descent. The focus will be on describing the benchmarking setup and presenting the benchmark results.
6. **Conclusion and Outlook**
   In this section I will review the implementations and the findings presented in the report. I will summarize the main results and provide an outlook on possible future work and improvements.