

With the advent of massive data sets, statistical learning and information processing techniques are expected to enable unprecedented possibilities for better decision making. However, existing algorithms for mathematical optimization, which are the core component in these techniques, often prove ineffective for scaling to the extent of all available data. We study random projection methods in the context of general convex optimization problems to address this challenge. The proposed method, called the Newton Sketch, is a faster randomized version of the well-known Newton's Method with linear computational complexity in the input data. We show that Newton's sketch enables solving large scale optimization and statistical inference problems orders-of-magnitude faster than existing methods. Moreover, due to the special structure of certain random projections, it is possible to speed up computation even further using dedicated hardware implementations such as graphical processing units (GPUs).