The last few years has seen a flurry of activity in non-convex approaches to enable solution of large scale optimization problems that come up in machine learning. The common thread in many of these results is that low-rank matrix optimization or recovery can be accomplished while forcing the low-rank factorization and then solving the resulting factored (non-convex) optimization problem. We consider two important settings, and present new results in each: dealing with projections – and important and generic requirement for convex optimization – and dealing with robustness (corrupted points) – a topic in robust high dimensional statistics that has received much attention in theory and applications.