Manifold constraint transfer for visual structure-driven optimization

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Highlights

- In this paper we leverage the manifold structure of visual data in order to improve performance in general optimization problems subject to linear constraints. As the main theoretical result, we show that manifold constraints can be transferred from the data to the optimized variables if these are linearly correlated. We also show that the resulting optimization problem can be solved with an efficient alternating direction method of multipliers that can consistently integrate the manifold constraints during the optimization process.
- we obtain a simple approach, which instead of directly optimizing on the manifold, and can iteratively recast the problem as the projection over the manifold via an embedding method.
- The proposed method is extremely versatile since it can be applied to different problems including kernel ridge regression (KRR) and sparse coding which have numerous applications in machine learning and computer vision. In particular, we apply the methods to different problems such as tracking, object recognition and categorization showing a consistent increase of performance with respect to the state of the art.