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Guifang Zhou* (gzhou@math.fsu.edu), 208 Love Building, 1017 Academic Way, Tallahassee, FL 32306, and **Kyle A Gallivan**. *Rank-Constrained Optimization: A Riemannian Manifold Approach*.

Rank-constrained optimization problems have received a lot of attentions recently. Our main interest is providing a new algorithm to solve the optimization problems that involve a rank inequality constraint on a union of Riemannian manifolds. This is in general a non-convex and difficult problem due to the presence of the rank constraint. To deal with this difficulty, we extend the general Riemannian optimization algorithms on the smooth manifold \mathcal{M}_k of rank-k manifold to its closure $\mathcal{M}_{\leq k}$. By taking steps along rank-related directions in the tangent cone, and afterwards using a rank-related retraction to go back to $\mathcal{M}_{\leq k}$, the new algorithm provides an efficient way for the rank updating. Convergence is also proved. Numerical examples demonstrate the basic properties and efficiency of our approach. (Received September 15, 2014)