

Robust Budget Allocation via Continuous Submodular Functions

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Abstract

The optimal allocation of resources for maximizing influence, spread of information or coverage, has gained attention in the past years, in particular in machine learning and data mining. But, in applications, the parameters of the problem are rarely known exactly, and using wrong parameters can lead to undesirable outcomes. We hence revisit a continuous version of the Budget Allocation or Bipartite Influence Maximization problem introduced by Alon et al. [2012] from a robust optimization perspective, where an adversary may choose the least favorable parameters within a confidence set. The resulting problem is a nonconvex-concave saddle point problem (or game). We show that this nonconvex problem can be solved exactly by leveraging connections to continuous submodular functions, and by solving a constrained submodular minimization problem. Although constrained submodular minimization is hard in general, here, we establish conditions under which such a problem can be solved to arbitrary precision ϵ .

References

Alon, Noga, Gamzu, Iftah, and Tennenholtz, Moshe. Optimizing Budget Allocation Among Channels and Influencers. In *WWW*. 2012.