

Submodular and Sparse Optimization Methods for Machine Learning and Communication

その他のタイトル	機械学習と通信のための劣モジュラ・スパース最適化手法
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Then we move on matrix completion problems. Roughly speaking, matrix completion problems are to determine missing entries in a given partial matrix under some criteria. Our first result is a new algorithm for constructing a multicast code for a wireless network using max-rank matrix completion. In the main ingredient of our algorithm, we employ the theory of mixed matrices, matroids, and submodular optimization. Second, we propose a new problem, the low-rank basis problem for a matrix subspace. Originally this problem comes from combinatorial optimization, but it turns out that this problem has various applications, including image separation and data compression. We present an efficient heuristic algorithm for this problem, using matroid theory and sparse optimization.

The last subject of this dissertation is compressed sensing. The main goal of compressed sensing is to recover a high-dimensional sparse signal from a few linear measurements. While the problem setup is quite simple, compressed sensing has been widely applied to machine learning, statistics, and signal processing. In this dissertation, we consider stable signal recovery in compressed sensing and show that the sum-of-squares method yields a new polynomial time recovery method for Rademacher sensing matrices. Our result sheds light on the power of sum-of-squares method on nonconvex problem arising from compressed sensing literature.

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