1128-05-117 **Srikumar Ramalingam*** (`srikumar@cs.utah.edu`). *Efficient Minimization of Higher Order Submodular Functions using Monotonic Boolean Functions.*

Submodular function minimization is a key problem in computer vision and many other domains. While the general submodular solver has a high complexity, many vision problems are defined over specialized subclasses of submodular functions that can be written as the sum of submodular cost functions defined over cliques containing only a few variables. We develop an efficient algorithm for the minimization of this useful subclass of submodular functions. To do this, we define a novel mapping that transforms submodular functions of order k into quadratic ones. The main idea is to use auxiliary variables to model the higher order terms and the transformation is found using a linear program. In particular, we model the auxiliary variables as monotonic Boolean functions, allowing us to use as few auxiliary variables as possible. We show that the fourth order function requires only 2 auxiliary variables in contrast to 30 variables in existing methods. In the general case, we give an upper bound on the number or auxiliary variables required to transform a function of order k using Dedekind number, which is substantially lower than the current bound of 2^{2^k}.

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