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Abstract

Tropical Geometry is a fairly new branch of mathematics where the usual addition and multiplication operations are replaced by the minimum/maximum and the usual addition, respectively. Tropical arithmetic is faster and more robust than classical arithmetic, and results in a piece-wise linear geometry which is seen to be an approximation of classical geometry. As a result, the classical notion of convexity becomes a piecewise-linear representation which is generally distinct.

This project is an exploration of applications of tropical geometry, with a focus on tropical matrix factorization and associated algorithms. We establish a link between the tropical matrix factorization problem and the problem of finding generators for a tropical convex hull and propose a method which finds a factorization in $O(nm^2)$ time for a special case, improving on previous methods. We discuss possible applications to inexact computing.