

# Multiscale Approaches to Optimal Transport Problems

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## Abstract

Transportation problems have a wide variety of applications. They are solved to compute the Wasserstein metric between probability measures, an important tool in statistics. Further, we are interested in optimal transports between images, which can be used for discrimination of bio-chemical processes or fingerprint matching, among others.

For discrete measures optimal transport problems can be formulated as linear programs. Although fast generic LP-solvers are available, they cannot handle the large input sizes many applications require. Thus, more specialized algorithms are needed. In multiscale methods the probability measures are discretised in a sequence of successively finer resolutions and the problems are solved from coarse to fine levels, while the solution of the previous iteration is used as an initial solution to the next problem. Two different variants of multiscale algorithms were recently developed, which both use local versions of the transportation problems to tackle the global problems more efficiently.