Computing combinatorial properties of 4-points and 5-points metric spaces

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Master thesis in Mathematics

Motivated by the problem of a classification of finite metric spaces by their fundamental polytopes, detailed in the article by Vershik published in 2015, we study the tools used by Delucchi and Hoessly in 2018 to obtain results for tree-like metrics. Using the mathematical software SageMath and excerpts of the canonical decomposition theory for metrics on a finite set developed by Dress and Bandelt in articles dating from 1984 and 1992, we compute, for 4 and 5-points metrics, different values of interest for the fundamental polytopes (aka Wasserstein polytopes) and Lipschitz polytopes, and the zonotopes associated to the corresponding split systems.

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