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A quick trip through tight-span theory

Abstract

The tight-span of a metric space was first introduced by Isbell in 1964 (as its injective hull) and subsequently rediscovered and studied by Dress in 1984 and Chromack and Lamore in 1994. One of its fundamental properties is that it is a ‘real-tree’ if the underlying metric space is tree-like, an observation that has led to various applications of the tight-span and related structures in phylogenetics and related fields. Intriguingly, in 2004 Develin and Sturmfels pointed out that tight-spans also have connections with objects arising in tropical geometry, connections which have been recently further investigated by Hirai, Koichi, Joswig, Herrmann and others. Here we will present a brief overview of tight-spans as well as some results and questions for these structures arising in areas such as tropical geometry, discrete geometry, graph theory and phylogenetics.