

Mapping Firms' Locations in Technological Space: A Topological Analysis of Patent Statistics

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Abstract

Mapper, one of the main tools of topological data analysis, is able to compactly summarize and represent complicated high-dimensional data as a graph. In this work, we apply this method to 333 major firms' patents in 1976-2005 to visualize firms' technological space of inventive activities as a Mapper graph. We observe branch-like structures called "flares" related to firms with unique trajectories in the Mapper graph, and thus propose an algorithm to extract them. We find statistically and economically significant correlations between the flares and financial performance. This talk is based on joint work (<https://arxiv.org/abs/1909.00257>) with Yasuaki Hiraoka, Mitsuru Igami, and Yasin Ozcan.