

Topological Data Analysis on the Northeast Asian Air Route Network

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Abstract— Studying the properties of airport network of various countries based on complex network theory has been well researched over the past decade. However, there were only a few attempts made to utilize air route network with waypoints and air traffic service routes. In this study, three variations of networks – unweighted, distance-weighted, and demand-weighted air route networks of the rapidly growing Northeast Asian region are considered, and various node centrality measures are applied. Based on measured values, nodes sharing common characteristics are identified by mapper algorithm, one of the main approaches of topological data analysis. Mapper output network successfully grouped waypoints sharing common characteristics such as terminal nodes and nodes on busy air routes. Findings on the set of important waypoints provide key insights for effective regional airspace design.