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SCALING OF GEOGRAPHIC SPACE FROM THE PERSPECTIVE OF FLIGHT PATTERNS

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The scaling of geographic space refers to spatial heterogeneity that exhibits a heavy tailed distribution. In other words, for a large geographic area the small constituents or units are far more common than the large ones (Jiang 2010). For example, there are far more short streets than long ones (Jiang 2007); far more small city blocks than large ones (Lämmer et al. 2006); far more small cities than large ones, a phenomenon referred to as Zipf's law (1949); far more short axial lines than long ones (Jiang and Liu 2010). This expression of far more small ones than large ones is a de facto heavy tailed distribution. Conventionally, spatial heterogeneity (Anselin 2006) is usually characterized by a normal distribution that is often said with a thin tail. A heavy tailed distribution can be described by one of the mathematical relationships: power law, exponential, lognormal, stretched exponential and power law with a cutoff. In this paper, we examined the scaling of geographic space from the perspective of flight patterns. The flight patterns are captured from GPS traces of over 20,000 daily flights flying over the USA in one week period. The GPS data is very large, a recorded position every 5 minutes for any one of the 20,000 flights on a 24/7 basis. We studied both connectivity of individual airports and flight length among the airports, and found that they all follow one of the heavy tailed distributions. We further want to put this scaling property in comparison with the one that is illustrated by city sizes, with a hope to get some interesting findings (Jiang and Jia 2010). Apart from the analysis, we will develop some effective visualization to show the flight patterns and to explore the hidden structure.

This submission is intended to be a poster possibly with a laptop demo showing the visualization of flight patterns and the analyzed results.

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