Clustering Google Dengue Trends and Chikungunya in Central America: a data-driven nonparametric approach

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Virus epidemics threaten not just a single state or a country, but whole macro-regions and continents. In the summer 2014 Mexico reported the first confirmed case of mosquito-borne chikungunya virus in a western state of Jalisco. Since then, spread of the virus across North and Central America has been attracting a lot of attention from the healthcare professionals. Since data on chikungunya are scarce and the virus is transmitted by the same type of mosquito as dengue, we use Google Dengue Trend (GDT) in Mexico as a proxy for the current estimate of chikungunya epidemiological situation. We analyze the Google Dengue Trends in the states of Mexico to unveil their possible common characteristics among each other and with available chikungunya data, which abet or hinder the virus spread. Particularly, we tailor a local regression trend test statistic to a new task of detecting clusters of trends in multiple time series, and elaborate a nonparametric bootstrap technique to ensure that the proposed methodology is data-driven and applicable for a wide range of environmental studies.

Keywords: bootstrap; epidemics; local regression; virus.