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## Using machine learning to forecast local epidemics of dengue fever in Latin America

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**Statement of the Problem:** Dengue fever is a mosquito-borne disease that occurs in tropical and sub-tropical parts of the world. As many as 400 million people are infected yearly. In mild cases, symptoms are fever, rash, and muscle and joint pain, while in severe cases, dengue fever can cause severe bleeding, low blood pressure, and even death (in fact, the first death of dengue fever this year in Hanoi, Vietnam was just reported today, May 22, 2017). Because, it is carried by mosquitoes. The transmission of dengue is related to climate variables such as temperature and precipitation. A growing number of scientists argue that climate change is likely to produce distributional shifts that may cause an increase in the outbreaks of dengue fever and have significant public health implications worldwide. The increased risk of dengue augments the need for accurate models to predict the time, location, and severity of dengue outbreaks in Latin America.

**Methodology & Theoretical Orientation:** This study builds a predictive statistical model using logistic regression, classification, and cluster analysis machine learning algorithms to forecast dengue fever outbreaks. It utilizes training data from NOAA's Global Historical Climatology Network temperature data, PERSIANN satellite precipitation measurements, NOAA's NCEP climate forecast system reanalysis precipitation measurements, and NOAA's satellite vegetation index for two cities prone to dengue, San Juan, PR and Iquitos, Peru.

**Potential Recommendations:** This study will help inform health care workers, local communities, and NGO-led efforts to combat dengue fever outbreaks. Accurate dengue outbreak prediction will also inform effective resource allocation and health and social policies. Recommendations for additional climate training data and/or data from other Latin American cities to increase the model's accuracy will also be included.

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