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Effective Surveillance and Predictive Mapping of Mosquito-Borne Diseases Using Social Media

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HIGHLIGHTS

- Social media based mosquito-borne disease surveillance and outbreak management using spatial and temporal information
- The combination of the standard kernel density estimate with additional important features derived from Twitter has been presented for predictive mapping.
- Latent Dirichlet allocation (LDA) based topic modelling techniques has been applied to filter out relevant topics related to symptoms, prevention and fear
- Experiments show that the proposed method has a positive effect in comparison to traditional surveillance techniques.

Abstract

Healthcare Emergency Management involves preventing, handling, organizing and controlling of specific events and in response to emergency situations. A social media based mosquito-borne disease surveillance and outbreak management using spatial and temporal information which help in identification, characterization, and modeling of user behavioral patterns on the web have been presented through this paper. The proposed predictive mapping based on geo-tagging data has a significant impact on preventing and tracking mosquito-borne disease in the specific area with limited resources. The tracking of real-time public sentiments provides an early discovery or alarming related to outbreak. Latent Dirichlet allocation (LDA) based topic modeling techniques have been applied to filter out relevant topics related to symptoms, prevention and fear. The two steps fine-grained classifications of data have been performed using Naive Bayes and Support Vector machine. The proposed framework focused on alternative methods of analysis and visualization of user's opinions that do not depend upon the assumption of normality. A novel intelligent surveillance process model has been presented which help government agencies for proper management of time and resources. The utilization of standard kernel density estimate (KDE) with important factors derived from Twitter and RSS feeds have been presented for predictive mapping. The model uses latent Dirichlet allocation for identification of coherent topics from collected data set at a particular interval. This model has been applied to predict the occurrence of mosquito-borne disease in India.