

Using geographic self-organizing map (Geo-SOM) to examine infectious disease outbreaks: A study of 2022 COVID-19 Omicron Wave in Hong Kong

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A large set of data necessarily creates a higher dimension in structure, which prevents humans from examining the complex associations among numerous variables and observations. A self-organizing map (SOM) is an unsupervised artificial neural network model that effectively reduces data dimensions while preserving the topological structure of the original data. We used a set of SOMs to investigate the spatiotemporal diffusion patterns and clusters of the COVID-19 Omicron in Hong Kong with its various sociodemographic and environmental variables from the public datasets. We found that many non-urban-centric residential areas repeatedly exhibited similar diffusion patterns over time after the relaxation of anti-pandemic measures. Notably, several local areas less accessible to shops and transportation hubs, along with major commercial and business centres, often became clusters. Areas with more older housing and industrial facilities were also identified vulnerable to COVID-19 diffusion. This study showcases that the use of geospatial AI techniques is useful for examining spatial and temporal diffusion patterns of infectious diseases and designing appropriate measures of their control and prevention.

Keywords: Self-Organizing Map, GeoAI, COVID-19, Hong Kong, Disease diffusion

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