Review of: "When a Cluster Is a Cluster"

Chrysafis Vogiatzis[1]

1 University of Illinois at Urbana-Champaign

Potential competing interests: No potential competing interests to declare.

Interesting essay that focuses on a fantastic 2020 work that studied (geospatially) the evolution of the COVID-19 pandemic in Italy in 2020. Unfortunately, the essay lacks the depth required for a significant step forward in our understanding of “clustering” in the sense that the author means. One possible step forward would be to specifically discuss what other studies in the area have failed to do. Per the author and their concluding statement: “The identification of the spatial clustering should be the first step when developing effective policies to manage and control any new epidemic. The big question is why the scientific community is ignoring the fundamental value of cases' exact location.”

That said, there has been significant work that has focused on using geospatial information to predict outbreaks, in a much more nuanced way than simply looking at case proximity. For example, see the following works that employ spatial data analytics, interesting time series (such as GNAR, or Geographic Weighted Regression), human mobility and vehicle flow data, and many, many others:

- Fang et al. “Data-driven framework for delineating urban population dynamic patterns: Case study on Xiamen Island, China,” published in *Sustainable Cities and Society*
- Li et al. “Monitoring the spatial spread of COVID-19 and effectiveness of control measures through human movement data: Proposal for a predictive model using big data analytics,” published in *JMIR Research Protocols*
- Urrutia et al. “SARS-CoV-2 Dissemination Using a Network of the US Counties,” published in *Operations Research Forum*
- Rapti et al. “The Role of Mobility in the Dynamics of the COVID-19 Epidemic in Andalusia,” published in *Bulletin of Mathematical Biology*.
- Mansour et al. “Sociodemographic determinants of COVID-19 incidence rates in Oman: Geospatial modelling using multiscale geographically weighted regression (MGWR),” published in *Sustainable Cities and Society*
- Lu et al. “Influence of transportation network on transmission heterogeneity of COVID-19 in China,” published in *Transportation Research Part C*
- Recently, a preprint that discusses another network-based time series model for predicting incidence of COVID-19 cases: “COVID-19 incidence in the Republic of Ireland: A case study for network-based time series models,” by Armbruster and Reinert.

These are only snippets of works that employ GIS and geographical information to infer spread, epicenters, evolutions. The essay from the author serves as a good, brief, and to-the-point introduction to why spatial clustering is important; to not include, though, works that have tried to include spatial information (in conjunction with human mobility and other

transportation-related data) is an omission that could be fixed in a future iteration of the essay.