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Editorial: Epidemic models on networks

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Editorial on the Research Topic
Epidemic models on networks

Mathematical Epidemiology started to be developed since 18th century with Daniel Bernoulli's work: "Essai d'une nouvelle analyse de la mortalité causée par la petite vérole, et des advantages de l'inoculacion pour la prevenir," presented to the Paris Real Science Academy in 1760, published in 1765, and considered the zero mark of Mathematical Models in Public Health problems.

From then on, statistical analysis were used to study and clarify interactions and dynamical mechanisms of disease transmission among populations. However, the approach was generally about data interpretation, without predictive models describing possible prospective scenarios.

In the 20th century, the seminal work of Kermack and McKendrick, "Contributions to the Mathematical Theory of Epidemics" (1927), creating compartmental models of population classes divided into "Susceptible," "Infected" and "Recovered/Removed" individuals, allowed to describe disease propagation by differential equations, enriching the analysis with prediction the effects of parameters as, for instance, vaccination or social distancing.

The start of the 21st century testified a strong development of computational tools and their applications to problems needing large data manipulation, permitting the study of spatial and temporal models described by networks of coupled non-linear differential equations, presenting bifurcations with changing qualitative behaviors under parameter variations.

Combining numerical algorithms and compartmental approach, disease evolutions are studied by complex connected networks identifying population clusters and how they interact during certain time intervals. Consequently, predictions of effects of public health actions increasing accuracy allowing efficient preventive and corrective policies.

The COVID-19 pandemic started to emerge at the end of 2019 promoted a big interest of the whole scientific community to understand the several aspects of the epidemic using different methodologies from Mathematics and Statistical Physics.

These facts inspired the conception of the Research Topic "*Epidemic Models in Networks*" and the articles described below are interesting samples of the development of these new epidemiology approaches.

- "*The Impact of COVID-19 on Bank Sector Traditional Business Model Sustainability in China: Bank Branch Versus Fintech*," by Yan and Jia, treates how COVID-19 impacted the economic actors reorganized their operations to face the necessity of social distancing and quarantine.
- "*A multilayer network model for studying the impact of non-pharmaceutical interventions implemented in response to COVID-19*," by Chen et al., provides ideas about how to face the disease propagation without pharmaceutic products, privileging preventive social protocols.

- "*Effects of individual heterogeneity and multi-type information on the coupled awareness-epidemic dynamics in multiplex networks*," by Chen et al., is about how to disseminate the awareness of an epidemic situation can be spread throughout a population, creating a natural preventive environment.

Examining these papers, it can be concluded that the contribution of this Research Topic is valuable to orient public health policies.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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