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Nature of complex network of dengue epidemic as a scale-free network (Article)

Malik, H.A.M.[a], Abid, F.[b], Mahmood, N.[c], Wahiddin, M.R.[d], Malik, A.[e]

[a]Department of Computer Science, AMA International University, Salmabad, Bahrain
[b]Department of Computer Science, King Khalid University, Abha, Saudi Arabia
[c]Department of Computer Science, Faculty of Computer Science, University of Karachi, Sindh, Pakistan

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Abstract

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Objectives: Dengue epidemic is a dynamic and complex phenomenon that has gained considerable attention due to its injurious effects. The focus of this study is to statically analyze the nature of the dengue epidemic network in terms of whether it follows the features of a scale-free network or a random network. Methods: A multifarious network of Aedes aegypti is addressed keeping the viewpoint of a complex system and modelled as a network. The dengue network has been transformed into a one-mode network from a two-mode network by utilizing projection methods. Furthermore, three network features have been analyzed, the power-law, clustering coefficient, and network visualization. In addition, five methods have been applied to calculate the global clustering coefficient. Results: It has been observed that dengue epidemic follows a powerlaw, with the value of its exponent γ = –2.1. The value of the clustering coefficient is high for dengue cases, as weight of links. The minimum method showed the highest value among the methods used to calculate the coefficient. Network visualization showed the main areas. Moreover, the dengue situation did not remain the same throughout the observed period. Conclusions: The results showed that the network topology exhibits the features of a scale-free network instead of a random network. Focal hubs are highlighted and the critical period is found. Outcomes are important for the researchers, health officials, and policy makers who deal with arbovirus epidemic diseases. Zika virus and Chikungunya virus can also be modelled and analyzed in this manner. © 2019 The Korean Society of Medical Informatics.

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