Social distancing in pedestrian dynamics and its effect on disease spreading

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Abstract

The ongoing Covid-19 Pandemic has had severe consequences on nations worldwide. With about 26 million cases and near 1 million deaths to date, costing global insurance industry, tourism and other business hundred of billions, it has been considered as one of the costliest disasters ever in human history. While many vaccines are under development, no candidate has yet met all of the standards proving its safety and efficacy. Facing these difficulties, governments have turned to non-pharmaceutical measures such as social distancing to limit the transmission of the disease. Motivated by the importance of these measures in the contemporary world, we study the effectiveness of social distancing, using mathematical epidemic modeling. To combine human mobility and disease spreading, we devise an agent-based model consisting of pedestrian dynamics and spreading phenomena. In this work we define a novel type of social distancing (keeping distance from other agents to avoid infection) based on the pedestrian dynamics. We also study the indirect transmission by taking into account the role of environment as a vehicle of spreading. For this purpose, we introduce the environmental contamination effect on the spreading of the disease. We will study the system for different scenarios and a range of parameters, further investigating the robustness of our results.

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