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Social distancing in pedestrian dynamics and its effect on disease spreading

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The ongoing Covid-19 pandemic has had severe consequences on nations worldwide. With about 26 million cases and nearly 1 million deaths to date (05.09.2020). It has imposed so many costs to the local, regional and global markets including hundreds of billions to the global insurance industry, tourism and other businesses. It has been considered as one of the costliest disasters after WWII.
Facing these difficulties without any approved vaccine so far, governments have turned to non-pharmaceutical measures such as social distancing to limit the transmission of the disease and flattening the growth of the spreading dynamics. Thus, we study the effectiveness of social distancing, using a mathematical epidemic modeling. In this work, for combining human mobility and disease spreading, we design an agent based model consisting of pedestrian dynamics with a novel type of social distancing and spreading phenomena. We also consider indirect transmission with the footprints of the infectious pedestrians. We show that the increase in the intensity of social distancing has a significant effect on the exposure risk. By classifying the population into social distancing abiders and non-abiders, we conclude that the practice of social distancing even by a minority of potentially infectious agents not only results in a drastic change on the population exposure risk, but also boosts the effectiveness of the protocols when practiced by the rest of the population.

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