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Dear Editor,

Please consider the accompanying manuscript, entitled "*A stochastic agent-based model to evaluate COVID-19 transmission influenced by human mobility*", for review and publication as an *Article* in *IEEE Journal of Biomedical and Health Informatics*. We are writing to express our strong confidence and enthusiasm for the manuscript and want to use this opportunity to explain why we believe this manuscript has the originality, novelty, and scientific impact suitable for the readership of *IEEE Journal of Biomedical and Health Informatics*.

The COVID-19 pandemic has created an urgent need for mathematical models that can project epidemic trends and evaluate the effectiveness of mitigation strategies. To forecast the transmission of COVID-19, a major challenge is the accurate assessment of the multi-scale human mobility and how they impact infection through close contacts. By combining the stochastic agent-based modeling strategy and hierarchical structures of spatial containers corresponding to the notion of places in geography, we present a novel model, Mob-Cov, to study the impact of human traveling behavior and individual health conditions on the disease transmission dynamics.

We find that frequent long movements within a small-level container (e.g. a street or a county) alleviates local crowdedness of people and reduces infection. But traveling between large-level containers (e.g. cities and nations) converts local transmission to global disease spread, facilitating the outbreak of the disease. In addition, dynamic infection and recovery in the population are able to drive the bifurcation of the system to a "zero-COVID" state or a "live with COVID" state, depending on the mobility patterns, population number and health conditions. Reducing total population and local people accumulation as well as restricting global travels help achieve zero-COVID.

Overall, the model framework includes a flexible individual-based approach that can capture not only the local interaction between individuals and microscopic disease transmission, but also the global spread of the disease influenced by really long-distance cross-district travels. The Mob-Cov model could potentially help policymakers to define measures at various spatial-temporal scales and evaluate the effective length scale of the interventions. Thus, this work could have a broad impact and inspire novel studies in many fields, such as physics, public health, medical science and social science.

We recommend the following experts as potential reviewers for this manuscript.

1) Dr. Laura Alessandretti
   Professor of Applied Mathematics and Computer Science
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This work has not been published, nor has it been submitted elsewhere. On behalf of our co-authors, we appreciate your consideration of this work.

Respectfully,

Xiaomo Jiang, Ph.D.