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Spatial Temporal Change of COVID-19 Vaccination Condition in the US: An Exploration Based on Space Time Cube

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Abstract : COVID-19 vaccines not only protect individuals but society as a whole. In this case, having an understanding of the change and trend of vaccination conditions may shed some light on revising and making up-to-date policies regarding large-scale public health promotions and calls in order to lead and encourage the adoption of COVID-19 vaccines. However, vaccination status change over time and vary from place to place hidden patterns that were not fully explored in previous research. In our research, we took advantage of the spatial-temporal analytical methods in the domain of geographic information science and captured the spatial-temporal changes regarding COVID-19 vaccination status in the United States during 2020 and 2021. After conducting the emerging hot spots analysis on both the state level data of the US and county level data of California we found that: (1) at the macroscopic level, there is a continuously increasing trend of the vaccination rate in the US, but there is a variance on the spatial clusters at county level; (2) spatial hotspots and clusters with high vaccination amount over time were clustered around the west and east coast in regions like California and New York City where are densely populated with considerable economy conditions; (3) in terms of the growing trend of the daily vaccination among, Los Angeles County alone has very high statistics and dramatic increases over time. We hope that our findings can be valuable guidance for supporting future decision-making regarding vaccination policies as well as directing new research on relevant topics.

Keywords : COVID-19 vaccine, GIS, space time cube, spatial-temporal analysis
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