Statistical Analysis of Temporal and Spatial Trends in US Covid-19 Cases and Deaths

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This study provides a statistical analysis of the spatial and temporal trends in US Covid-19 case from March 2020 - February 2021.

Introduction

Covid-19 is a novel, highly contagious, acute respiratory virus that was first identified in December 2019 in Wuhan, China. Over the course of the following 14 months, this virus spread rapidly to every corner of the globe, becoming one of the deadliest pandemics in recorded history. In the United States, the first confirmed Covid-19 case was identified in January 2020 and by mid-March there were confirmed cases in every single state and North American territory. In the midst of this rapid pandemic spread, epidemiologists and modelers struggled to accurately forecast the spatial and temporal trends in cases and deaths. However, with regularly updated, publicly-available covid tracking data, a sufficient amount of data now exists to retroactively examine how cases and deaths evolved over the course of this 14 month period. This study utilizes the New York Times Covid Tracking Data to statistically analyze trends in the timeseries of Covid-19 cases and deaths as well as the spatial development of cases at the state level across the united states using cluster analysis.

Methodology

Data Sources

Due to the fragmented nature of the US public health system, there is no centralized governmental data repository that is updated daily with Covid-19 case and death data. Instead, this study obtained data from the New York Times (NYTimes) Covid-19 Tracking Project (https://github.com/nytimes/covid-19-data). The NYTimes relies on dozens of reporters across multiple time zones to regularly update this tracking database with new information from press conferences, report releases, and local databases. Datasets utilized in this analysis reported the daily cumulative case and death counts in the US aggregated at the national, state and county level (US.csv, US-states.csv, US-counties.csv), respectively. Demographic data on state populations were also obtained from the US census bureau to compare per capita rates.