Population movement index

Using data and network analytics to identify
transmission pathways and locations

§sas

Privacy compliant

**Powerful
data management**

**Explainable
network analytics**

The Issue

Public health researchers and policymakers need access to the right data to help them understand how population movement affects the spread of COVID-19. Using network analytics based on aggregated data from telecommunications companies gives decision makers accurate insights about the pattern of virus spread across locations. It also helps determine social distancing measures to control and reduce transmission rates.

SAS can work with telecommunications companies and public health departments to capture mobility data and feed it into advanced network analysis algorithms. As a result, they'll get insights and visual reports about the in-and-out flow of people within geographical areas and how it affects the spread of the virus.

The Challenges

Access to data. Governments are responsible for public health policies, but telecommunications companies own the data needed for population movement index algorithms. This requires a partnership between governments and telecommunications companies for population tracking to work. SAS provides a comprehensive analytical platform that includes robust data management and advanced optimization network algorithms to describe the mobility behavior. The platform also delivers statistical analysis to correlate the mobility behavior to the spread of the virus.

Public perception. Telecommunications data must be aggregated before being shared or used for analysis so that no subscriber or individual customer information is used. However, the public may not understand the distinction between personal and aggregate data, which could lead to privacy concerns and backlash against parties involved. SAS understands citizen privacy legislation and provides technical and consulting expertise to help ensure that data is used according to governmental requirements.

Analytical expertise. Not all companies have the expertise needed to build population movement models. SAS provides analytical solutions and industry expertise to discover insights from data and make sense of it all. Identify what's working and fix what isn't.

Our Approach

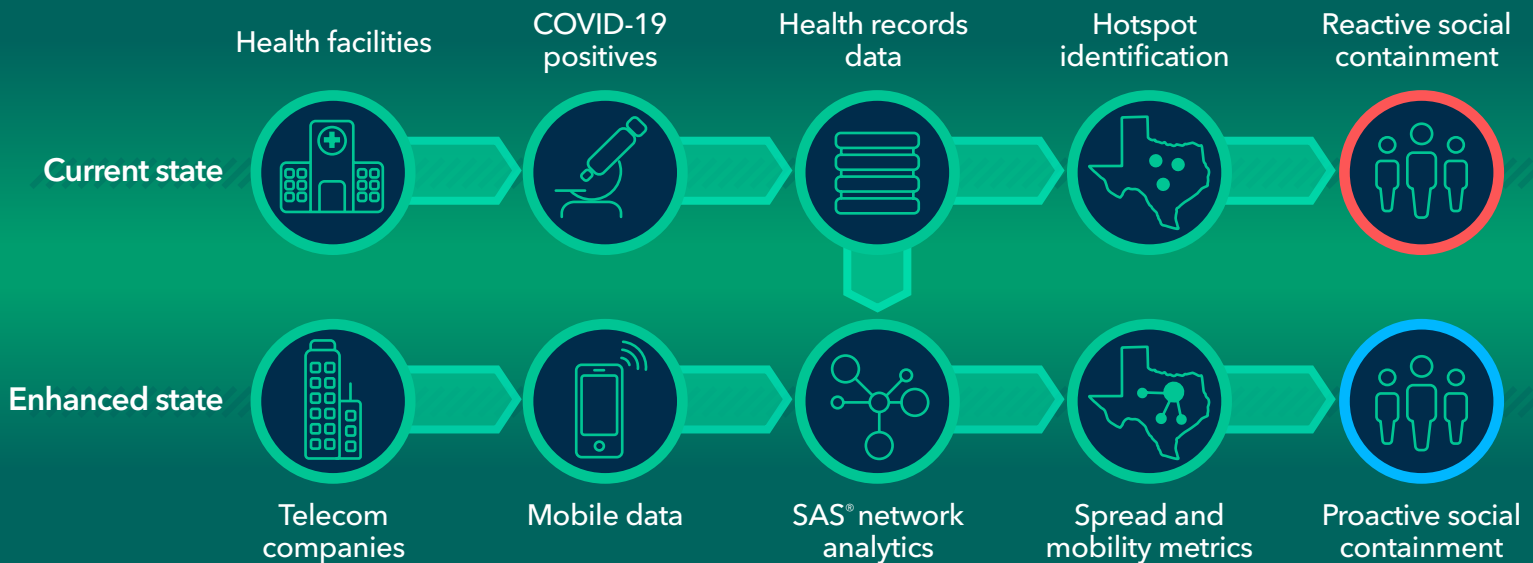SAS provides data management and analytics that help you respond to the current crisis.

- **Network analysis algorithms to determine mobility behavior.** You can create a network where nodes are locations (neighborhoods, municipalities, cities, counties, etc.) and links are the number of people flowing in and out between locations (hourly, daily, etc.). You can also compute a series of network metrics such as degree, influence, betweenness, closeness, hub, etc. This enables you to analyze the network topology and identify the key locations within a network. You'll be able to identify the common paths from the key locations to all other locations to determine the frequent paths for virus spread.

- **Machine-learning models to predict locations with new cases.** We can help you deploy machine-learning models to predict locations with new cases in a specified time frame (upcoming days or weeks). Models provide valuable and timely insight to help local authorities prepare social distancing policies and measures.

- **Dashboards and visualizations showing the potential impact of the virus.** You can create demographic views of major population flows that include side-by-side maps showing correlations between key locations and virus spread; maps describing the flow and the frequent trajectories of people and the pathways for the virus; and maps showing the predicted locations for new cases. This enables you to monitor points of interest in terms of volume of people. You can help local authorities evaluate shelter-in-place or stay-at-home policies by comparing population movements before the outbreak and the current situation.

The SAS® Difference

SAS provides a deep portfolio of analytics solutions and broad industry knowledge to help customers succeed. Our capabilities include:

- **A powerful data management platform** to ingest and prepare massive volumes of data needed for a population movement project.

- **Advanced analytics** to analyze data and create a set of network metrics and subgraphs needed to create the relevant key performance indicators (KPIs) to describe mobility behaviors and how they affect the virus spread.

- **Interactive visualization tools** to enable detailed investigation of mobility behaviors and how the spread of the virus is affected by the flows of people to and from various locations.

- **IoT capabilities** to ingest data, perform analytical tasks and visualize outcomes in real time, including the ability to add alerts to inform users when particular scenarios and thresholds are reached.

Enhanced Population Movement Analysis

	Health facilities	COVID-19 positives	Health records data	Hotspot identification	Reactive social containment
Current state					

	Telecom companies	Mobile data	SAS® network analytics	Spread and mobility metrics	Proactive social containment
Enhanced state					

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