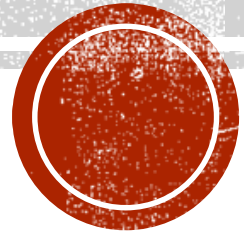
THE APPLICATION OF APPLE MOBILITY REPORTS IN COVID-19 RESEARCH



Mengxi Zhang, Assistant Professor

Ball State University College of Health

MOBILITY DATA & INDEX
MOBILITY RESEARCH GROUP OF THE CHINA DATA LAB

Dataset Name	Present Date	Presenter
1. Foursquare Community Mobility Data	4/16/2021	Xiaoyue Wang
2. Descartes Lab Social Distancing Index	4/30/2021	Xiaokang Fu
3. Safegraph Foot Traffic Data	5/7/2021	Xiao Huang
4. Google Community Mobility Reports	5/14/2021	Sisi Wang
5. Mobility Metrics and Social Distancing Index	6/4/2021	Tao Hu
6. Apple Mobility Reports	6/24/2021	Mengxi Zhang

Hu, Tao, Siqin Wang, Bing She, Mengxi Zhang, Xiao Huang, Yunhe Cui, Jacob Khuri et al. "Human Mobility Data in the COVID-19 Pandemic: Characteristics, Applications, and Challenges." *Applications, and Challenges (May 24, 2021)* (2021).

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		Baidu Mobility Index	China/city and province	1/1/2020 ~ 5/7/2020 & 9/3/2020 ~ presen	Yes	Public	No	inter/intro-city mobility index	Not publicly accessible after May 7 2020, only available for Mainland China	Ze-Liang et al., 2020 Liu et al., 2020 Xu et al., 2020
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SUMMARY OF HUMAN MOBILITY DATASETS IN RECENT COVID-19 STUDIES

	Unacast Social Distancing Index	U.S.	02/24/2020 ~ present	No	Submit Application	Yes	Granular data, available down to specific data points; bias correction based on classifications of businesses	Since data is coming from third party sources, people may have to agree to consent on those sources	Brodeur et al., 202
	University of Maryland Mobility Metrics and Social Distancing Index	U.S./county and state	01/01/2020 ~ present	No	Submit Application	Yes	Integrated and cleaned location data from multiple sources; be highly representative	Only available in the U.S.	Zhang et al., 2020 Lee et al., 2020 Ghader, et al., 202
	Camber Systems Social Distancing Reporter	U.S./county	08/01/2020 ~ present	No	Submit Application	Yes	Integrating multiple data sources; less biased and more representative; easy to interpret	subject to calibration; only available in U.S. county level; no data before August 2020	Jeffrey et al., 2020
Social Media-Derived Mobility Data	Geotagged Tweets	Worldwide/any spatiotemporal scale	01/01/2018 ~ present	Yes	Public	No	Worldwide coverage, real-time, aggregation-flexible	Bias in population, low penetration	Huang et al., 2020a Li et al., 2021 Su et al., 2020
	Facebook Movement Range Maps	Worldwide	01/03/2020 ~ present	No	Submit Application	Yes	Machine-readable format that is global and free of charge	Only provided by mobile phone users who have enabled location history	Lau et al.,2020; Kuchler et al., 2020 Beria et al., 2021

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WHAT IS THE APPLE MOBILITY TREND REPORTS?

Tim Cook
@tim_cook

While protecting your privacy, we are sharing aggregated mobility data from Apple Maps to help public health authorities learn how people travel in their communities and to provide valuable insights to stop the spread of COVID-19. Stay safe and healthy!
apple.com/newsroom/2020/…

Apple makes mobility data available to aid COVID-19 efforts

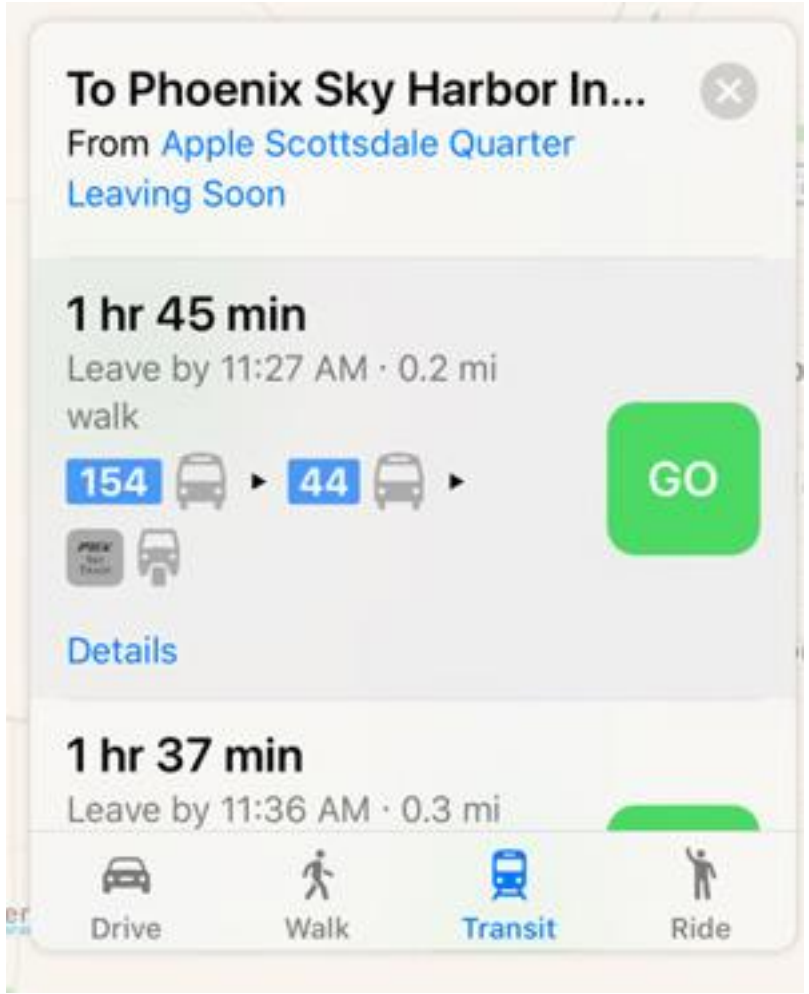
Apple today released a mobility data trends tool from Apple Maps to support the global work to mitigate the spread of COVID-19.

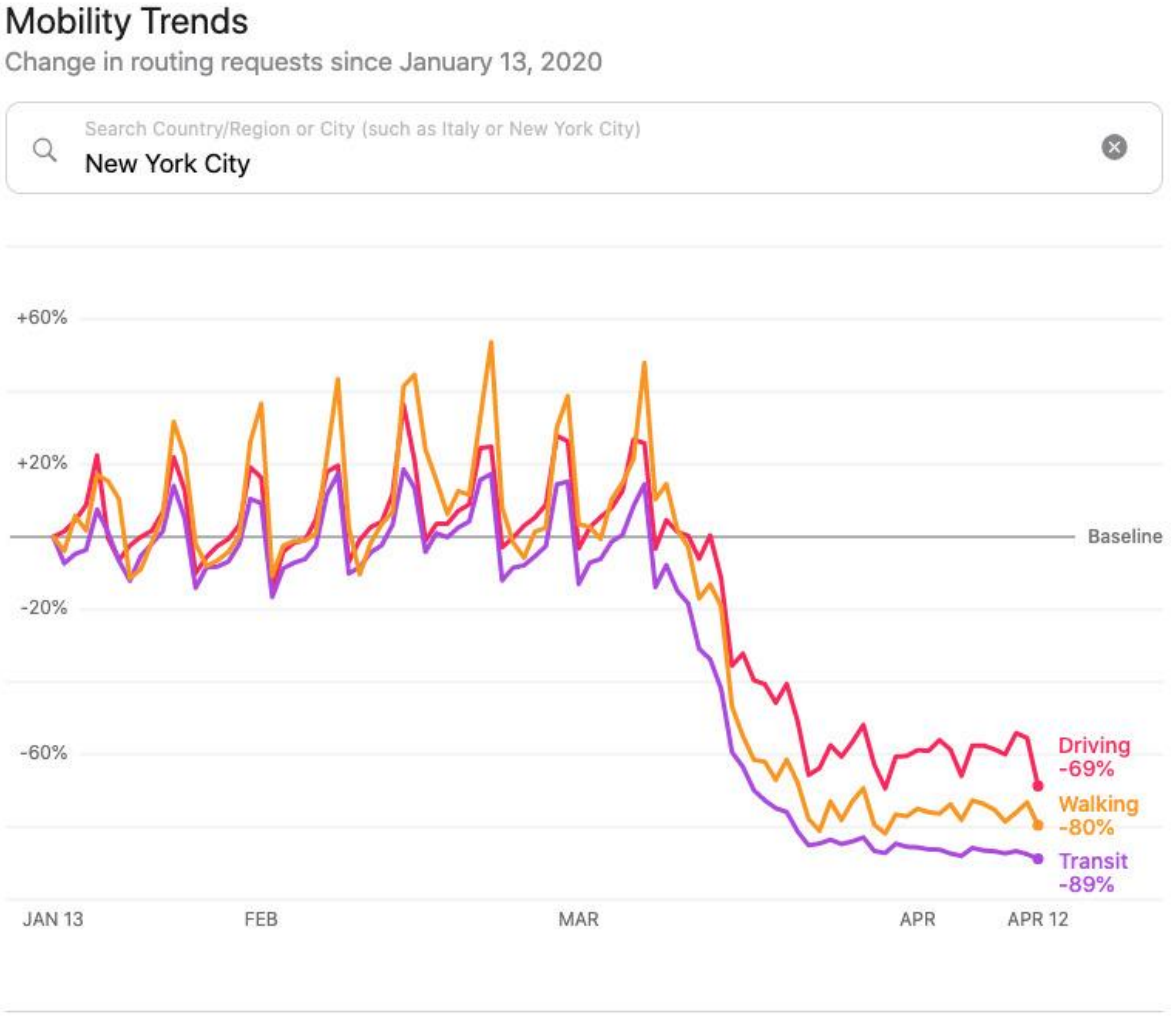
apple.com

♡ 5,010 1:13 AM - Apr 15, 2020

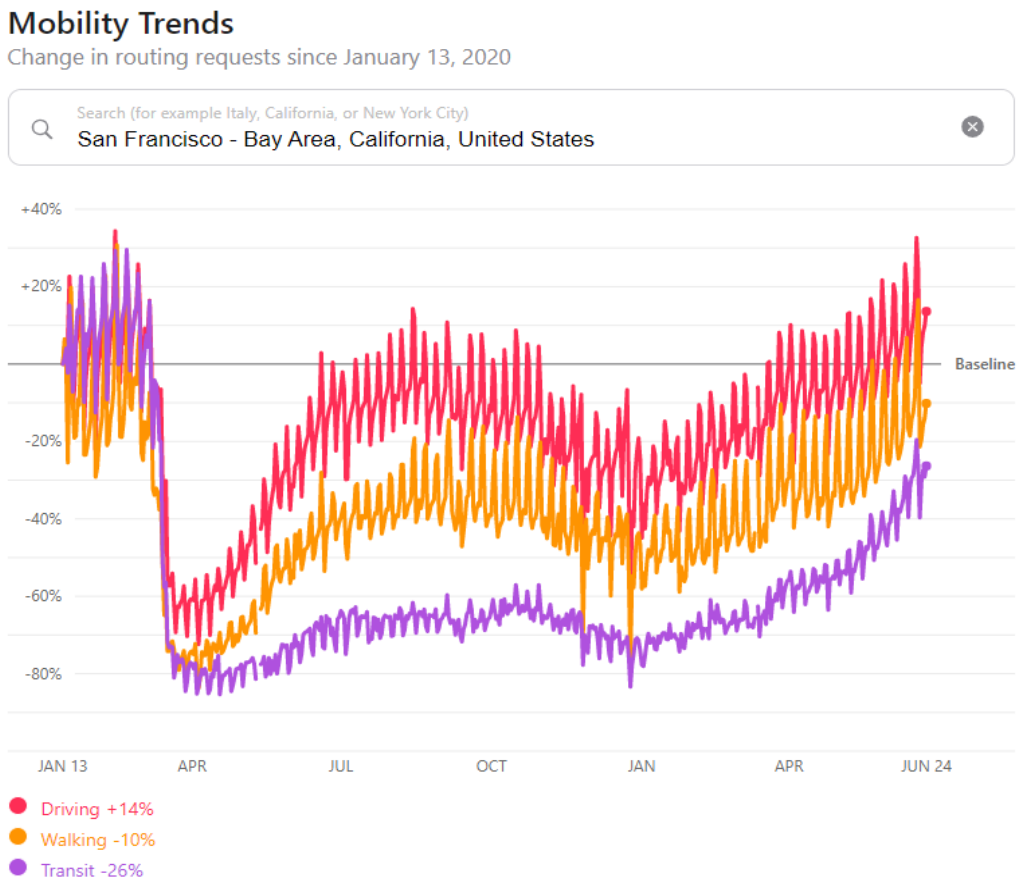
1,372 people are talking about this

HOW THE DATA IS COLLECTED?





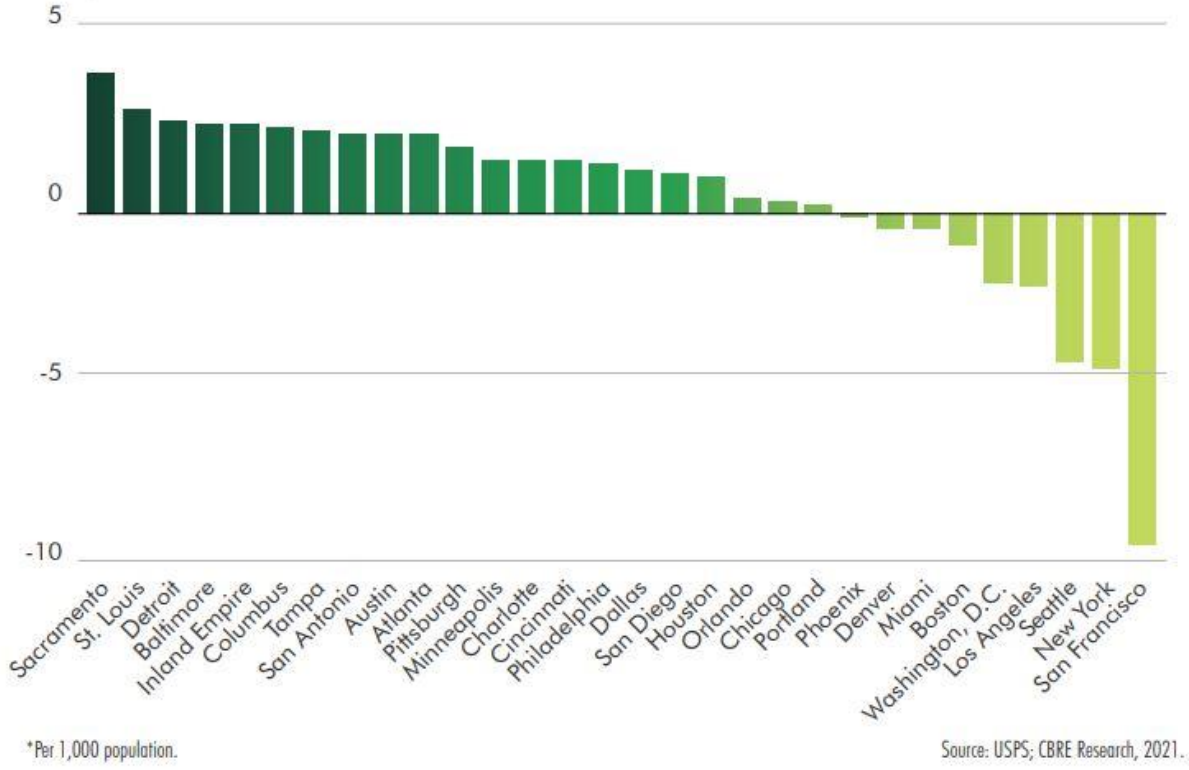
WHAT THE DATA SAY ABOUT COVID-19?



MOVING TO THE BAY AREA OR LEAVING?

FIGURE 3 | COVID-19 IMPACT ON MIGRATION PATTERNS

Change in net moves, 2020 vs. 2019*



*Per 1,000 population.

Source: USPS; CBRE Research, 2021.

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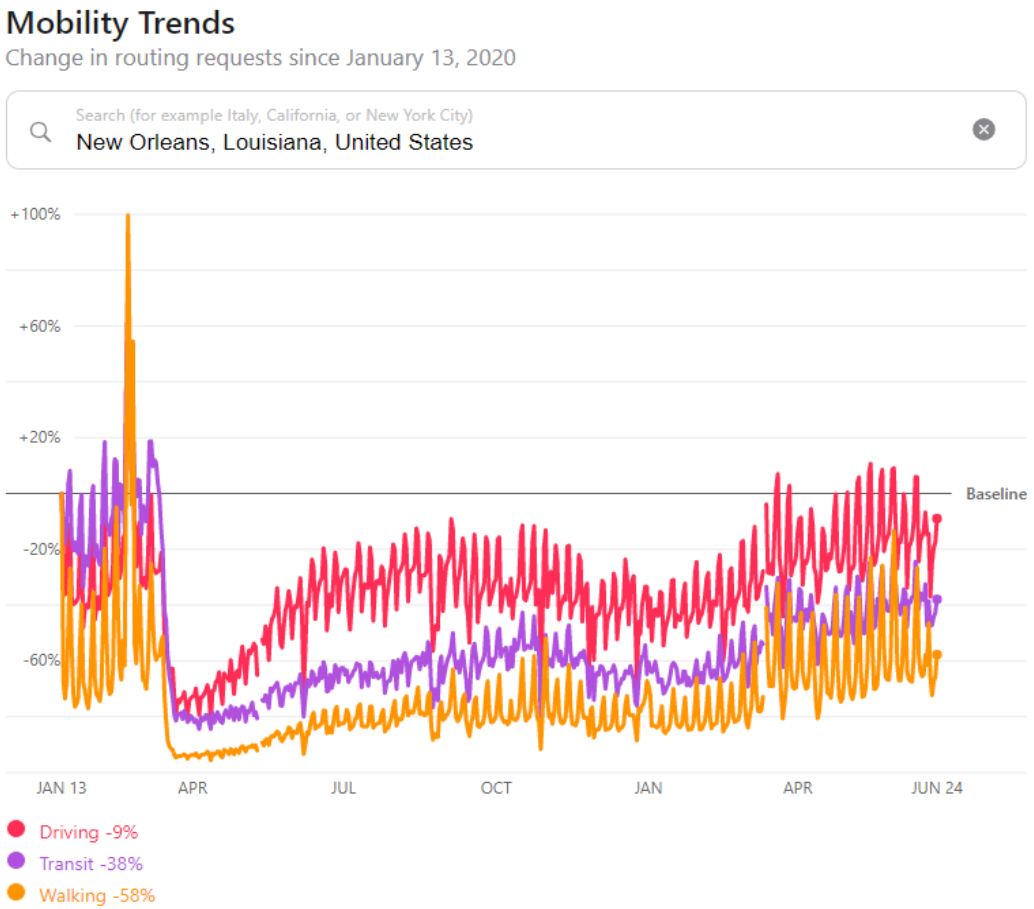

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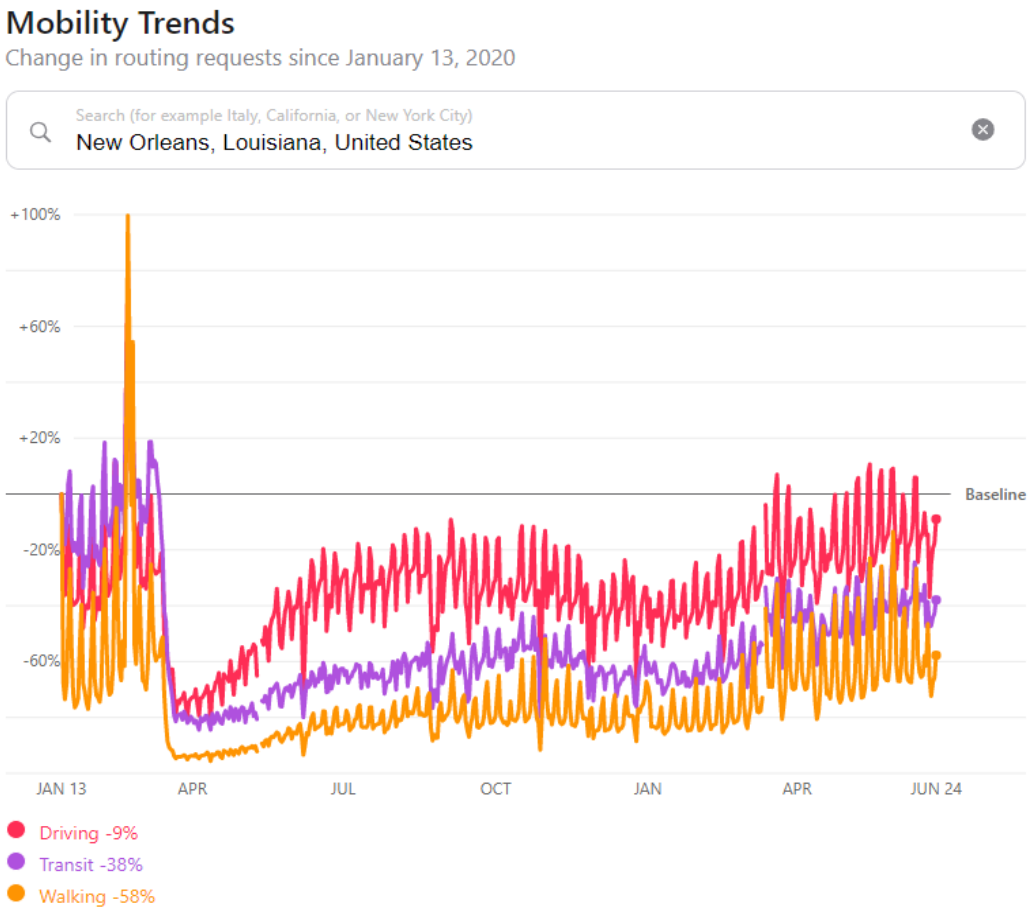

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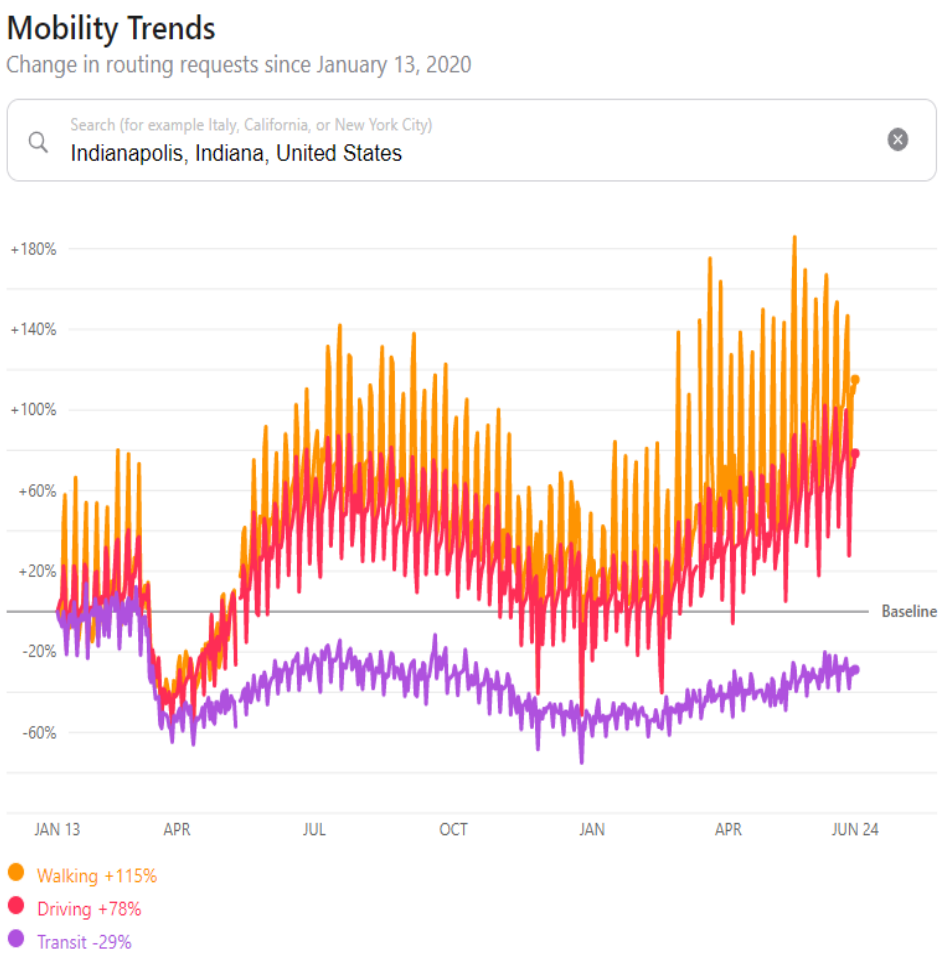

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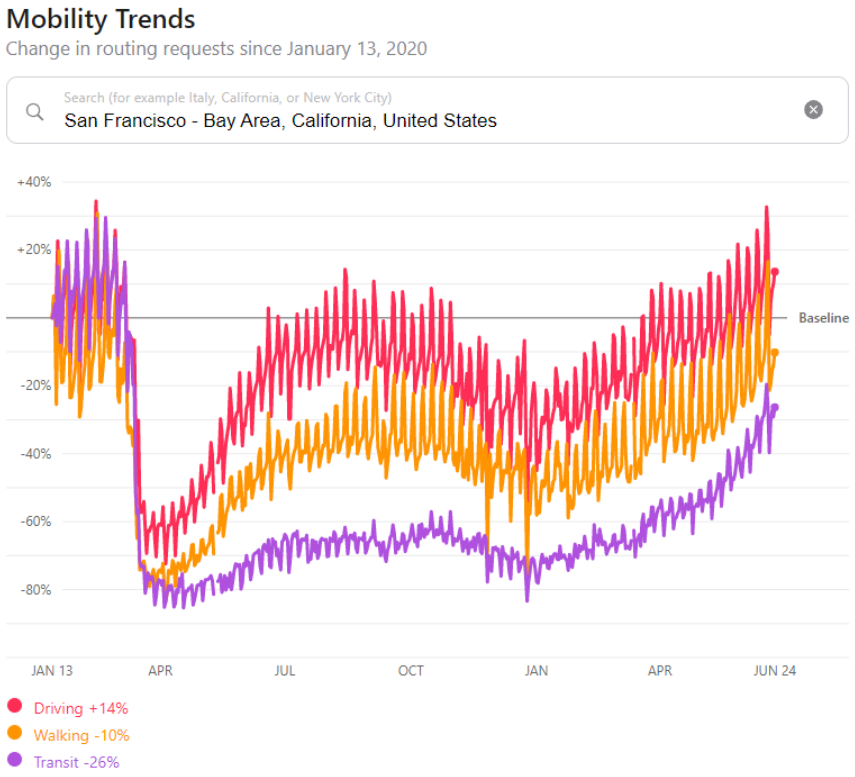

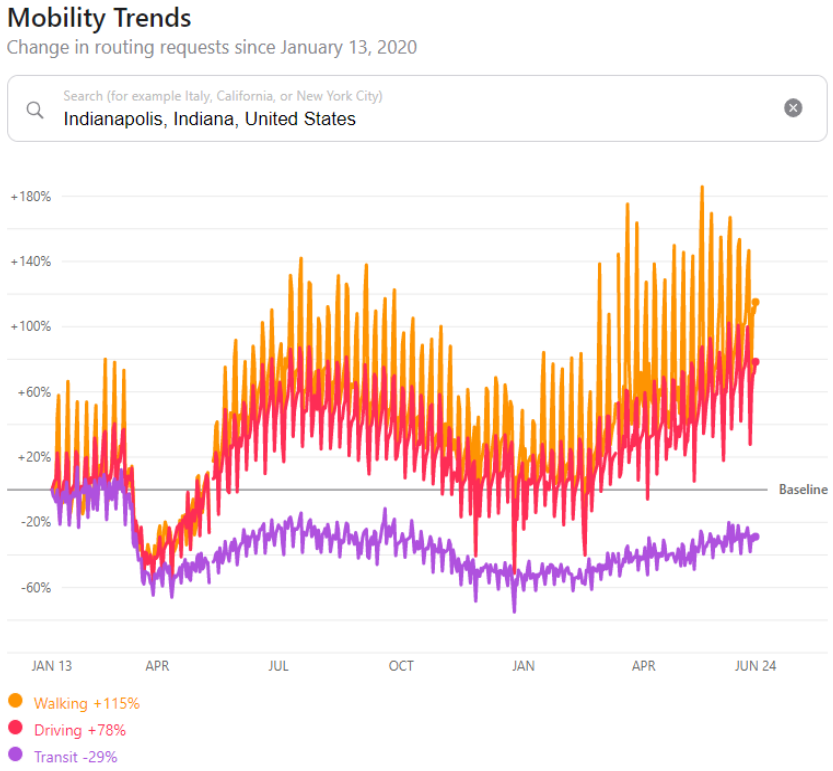

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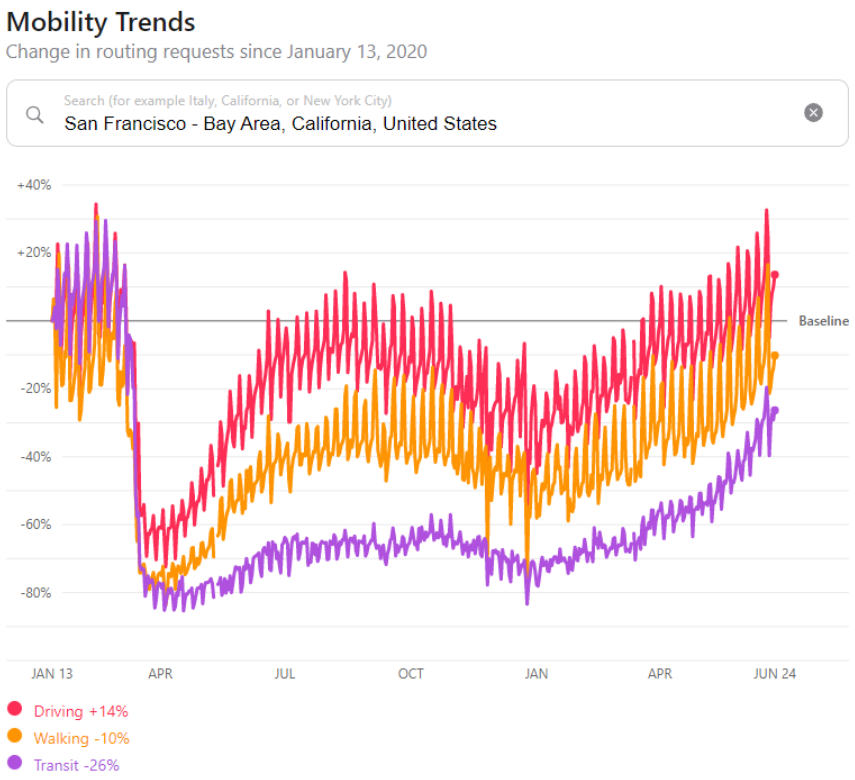
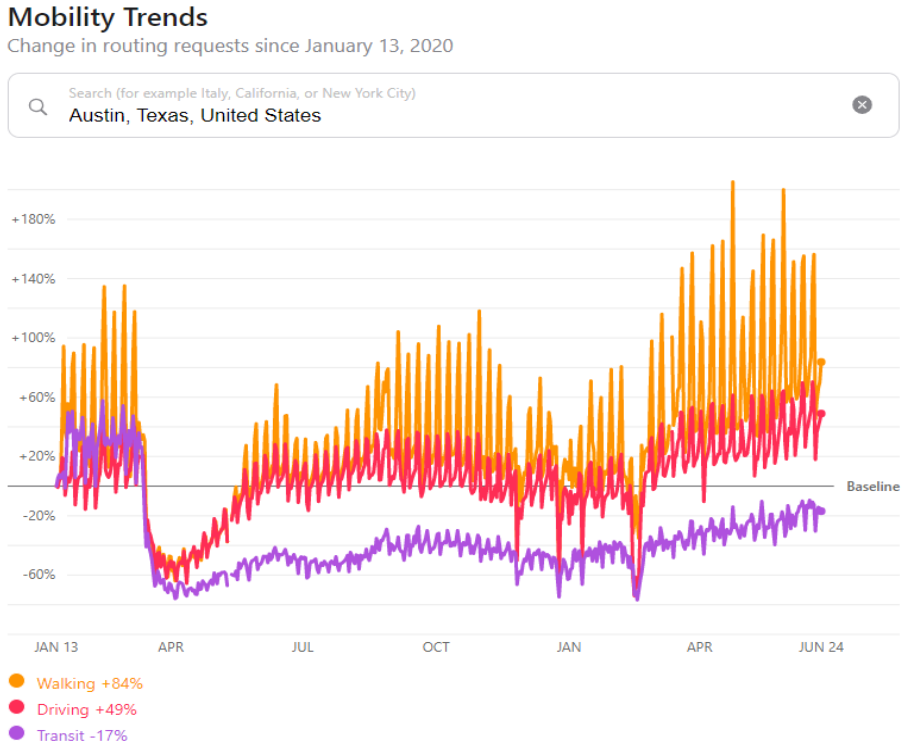
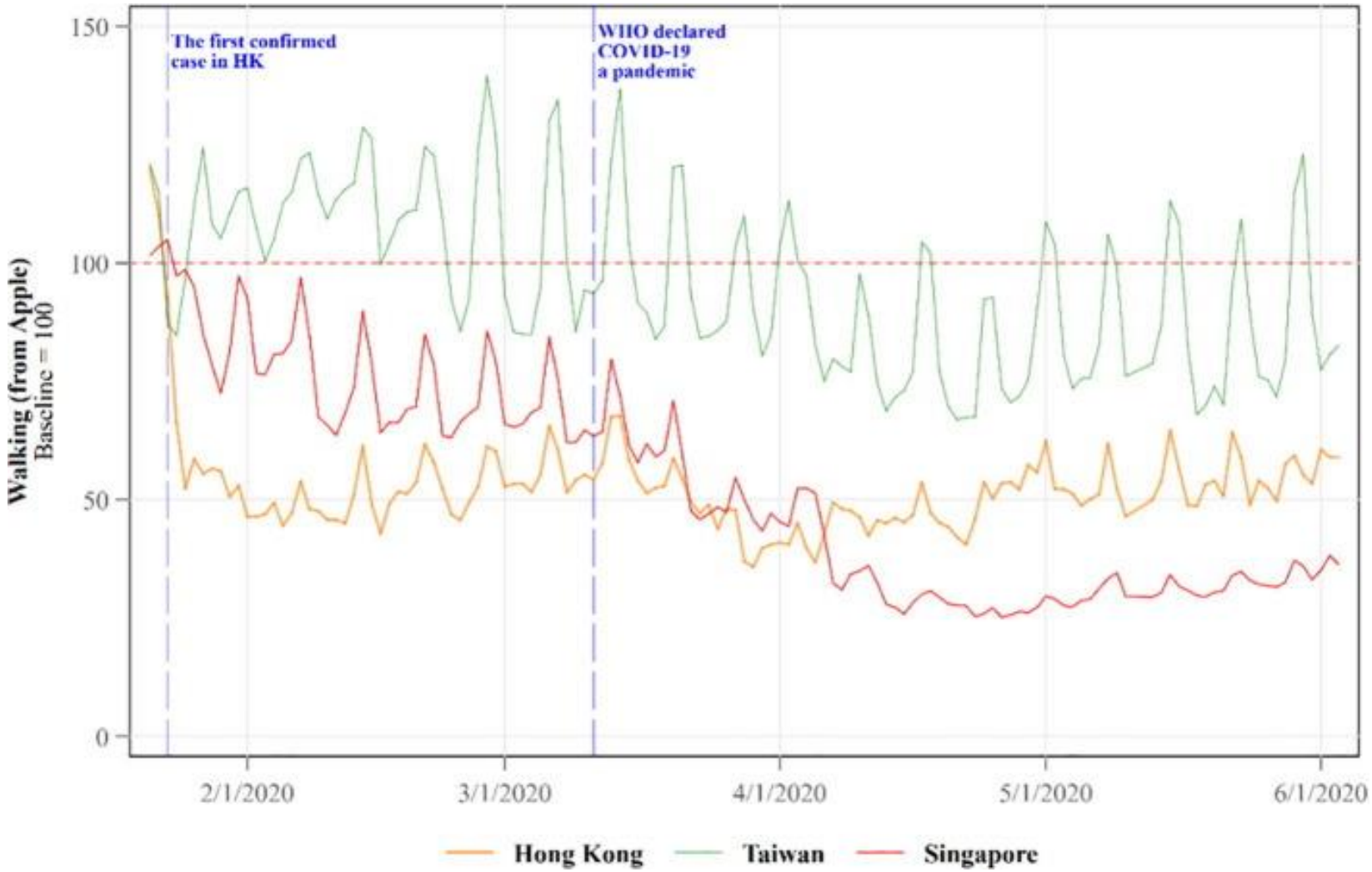
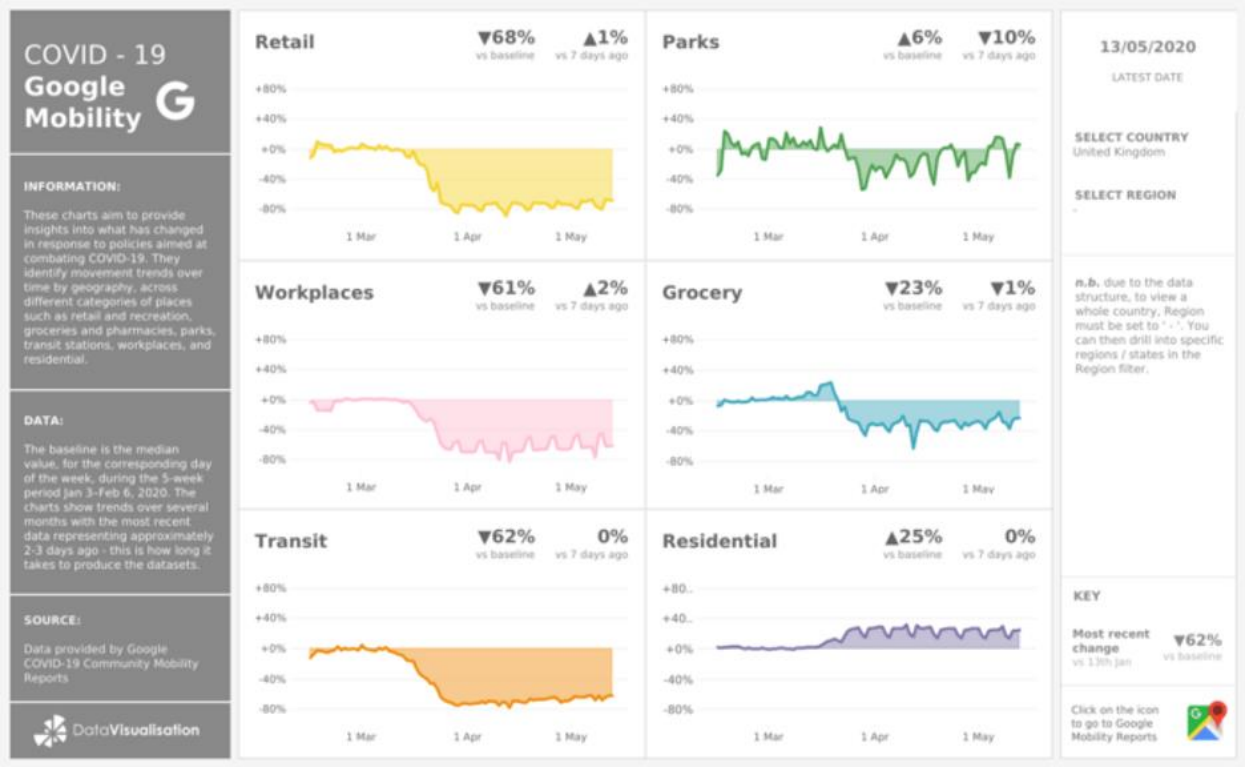
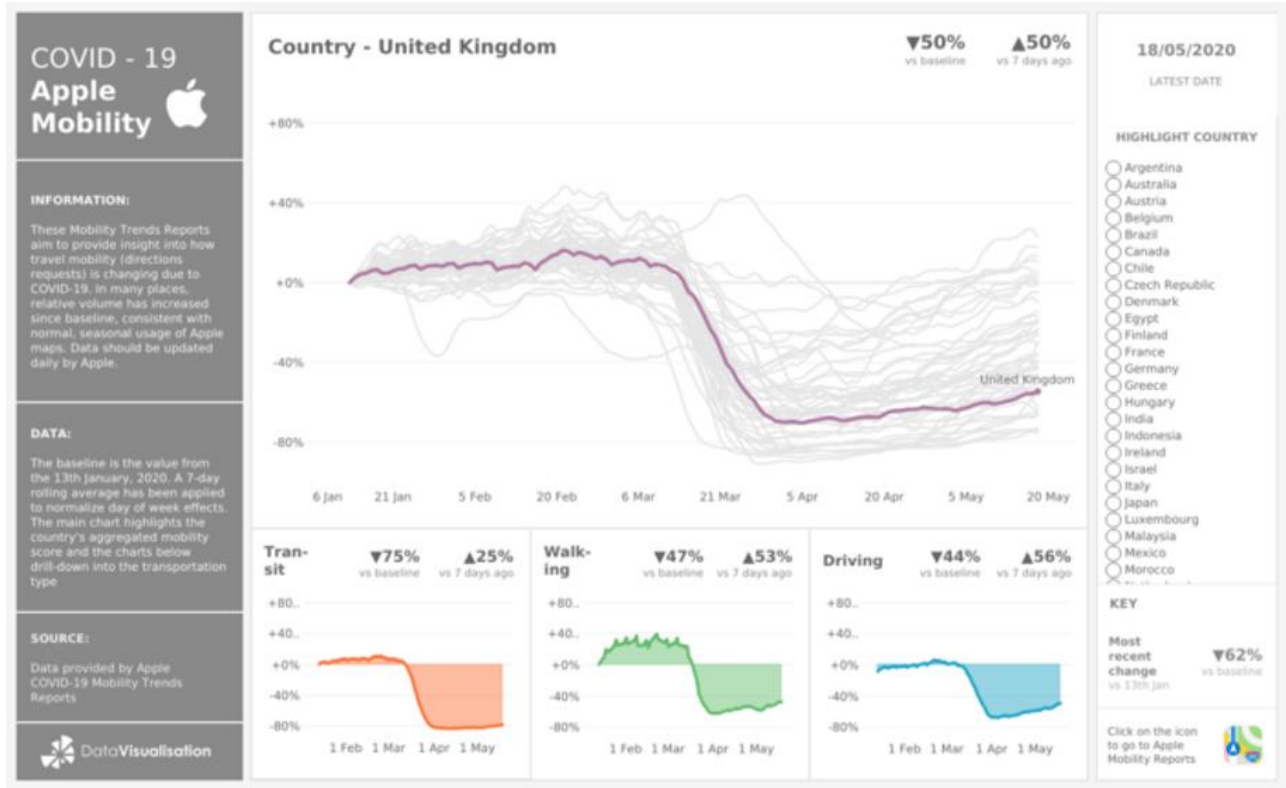




Wan, Kin-Man, Lawrence Ka-ki Ho, Natalie WM Wong, and Andy Chiu. "Fighting COVID-19 in Hong Kong: The effects of community and social mobilization." *World Development* 134 (2020): 105055.




COVID - 19
Google Mobility
INFORMATION:
These charts aim to provide insights into what has changed in response to policies aimed at combating COVID-19. They identify movement trends over time by geography, across different categories of places such as retail and recreation, groceries and pharmacies, parks, transit stations, workplaces, and residential.
DATA:
The baseline is the median value, for the corresponding day of the week, during the 5-week period Jan 3-Feb 6, 2020. The charts show trends over several months with the most recent data representing approximately 2-3 days ago - this is how long it takes to produce the datasets.
SOURCE:
Data provided by Google COVID-19 Community Mobility Reports
DataVisualisation
Retail
▼68% vs baseline
▲1% vs 7 days ago
Parks
▲6% vs baseline
▼10% vs 7 days ago
Workplaces
▼61% vs baseline
▲2% vs 7 days ago
Grocery
▼23% vs baseline
▼1% vs 7 days ago
Transit
▼62% vs baseline
0% vs 7 days ago
Residential
▲25% vs baseline
0% vs 7 days ago
+80%
+40%
+0%
-40%
-80%
1 Mar
1 Apr
1 May
13/05/2020
LATEST DATE
SELECT COUNTRY
United Kingdom
SELECT REGION
n.b. due to the data structure, to view a whole country, Region must be set to ' - '. You can then drill into specific regions / states in the Region filter.
KEY
Most recent change
vs 13th Jan
▼62%
vs baseline
Click on the icon to go to Google Mobility Reports


COVID - 19
Apple Mobility
INFORMATION:
These Mobility Trends Reports aim to provide insight into how travel mobility (directions requests) is changing due to COVID-19. In many places, relative volume has increased since baseline, consistent with normal, seasonal usage of Apple maps. Data should be updated daily by Apple.
DATA:
The baseline is the value from the 13th January, 2020. A 7-day rolling average has been applied to normalize day of week effects. The main chart highlights the country's aggregated mobility score and the charts below drill-down into the transportation type
SOURCE:
Data provided by Apple COVID-19 Mobility Trends Reports
DataVisualisation
Country - United Kingdom
▼50% vs baseline
▲50% vs 7 days ago
+80%
+40%
+0%
-40%
-80%
6 Jan
21 Jan
5 Feb
20 Feb
6 Mar
21 Mar
5 Apr
20 Apr
5 May
20 May
United Kingdom
Tran-sit
▼75% vs baseline
▲25% vs 7 days ago
Walk-ing
▼47% vs baseline
▲53% vs 7 days ago
Driving
▼44% vs baseline
▲56% vs 7 days ago
1 Feb
1 Mar
1 Apr
1 May
18/05/2020
LATEST DATE
HIGHLIGHT COUNTRY
Argentina
Australia
Austria
Belgium
Brazil
Canada
Chile
Czech Republic
Denmark
Egypt
Finland
France
Germany
Greece
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vs baseline
Click on the icon to go to Apple Mobility Reports

Morita, Hiroyoshi, Shinichiro Nakamura, and Yoshitsugu Hayashi. "Changes of urban activities and behaviors due to COVID-19 in Japan." *Available at SSRN 3594054* (2020).

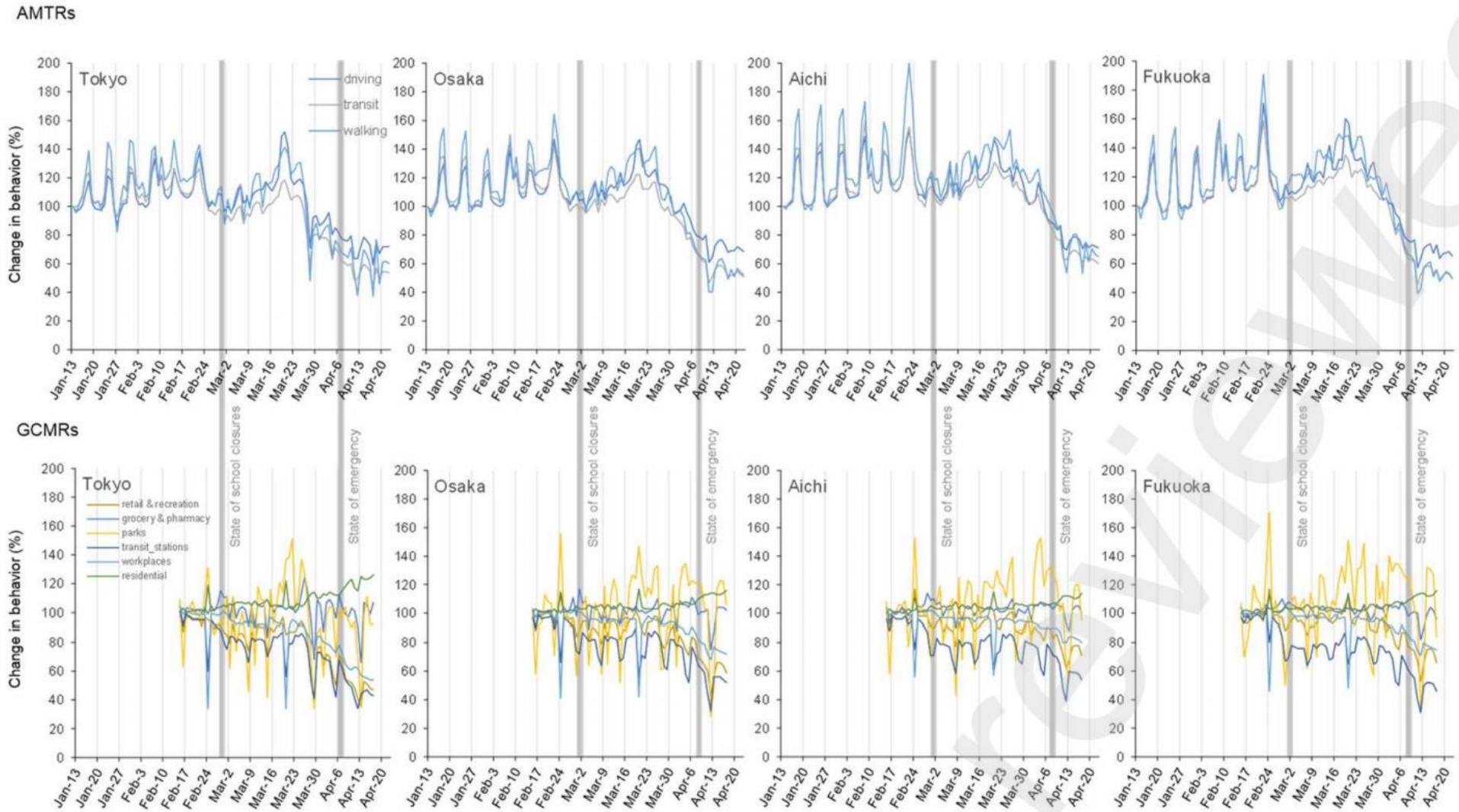


Figure 1. Changes in mobility trends, as determined by data from Apple and Google.

The horizontal axis of the graph shows the partial-correlation coefficients between behavioral change (by mode of transportation and by purpose) and each factor.

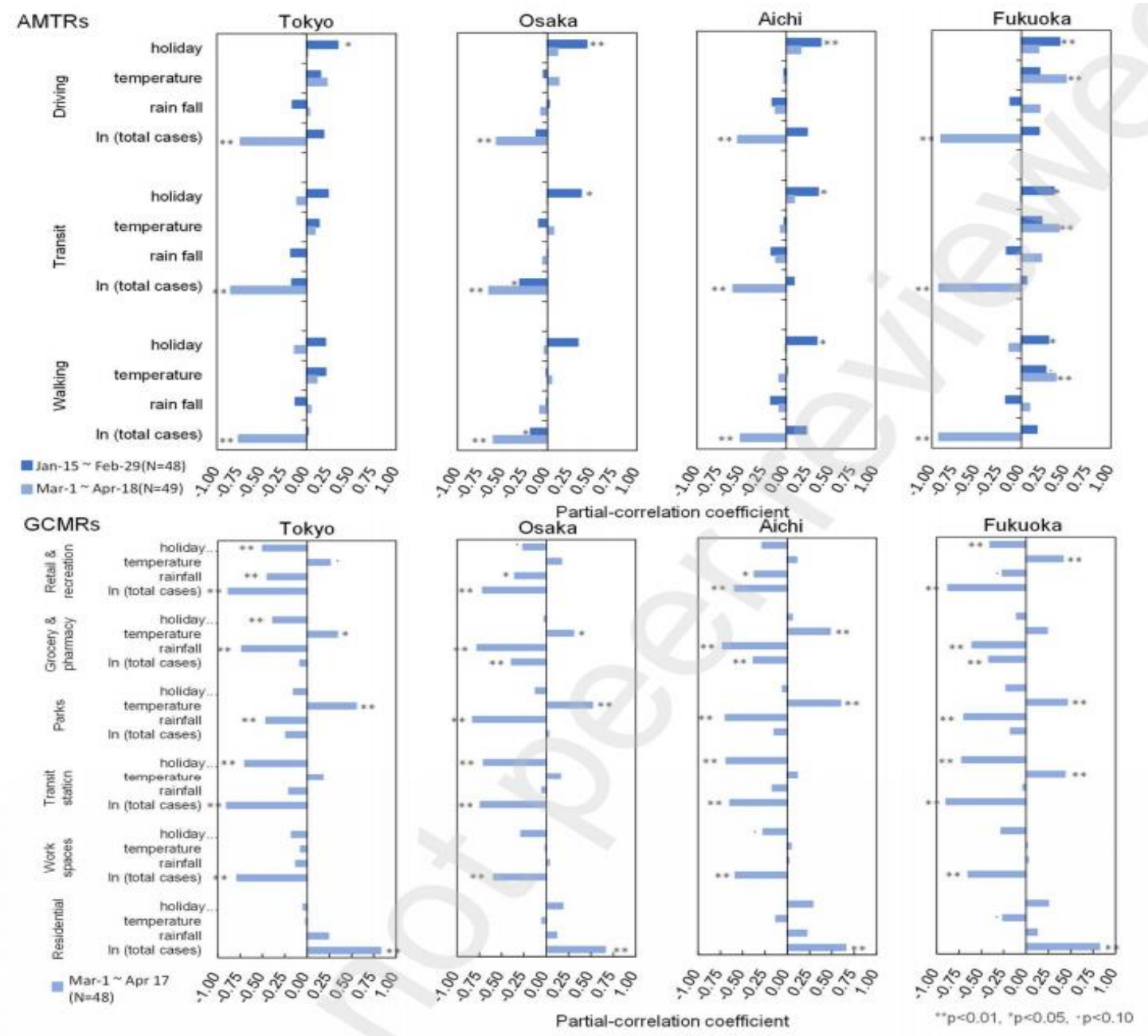
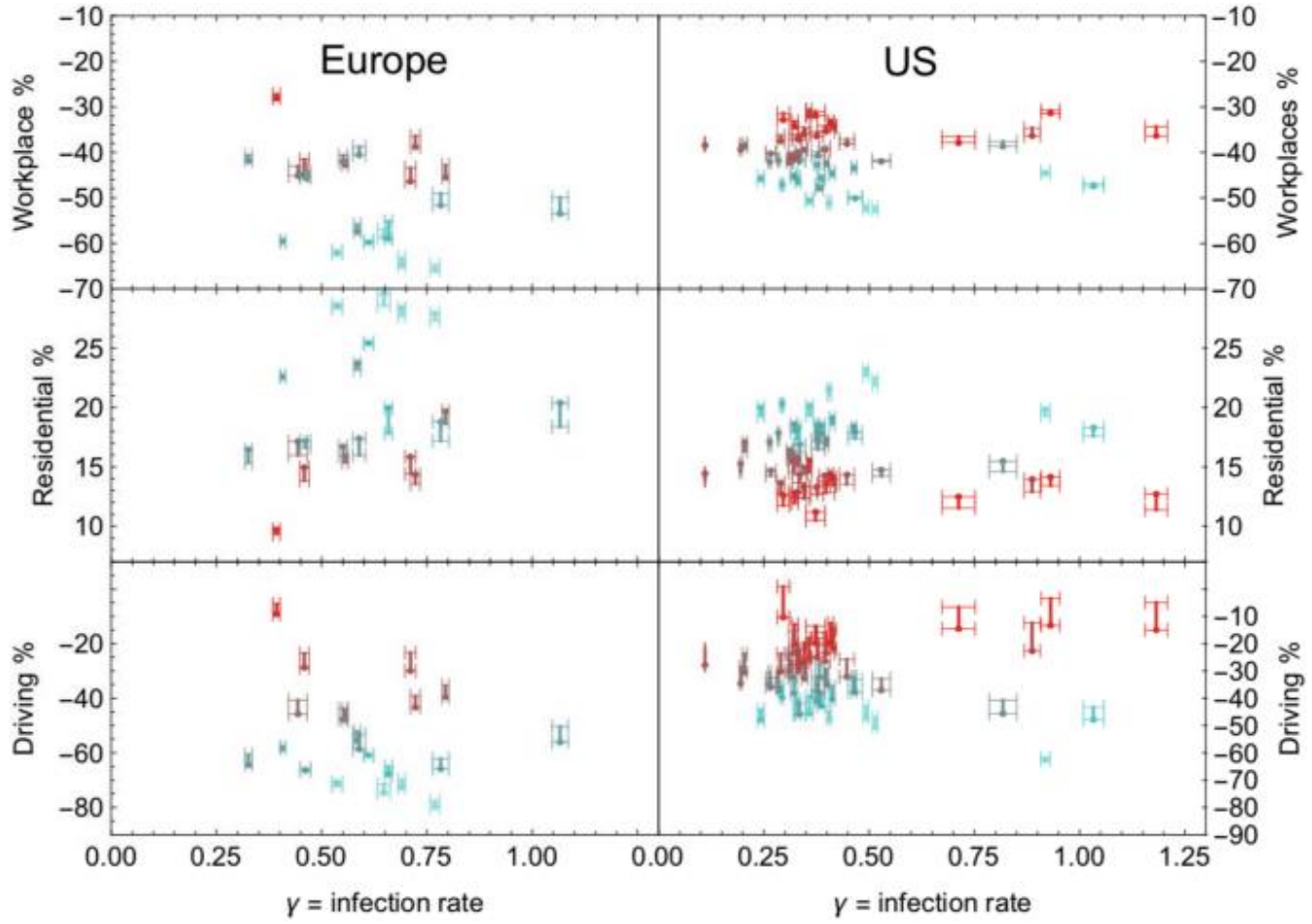


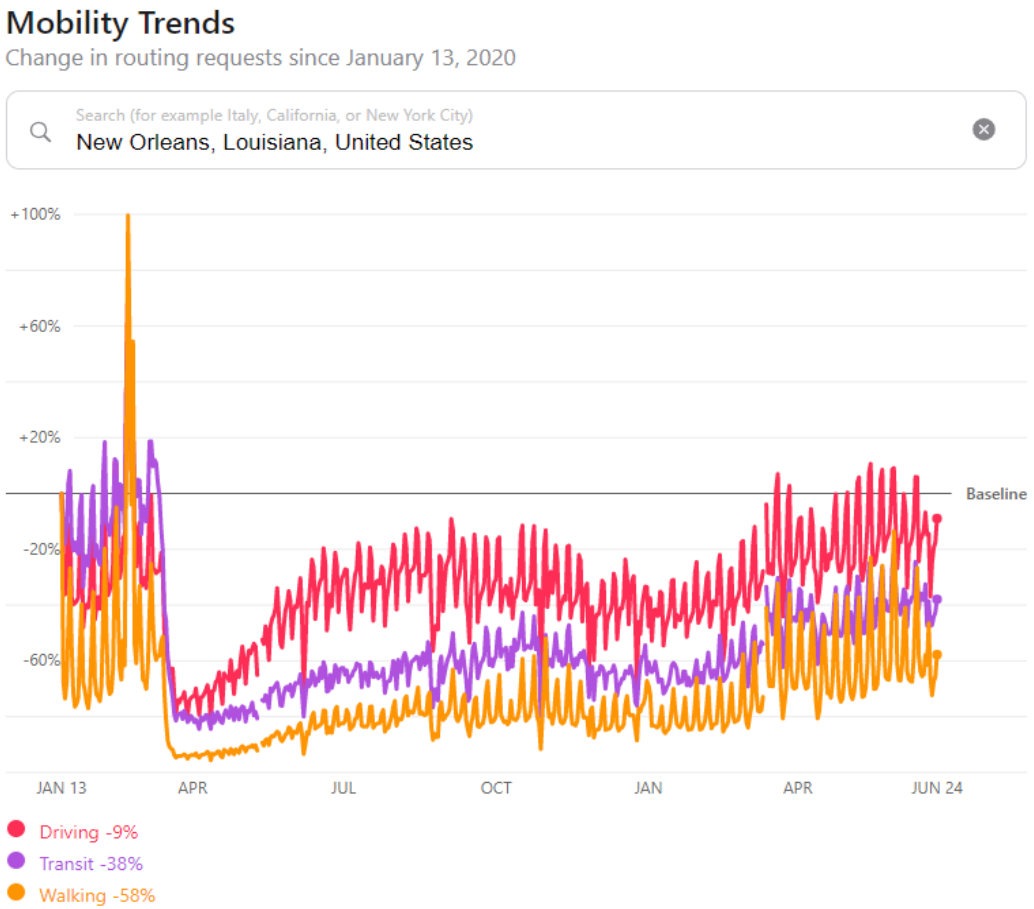
Figure 2. Partial-correlation coefficients between behavioral changes and weekly rhythms, cases, and climatic factors.

Not peer reviewed

Cot, Corentin, Giacomo Cacciapaglia, and Francesco Sannino. "Mining Google and Apple mobility data: Temporal Anatomy for COVID-19 Social Distancing." (2020).



WHAT THE DATA SAY IN ADDITIONAL TO COVID-19?



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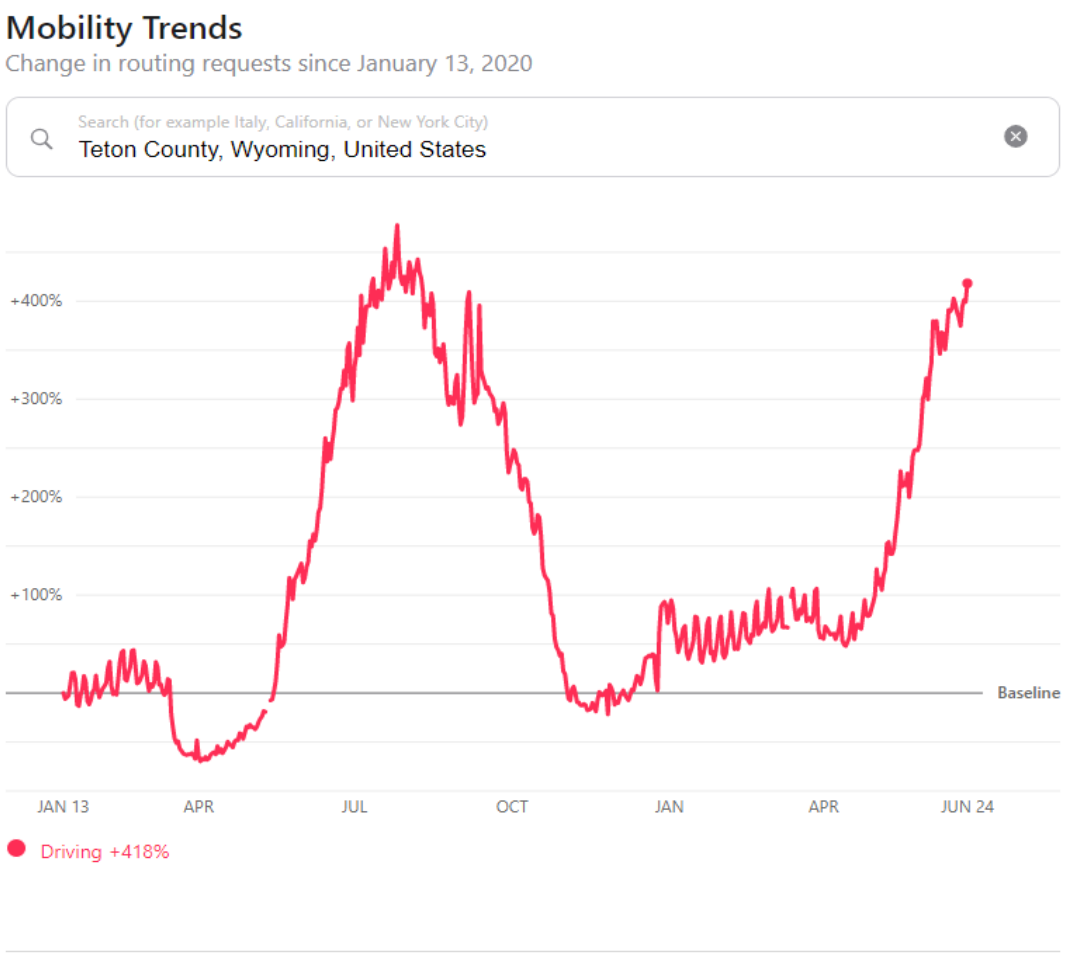

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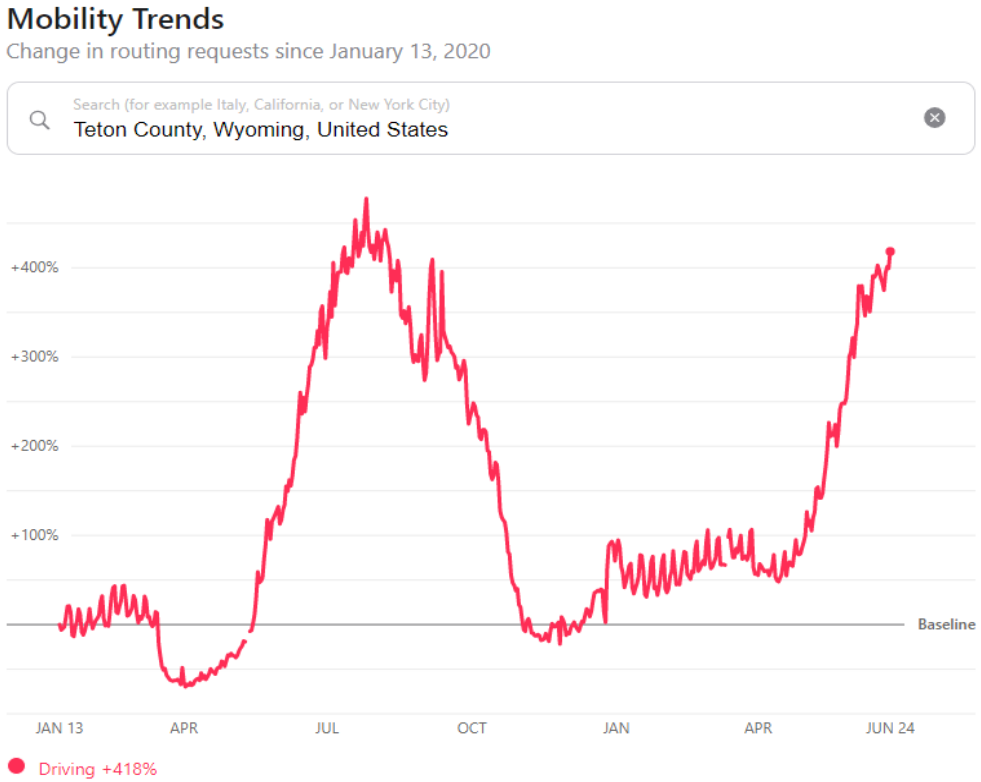

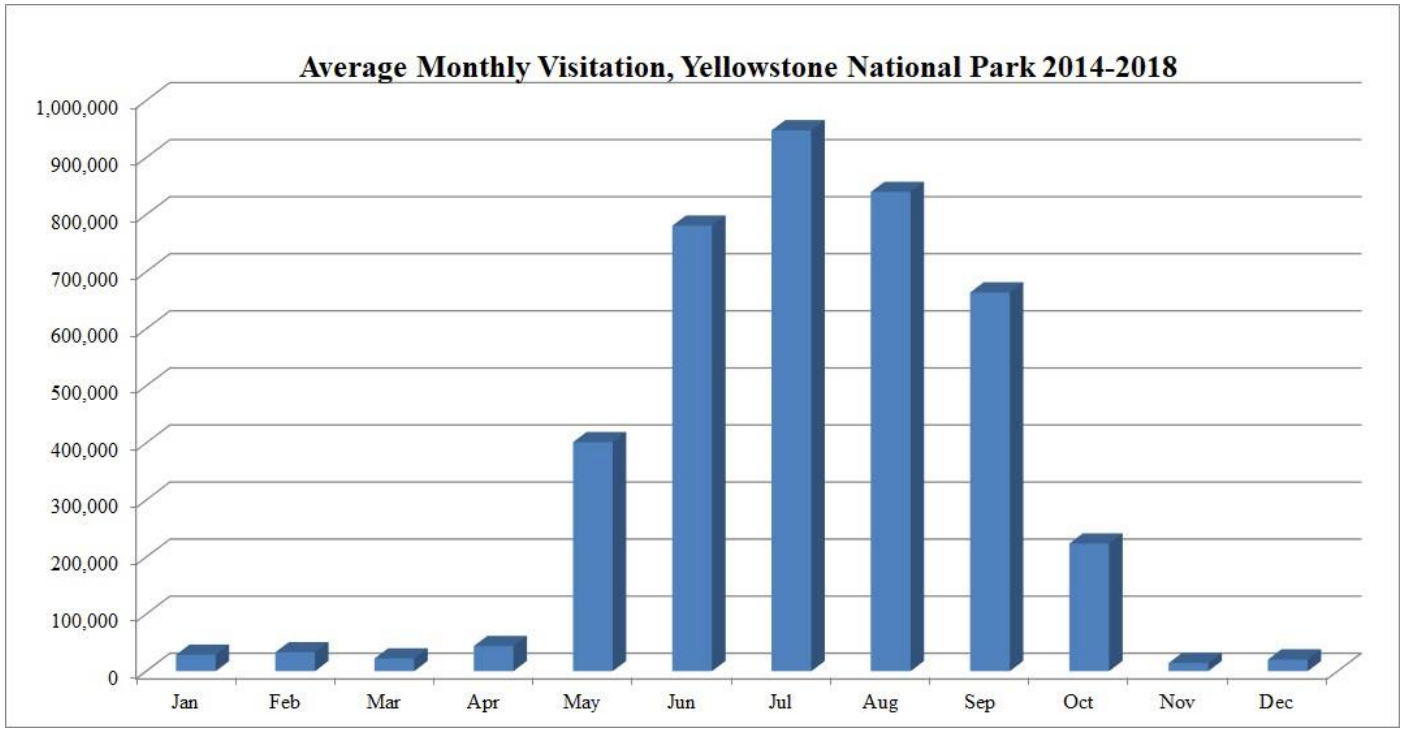

MOBILITY RESEARCH GROUP OF THE CHINA DATA LAB

Shuming Bao, China Data Center, USA
Yunhe Cui, University of Connecticut, USA
Xiaokang Fu, Wuhan University, China
Tao Hu, Harvard University, USA
Yaxin Hu, Wuhan University, China
Xiao Huang, University of Arkansas, USA
Zhenglong Li, University of South Carolina, USA
Haokun Liu, University of Bern, Switzerland
Wei Luo, National University of Singapore, Singapore
Siqin Wang, The University of Queensland, Australia
Xiaoyue Wang, Wuhan University, China
Yingwei Yan, National University of Singapore, Singapore
Mengxi Zhang, Ball State University, USA
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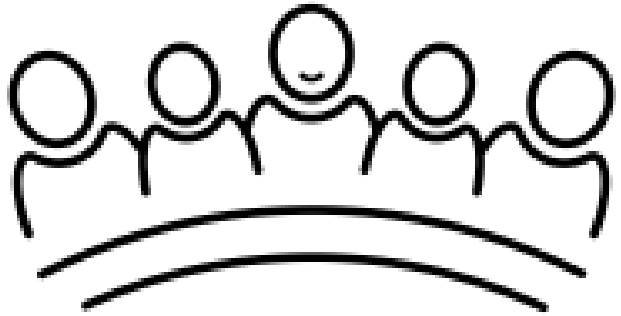
COLLABORATION TO BE CONTINUED

1. Mengxi Zhang et al. Human mobility and COVID-19 transmission: a systematic review and future directions
2. Siqin Wang et al. A bibliometric analysis and network visualisation of human mobility studies from 1990 to 2020: emerging trends and future research directions.
3. Tao Hu et al. Mobility Data in COVID-19 Pandemic: Applications and Challenges
4. Tao Hu, et al. Revealing public opinion towards COVID-19 vaccines using Twitter data in the United States: a spatiotemporal perspective.

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