



# CORRELATION BETWEEN COVID-19 AND MOBILITY IN ITALY

# Hello!

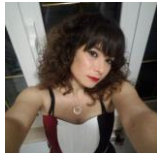
## Team members for group project:



**Fiordeponi Giovanni**



**Ionta Antonio**



**Marchiori Silvia**

# Abstract

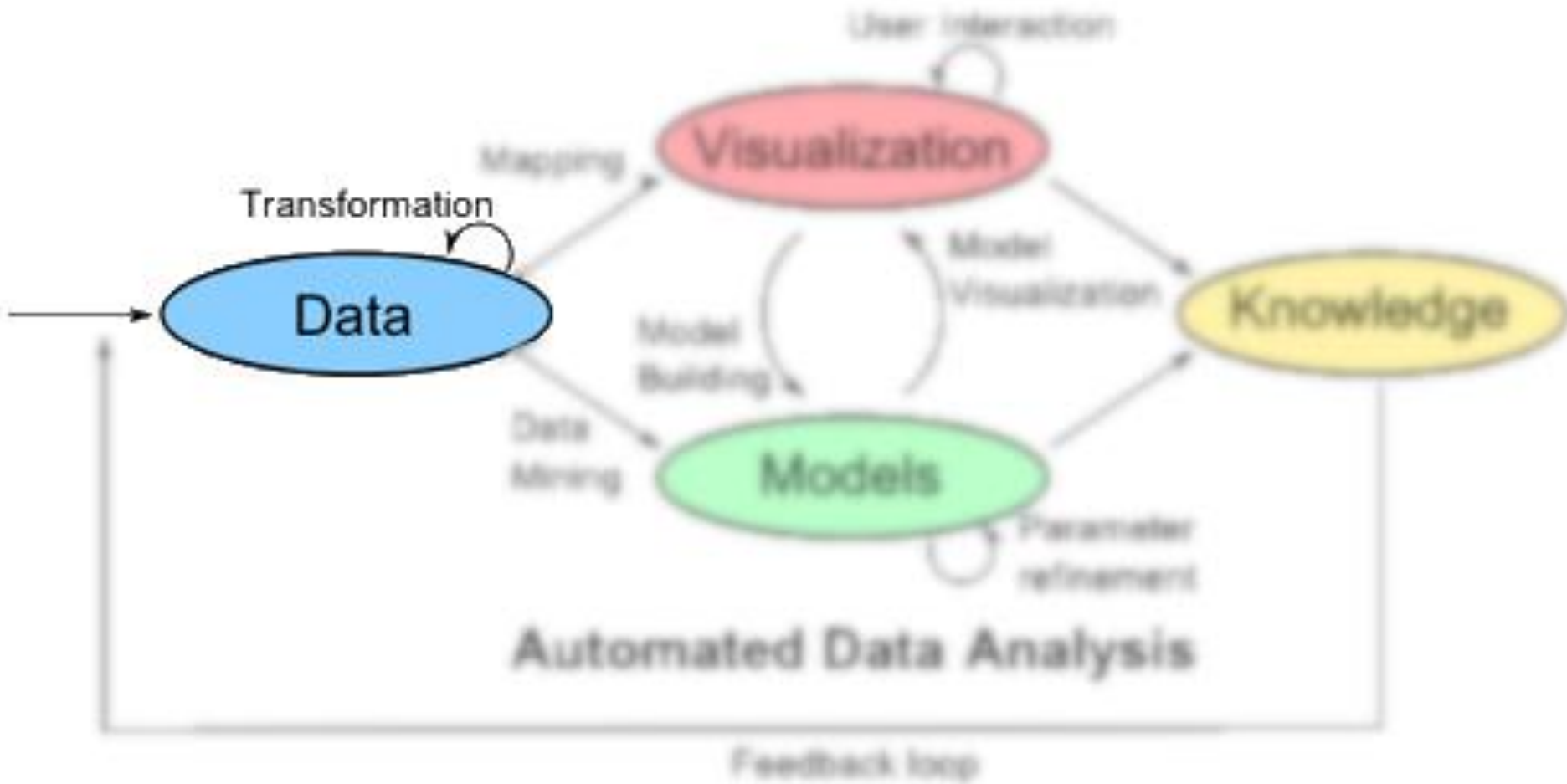
- ▷ Presenting a Visual Analytics environment regarding the effects of the CoVid-19 pandemic in Italy, during the year 2020.
- ▷ Addressing the correlation between the pandemic aggressiveness trend and the variation of mobility of the population.



*Has the lockdown be effective to  
reduce the contagion?*

*Is there a direct connection with an  
increment in people's movement?*

# Visual Data Exploration



# DATA

# Datasets

## CoVid-19 Italy Data

Information about the pandemic's severity in Italy, day by day.

Offered by the Italian Department of Civil Protection.

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- ▷ Positives
- ▷ New cases
- ▷ Death
- ▷ Healed
- ▷ Hospitalized
- ▷ Isolated
- ▷ Intensive care

## CoVid-19 Community Mobility Reports

Movement trends by region, across different categories of places. For each category in a region, reports show the changes comparing mobility for the report date to the baseline day, reported as a positive or negative percentage.

Offered by Google.

- ▷ Groceries-Pharmacy
- ▷ Parks
- ▷ Residential
- ▷ Retail-Recreation
- ▷ Transit

A subset of the data enclosed in these sources were selected and, through an activity of pre-processing, were aggregated (spatiotemporal coordinates as join condition) into a single CSV file feeding the visualization.

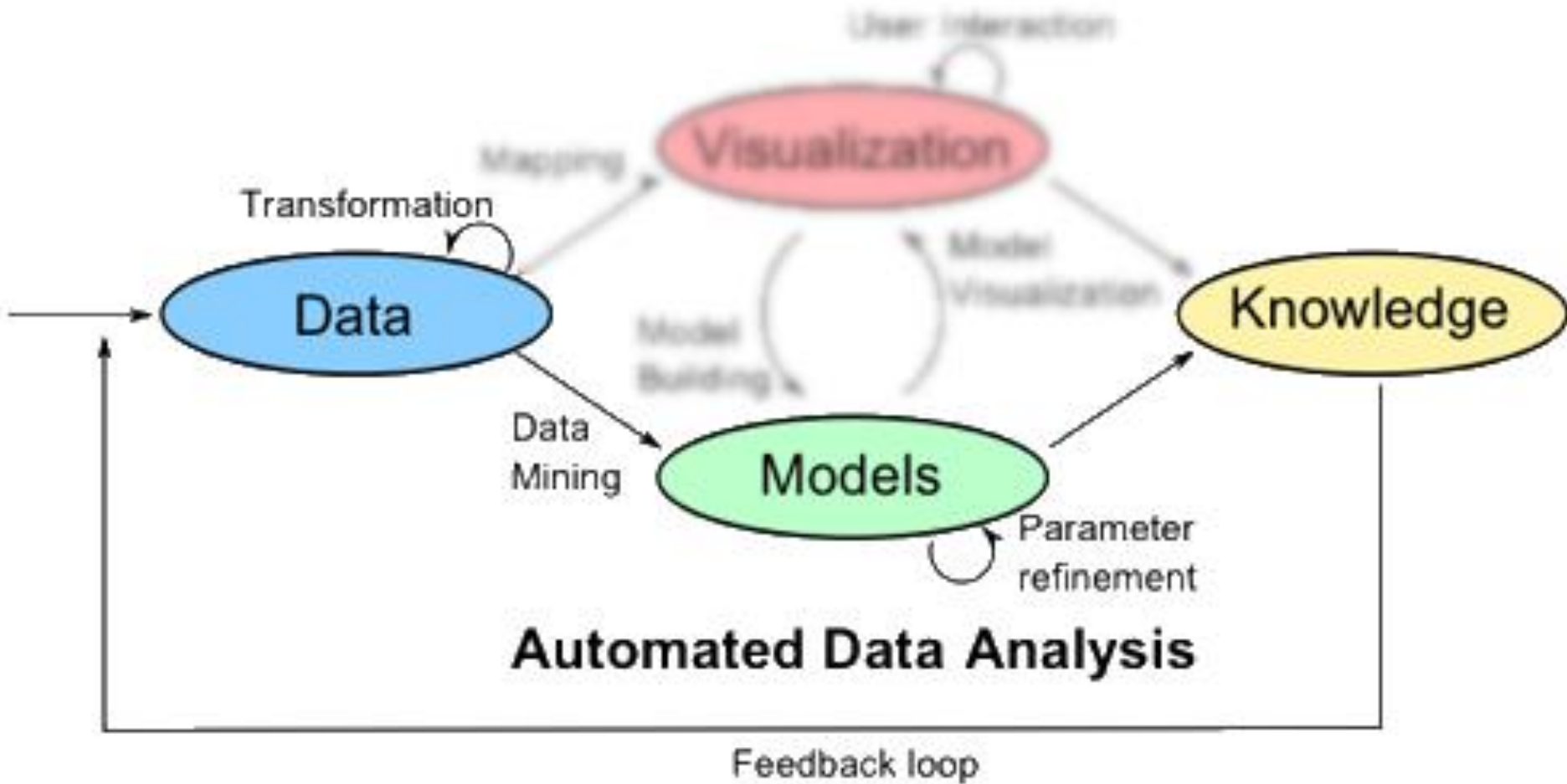
 **~6300 records**

21 regions \* 30 days \* 10 months

 **12 dimensions** **~75600 AS index**

6300 tuples \* 12 attributes

# Visual Data Exploration



MODEL



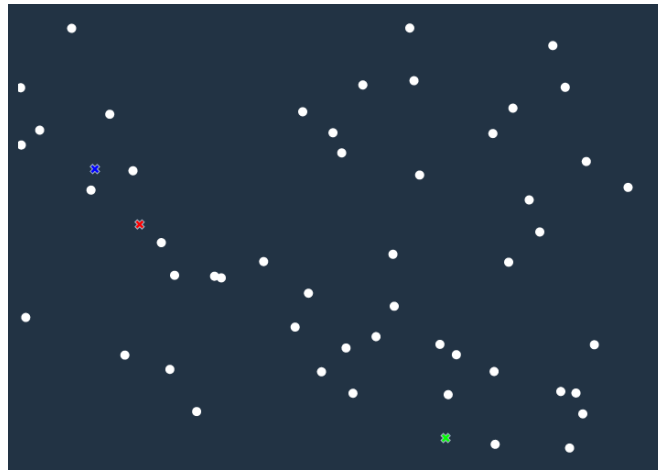
# Looking for Correlation

## Dimensionality Reduction: t-SNE

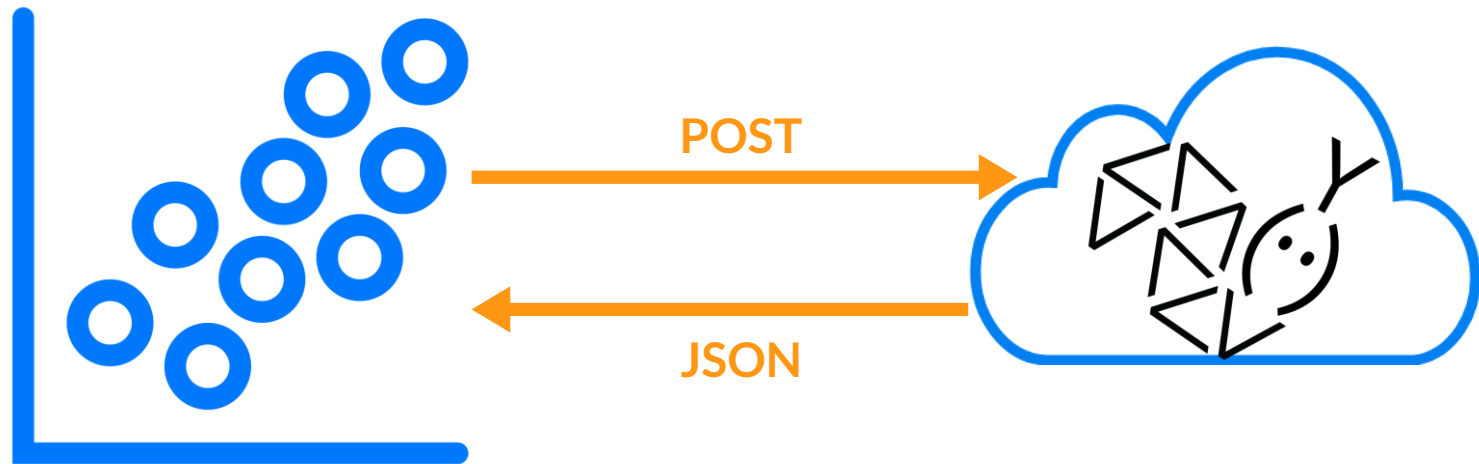
Application of the non-linear transformation of t-SNE to the input dataset.

Obtaining a two-dimensional representation of the data, where similarities can be visually highlighted.

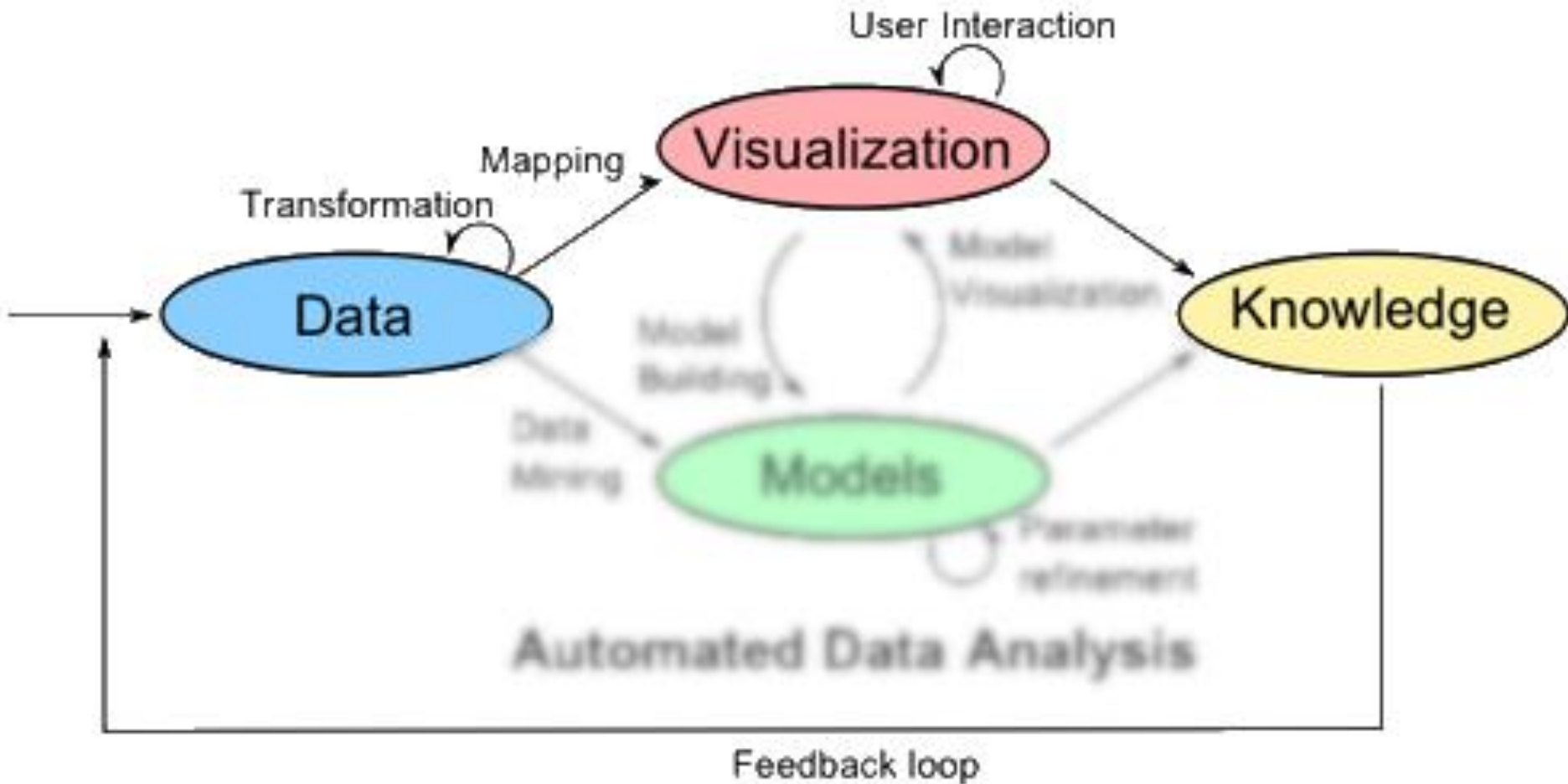
## Clustering: K-Means



# Analytics on Demand



# Visual Data Exploration



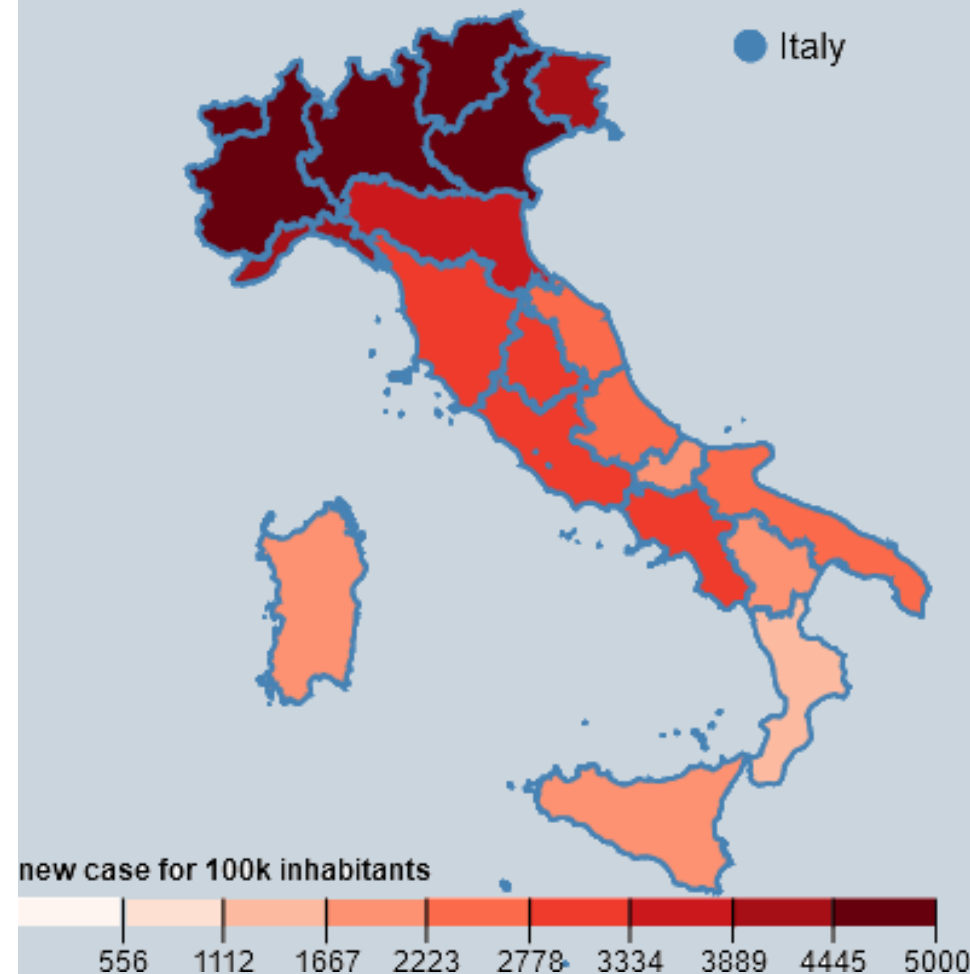
# VISUALIZATION

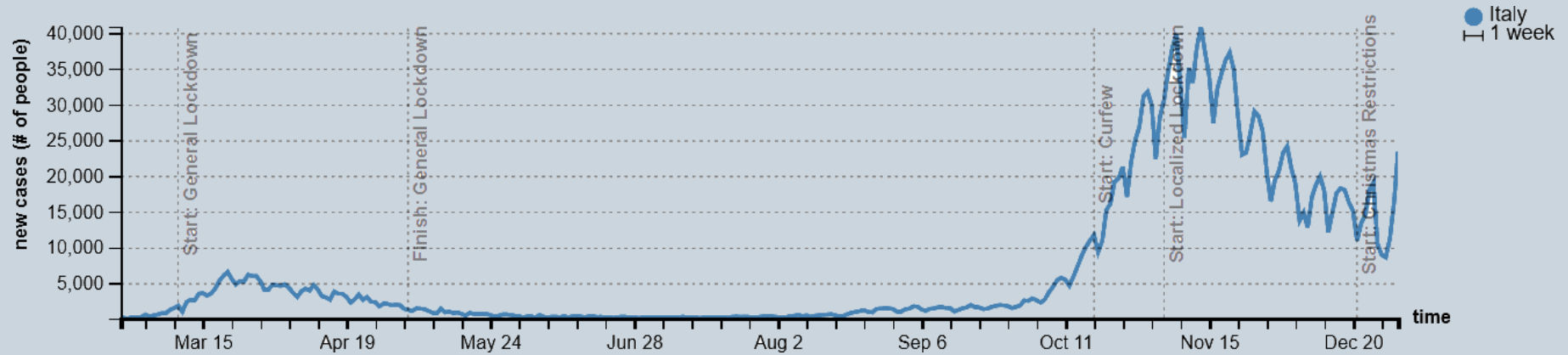
# Choropleth Map

Illustrates the spread of the pandemic across the country.

Why?

- ▷ Show cases wrt population
- ▷ Select different regions





# Time Series

Shows the evolution of the pandemic during the year wrt different parameters.

## Why?

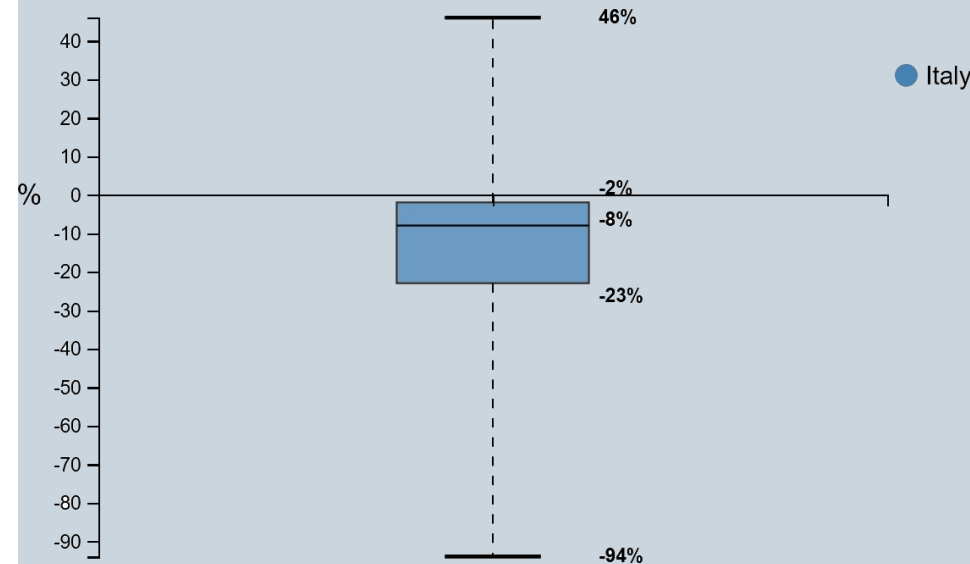
- ▷ Restrict data to a give range
- ▷ Compare different regions

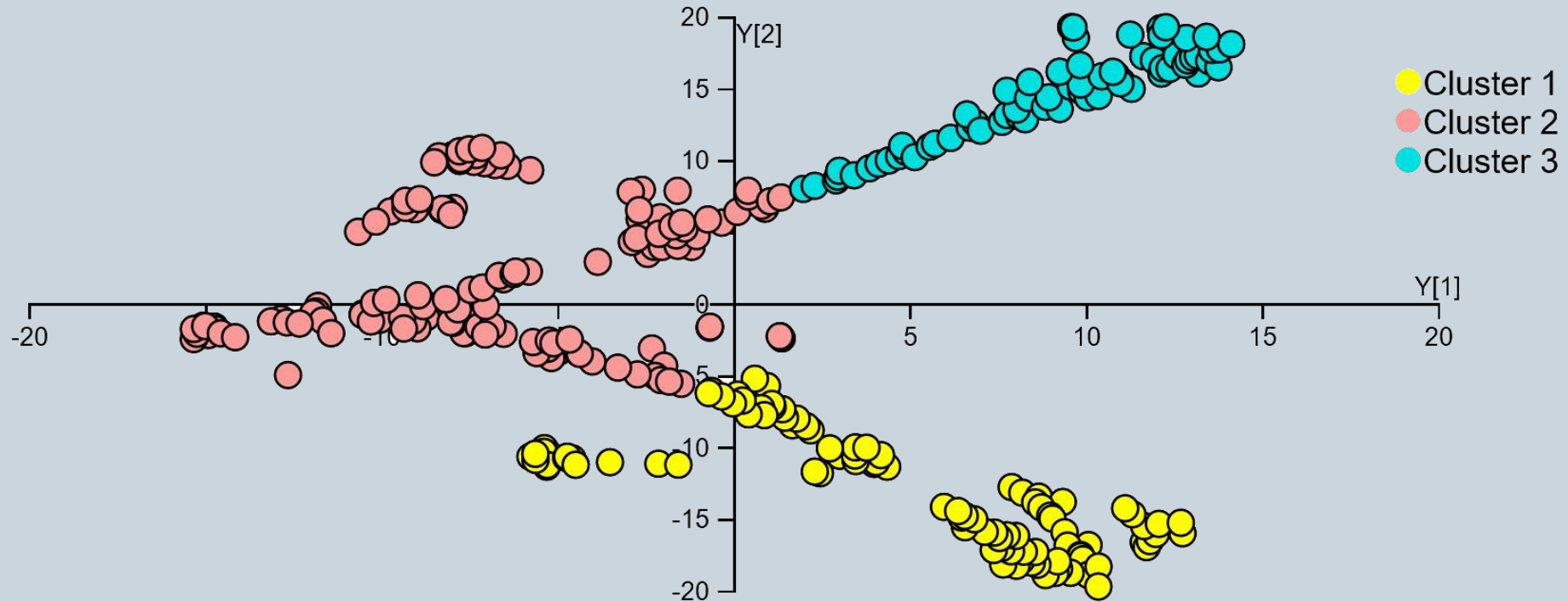
# Boxplot

Represents the mobility data of the selected regions.

**Why?**

- ▷ Mobility as statistic order
- ▷ Time independant





# Scatter Plot

Results of dimensionality reduction and clustering

**Why?**

- ▷ Correlation between pandemic's trend and mobility
- ▷ Address regions similarities
- ▷ Show national trends

visualizations  
escalation  
effectiveness  
future performed variety submitted  
purposes connection deals  
planning reduce time certain  
snapshot movement Analytics  
maker present like recent diversifying evaluate  
case situation interval comparison  
visual number decision Italian Addressing  
contagion COVID-19 answer data accomplishing  
task huge great mobility severity framed point people's Italy  
view particular give trend population increment lockdown visual  
Project Government direct regional correlation exists  
paper effective key hides complexity final  
hypothetical focuses variation bringing topic governmental  
standing granularity restrictive

## RELATED WORKS

environment  
presenting





*How can this work be located with respect to existing literature about similar topics?*

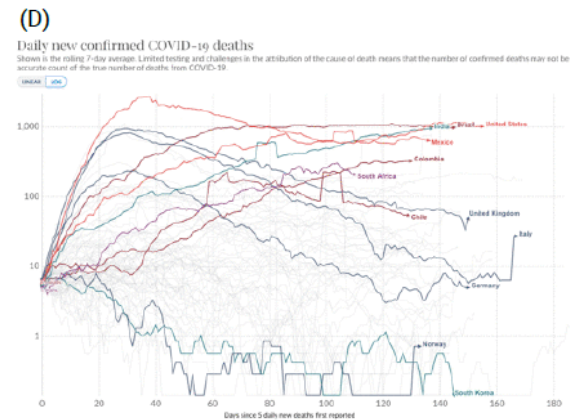
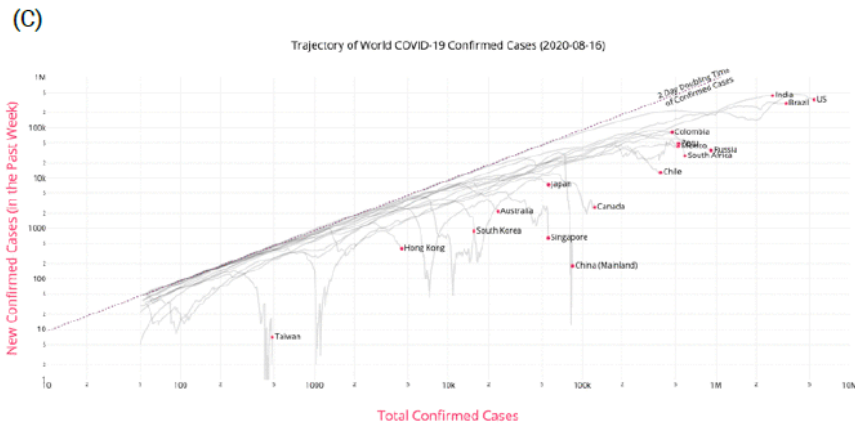
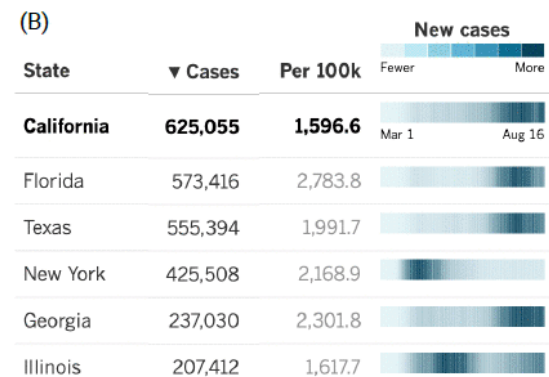
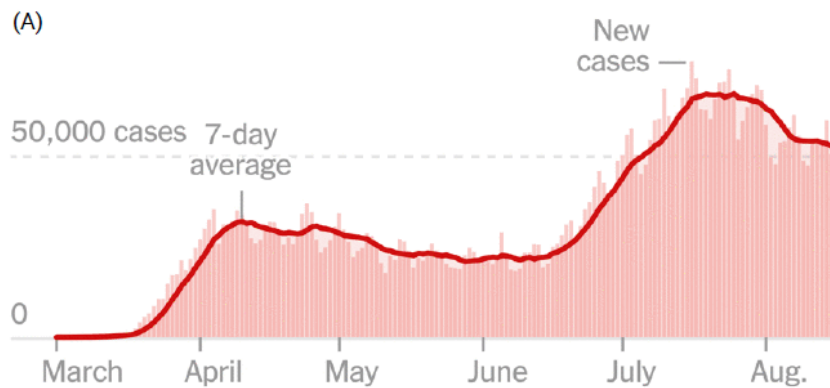


Figure 3: Examples of temporal visualizations: (A) New reported cases by day in the United States, superimposed with a 7-day average line (by the New York Times [105]); (B) A set of Pez Charts showing case number changes over time (by the Los Angeles Times [65]); (C) A type of Growth Chart displaying the total number in the past week against the total number over time (by Aatish Bhatia [5]); (D) Days since confirmed cases first reached 30 cases per day using event alignment (in a log scale) (by Our World In Data [87]).

[ZSPBBP]

# [ZSPBBP]

Proposes a huge panoramic of CoVid-19 crisis visualizations, analyzing a corpus of works on the topic.

## **What is similar?**

- ▷ Purpose of communication
- ▷ Visualizations for informing the severity of the pandemic
- ▷ Geospatial visualizations

## **What is different?**

- ▷ Target user

## **Lesson learned**

- ▷ Non-ambiguous, almost familiar, visual environment concerning CoVid-19 data
- ▷ Color-coding normalized data
- ▷ Avoid simplifications
- ▷ Data source reporting

Day #

<

41

>

Run

Color Counties By

Category:

☒ Sick
 ☐ Dead
 ☐ Beds Filled

Show:

☒ All Cases
 ☐ New Cases

For Ages:

☐ Under 18
 ☒ 18-64
 ☒ 65 and Over

Graph Scale

☐ Percentage
 ☒ Absolute

Decision Point Days

☒ Media: 1
 ☒ Schools: 10
 ☐ Shelter in place: 6

> 42.54%

> 37.22%

> 31.91%

> 26.59%

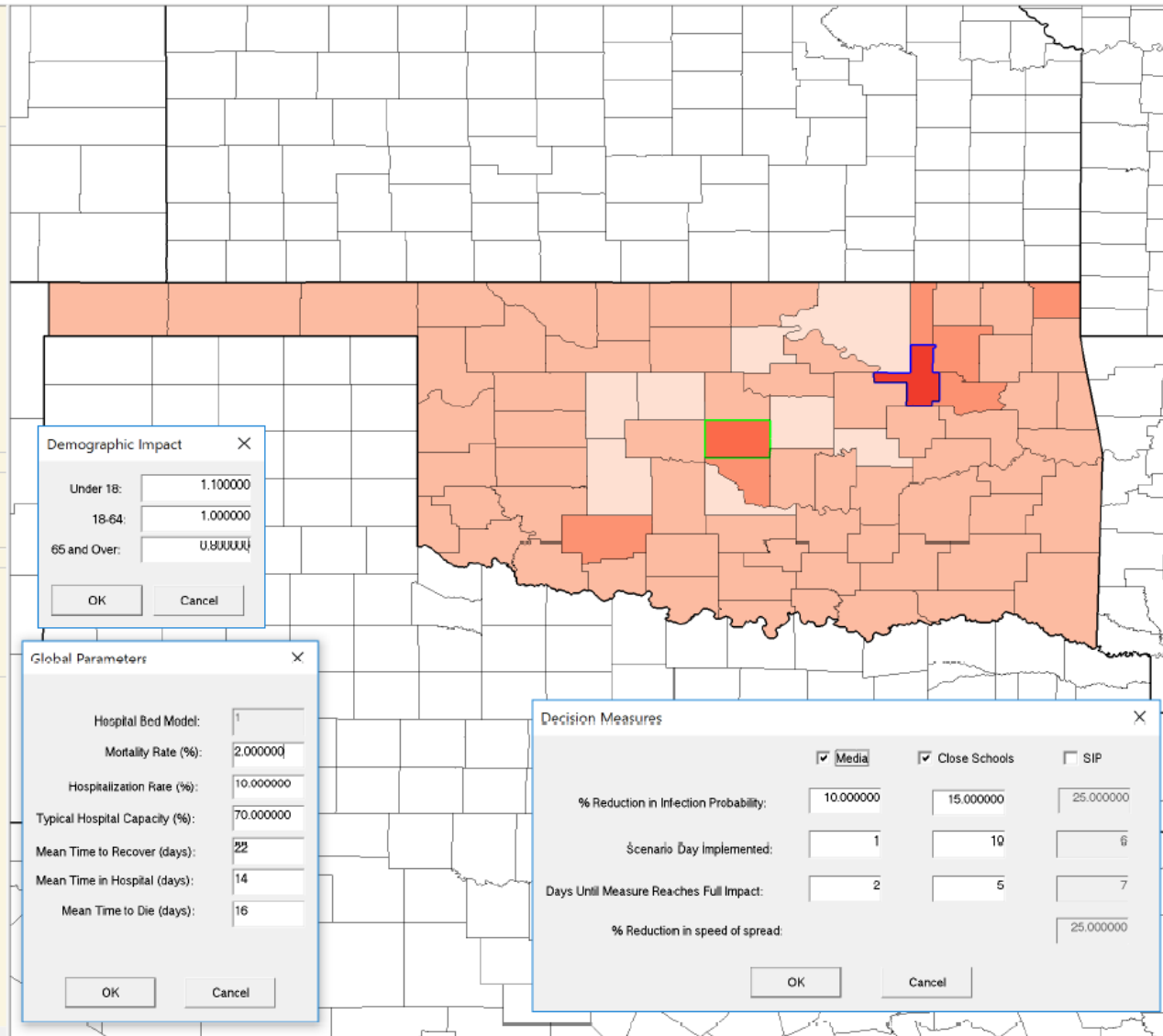
> 21.27%

> 15.95%

> 10.64%

> 5.32%

> 0.00%



Demographic Impact

Under 18:

1.100000

18-64:

1.000000

65 and Over:

0.800000

OK

Cancel

Global Parameters

Hospital Bed Model:

1

Mortality Rate (%):

2.000000

Hospitalization Rate (%):

10.000000

Typical Hospital Capacity (%):

70.000000

Mean Time to Recover (days):

22

Mean Time in Hospital (days):

14

Mean Time to Die (days):

16

OK

Cancel

Decision Measures

☒ Media

☒ Close Schools

☐ SIP

% Reduction in Infection Probability:

10.000000

15.000000

25.000000

Scenario Day Implemented:

1

10

6

Days Until Measure Reaches Full Impact:

2

5

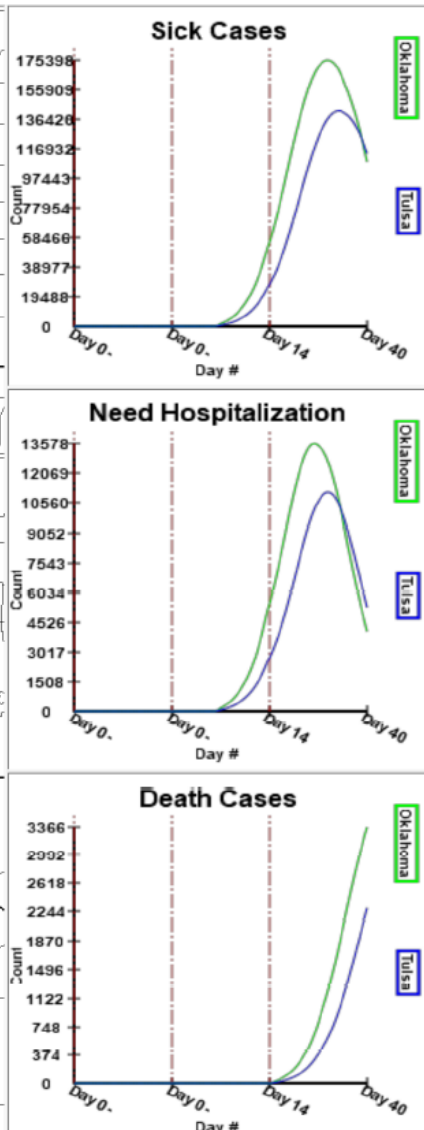
7

% Reduction in speed of spread:

25.000000

OK

Cancel



[AGSEHH]

# [AGSEHH]

Provides an environment to facilitate CoVid-19 modeling, exploration and visualization for offering support to decision-maker user.

## **What is similar?**

- ▷ Target user and main purpose
- ▷ Visual components for describing virus trends

## **What is different?**

- ▷ Analytics

## **Lesson learned**

- ▷ Mobility as parameter at stake

Mobility trends for places like public transport hubs such as subway, bus, and train stations



21 States have a higher Transit Stations mobility, than they did before covid-19 restrictions (mid-February) began.

[VARDHAN]

# [VARDHAN]

Measures people's movement before and during the COVID-19 with a visualization in the form of scrollytelling in tandem with tile grid maps.

## **What is similar?**

- ▷ Google Mobility dataset

## **What is different?**

- ▷ Lack of analytics

## **Lesson learned**

- ▷ Presenting results engaging users



# Conclusions and Future Works



# The End

This project tried to offer a visual environment of support for verifying the effectiveness of the main anti-COVID measure, social distancing, in Italy

## **Cues for future works:**

- ▷ Growth Chart
- ▷ Story-telling
- ▷ Correlation with other kinds of data

# References

- ▷ [\[ZSPBBP\]](#)  
Yixuan Zhang, Yifan Sun, Lace Padilla, Sumit Barua, Enrico Bertini, and Andrea G. Parker. 2021. Mapping the Landscape of COVID-19 Crisis Visualizations. In CHI Conference on Human Factors in Computing Systems (CHI '21), May 8–13, 2021, Yokohama, Japan. ACM, New York, NY, USA, 23 pages.  
<https://doi.org/10.1145/3411764.3445381>
- ▷ [\[AGSEHH\]](#)  
S. Afzal, S. Ghani, H. C. Jenkins-Smith, D. S. Ebert, M. Hadwiger and I. Hoteit, "A Visual Analytics Based Decision Making Environment for COVID-19 Modeling and Visualization," 2020 IEEE Visualization Conference (VIS), Salt Lake City, UT, USA, 2020, pp. 86-90, doi: 10.1109/VIS47514.2020.00024.
- ▷ [\[VARDHAN\]](#)  
Vardhan, P. (2020, August 28). Tile Narrative: Scrollytelling with Grid Maps In Visualization for Communication (VisComm).  
<https://doi.org/10.31219/osf.io/xr64m>

# Thanks!

## Share ideas and get involved!



Visit the GitHub page of the project