



Frankfurt School

# Because you move me

How Covid-19 has changed London's mobility preferences  
– A mobility tracker

Data Analytics in Business (Dr. Lucas Böttcher)  
Dennis Simon Merlin Blaufuss, Nicolas Kepper, Sophie Merl

# COVID-19 HAS CHANGED PEOPLES TRAVEL BEHAVIOUR

LOCKDOWN 3.0 UK shops return to lockdown as Covid-19 infection rate spikes  
COVID-19 05 Jan 2021 by Chloe Rigby

Effect of COVID-19 response policies on walking behavior in US cities

ENVIRONMENT  
Coronavirus: 8 ways to connect with nature during lockdown

McKinsey Center for Future Mobility  
From no mobility to future mobility:  
Where COVID-19 has accelerated change  
Compendium 2020/2021

<https://www.pewresearch.org> › ho... ▾ Diese Seite übersetzen  
How Coronavirus Has Changed the Way Americans Work  
09.12.2020 — Among those who are currently working from home all or most of the time ... to the coronavirus from the people they interact with at work or ...

Traffic and travel information  
How COVID-19 changed mobility: A look back from the future



# AGENDA

## Part 1: Developments in London

1. Considered variables
2. Covid-19 development in London
3. Visualization on borough level – Heatmap

## Part 2: Tracking Mobility with Covid-19 Development

### *A – Initial Thoughts*

1. Variable overview & predictor selection
2. Search for correlation

### *B – Our Mobility Tracker*

#### 1. Model

- Model Specification
- Model Fit

## Part 3: Acknowledgments & Next steps

1. Technological information
2. Outlook

## Part 4: Q&A



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# PART 1: VARIABLES COVID-19 DEVELOPMENT & MOBILITY TRENDS IN LONDON



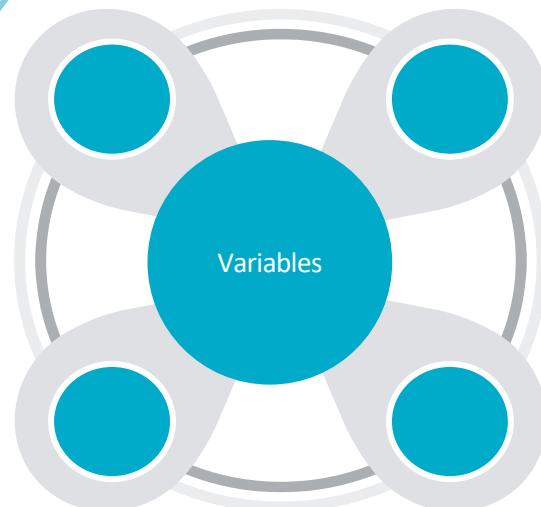
# POTENTIAL DATASETS

## GOV.UK Covid-19

- > Covid Development
- > Cases, Healthcare, Deaths, (PCR) Testing, Vaccination
  
- > Mobility Data on Borough level
- > Retail & Recreation, Grocery & Pharmacy, Parks, Transit, Workplaces, Residential
- > Comparison to a 5-weeks baseline
- > Either total visitors or duration (for Residential)



## Mobility



## Restaurants



- > Seated dinners

- > Weather
- > e.g., Rain, temperature, wind

## Weather



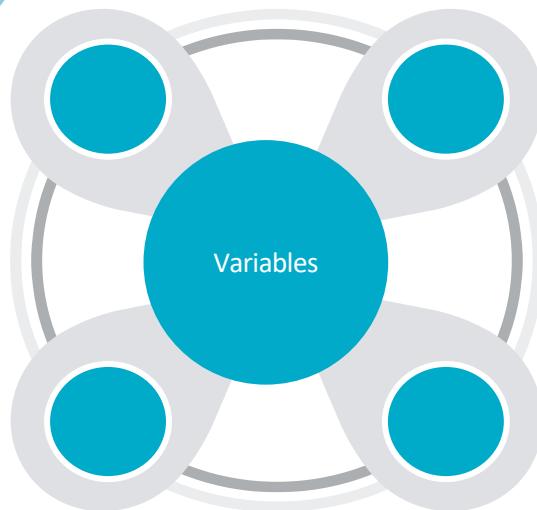
# OUR SELECTED DATASETS

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## Mobility



## Restaurants OpenTable<sup>®</sup> part of Booking.com

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## Weather

# CONSIDERED VARIABLES<sup>1</sup>

## Coronavirus in the UK



> **Cases:** People who have had at least one positive Covid-19 test result



> **Healthcare:**

- *Admission:* Covid-19 patients admitted to hospital
- *Hospital cases:* Covid-19 patients in hospital at 8AM
- *Occupied ventilation beds:* Patients in ventilation beds



> **Deaths:** Number of people who died within 28 days of their first positive test for Covid-19



> **PCR Testing & Positivity:** The number of people who received a PCR test in the previous 7 days, and the percentage of those who had at least one positive Covid-19 PCR test result in the same 7 days



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## Google's Covid-19 Community Mobility Reports



> **Retail and recreation:** Mobility trends for places such as restaurants, cafés, shopping centres, theme parks, museums, libraries and cinemas.



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# LONDON WAS HIT HARD BY THE PANDEMIC – PEAK IN JANUARY 2021 AND INCREASE SINCE SUMMER 2021



## Cases

- Cases **exponentially rising** until winter 2020/21
- Renewed **stable increase** as of autumn 2021



## Healthcare

- High demand for healthcare services **in the beginning of the pandemic** and **peak in January 2021**
- Up to c. 8k people were hospitalized per day



## Deaths

- Almost **17k people died** after receiving a positive Covid-19 test
- **Up to 200 deaths per day** were reported in April 2020 and January 2021



## PCR<sup>1</sup> Testing

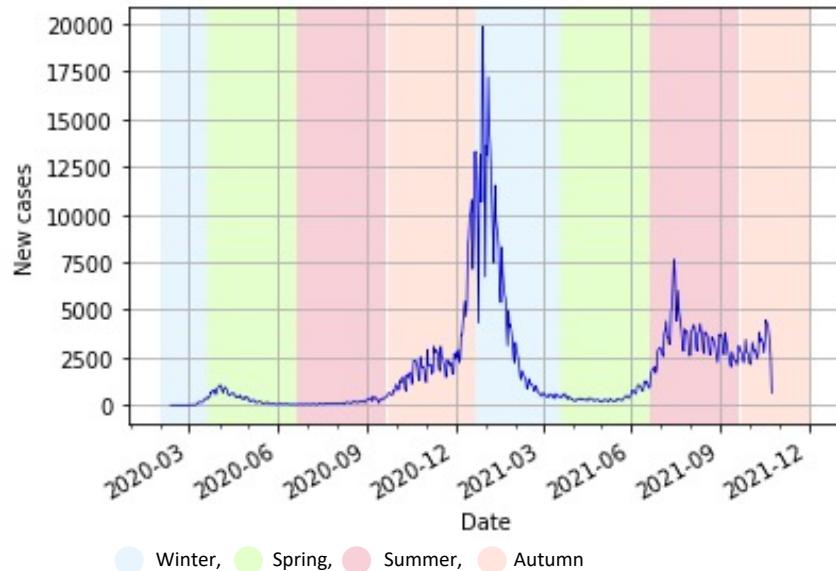
- Relatively **stable incline** in test capacity
- Positivity was highest at the **beginning** of the pandemic as well as during **peak** in cases



## Vaccination

- c. **66%** of people are vaccinated, c. **60%** are fully vaccinated
- In **spring 2021**, vaccination rate increased rapidly

## Cases



1: polymerase chain reaction

Note: Spring: End of March – end of June; Autumn: end of September – end of December

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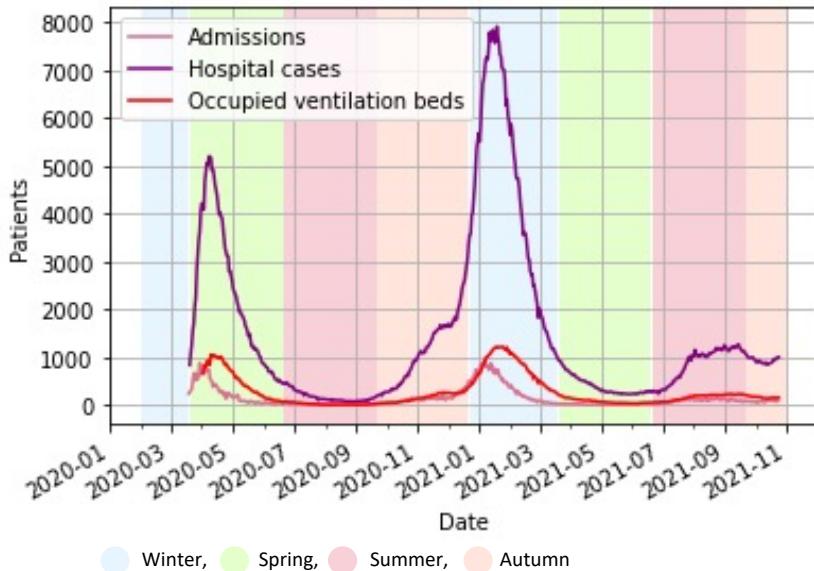
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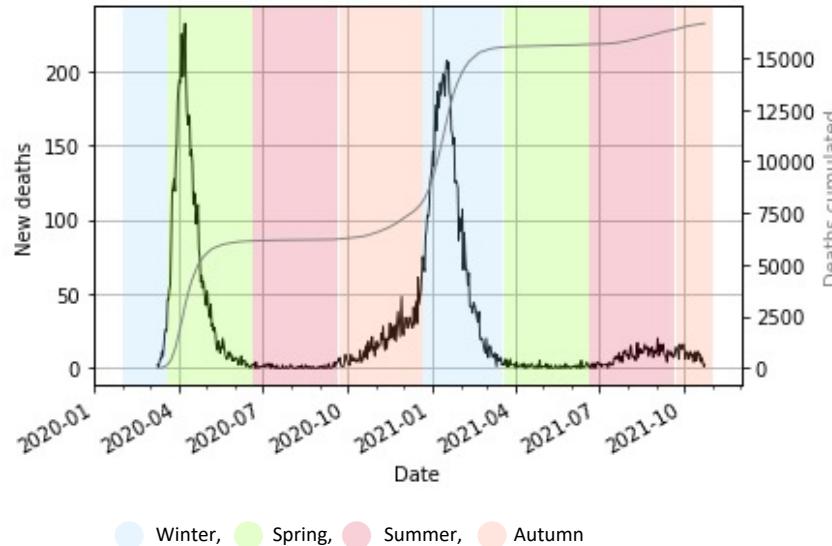
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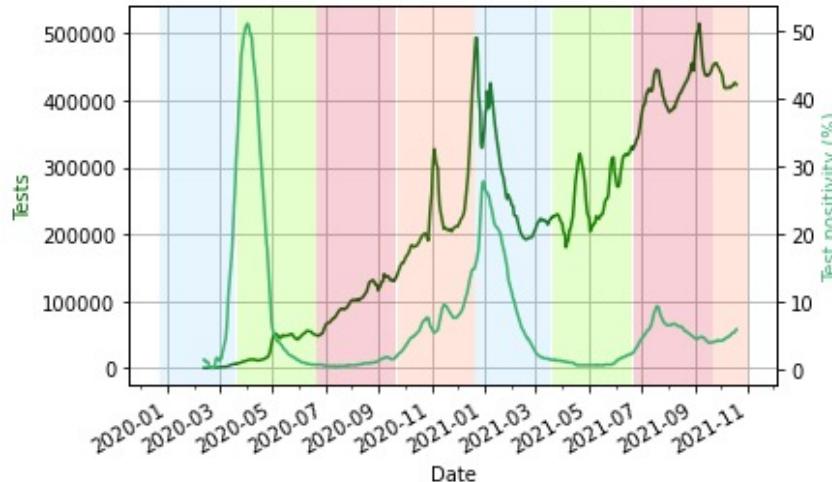
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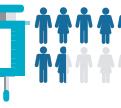
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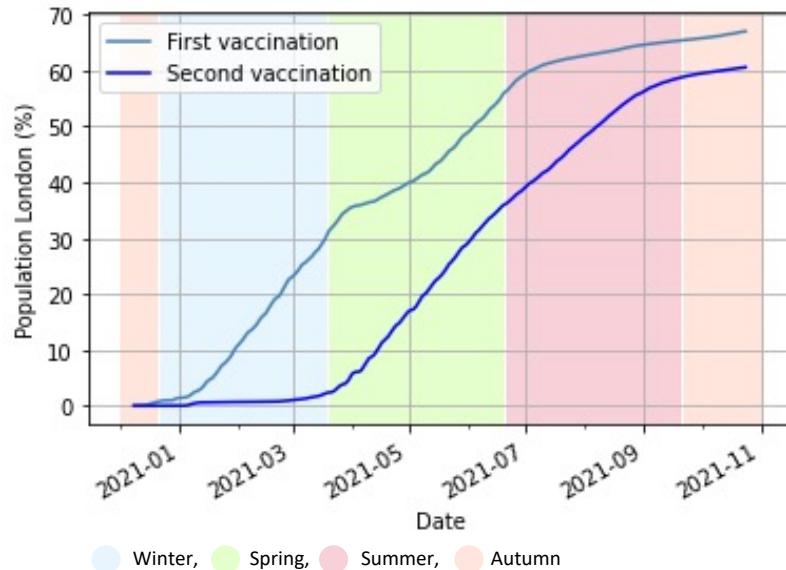
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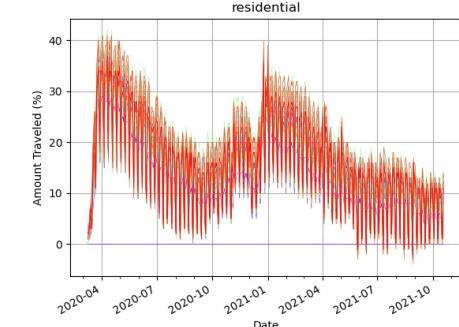
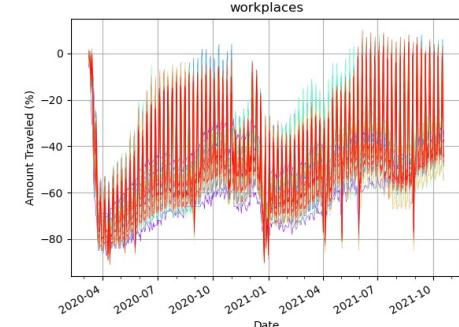
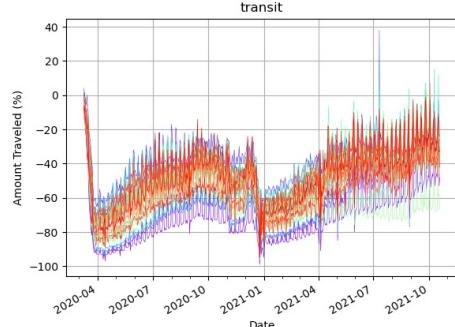
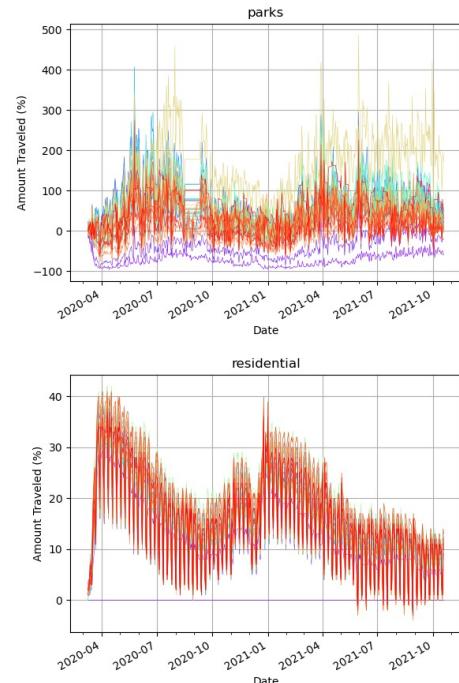
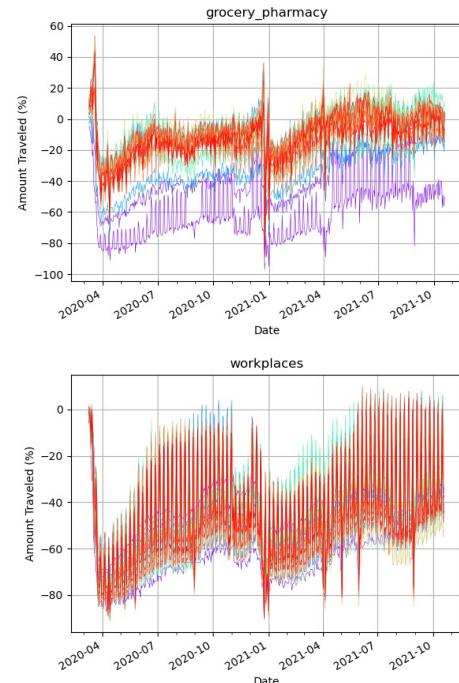
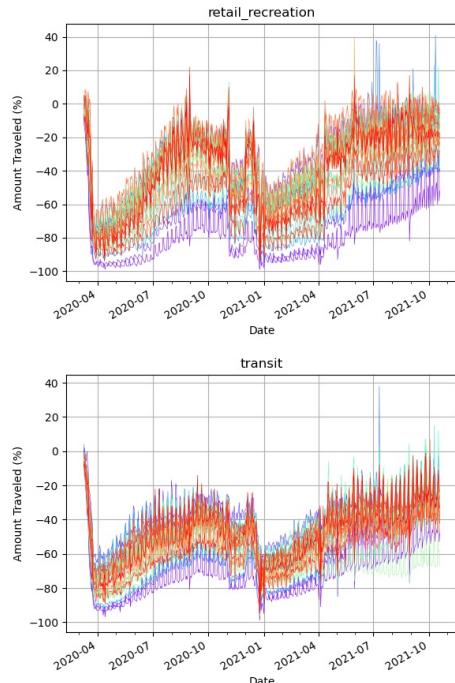
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# DURING THE SAME PERIOD MOBILITY TRENDS EVOLVED IN LONDON – VISUALIZATION AS TIMESERIES'

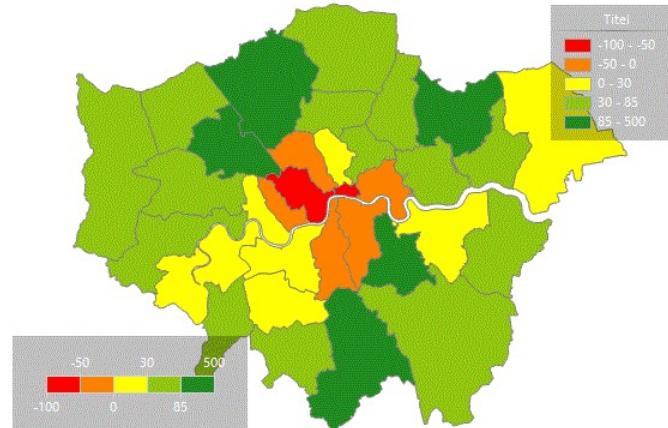


## DURING THE SAME PERIOD MOBILITY TRENDS EVOLVED IN LONDON – HEATMAP VISUALIZATION ON BOROUGH LEVEL

### DISCLAIMER

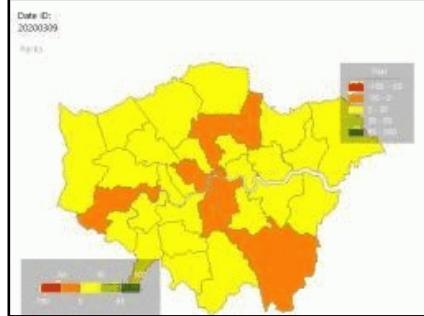
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Parks

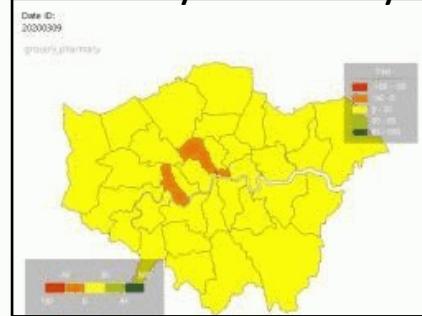


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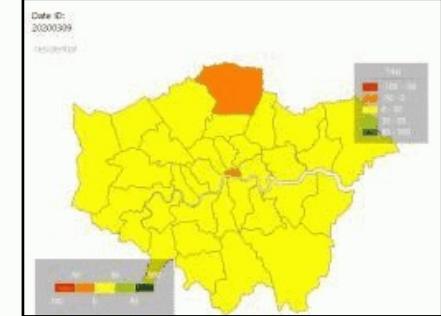
Parks



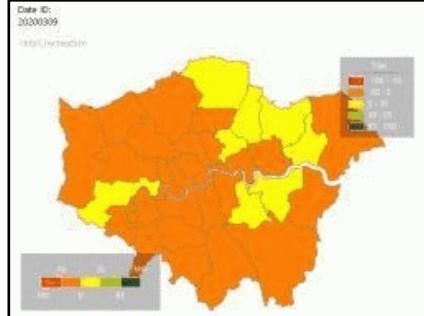
Grocery Pharmacy



Residential



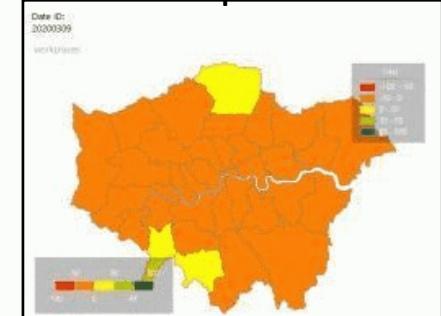
Retail Recreation



Transit



Workplaces



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## PART 2 A: TRACKING MOBILITY WITH COVID-19 DEVELOPMENT – *INITIAL THOUGHTS*



# VARIABLE OVERVIEW & PREDICTOR SELECTION



# THE SEARCH FOR A CORRELATION



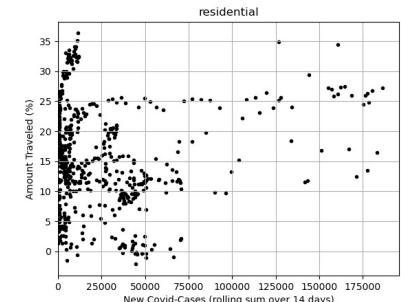
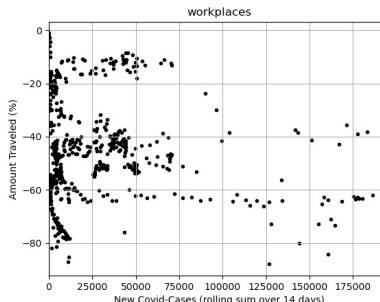
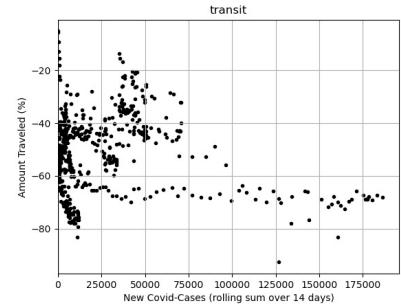
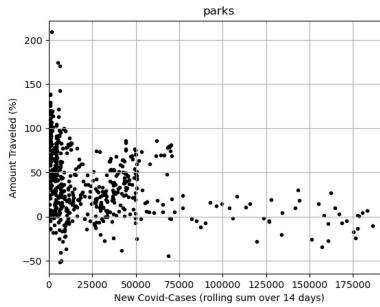
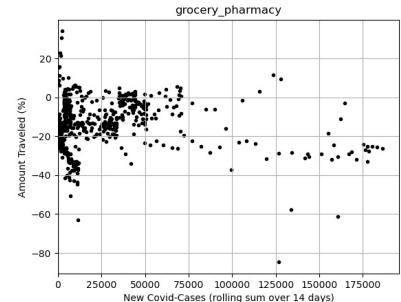
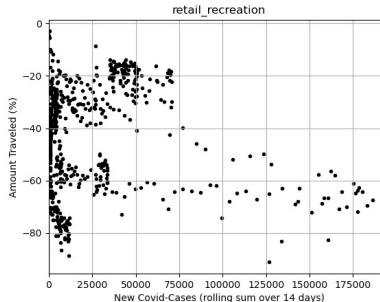
## Cases

- Rolling sum to even out
- Inspiration: German “Inzidenz”



## Deaths

- Describes relationship better
- Something is fishy



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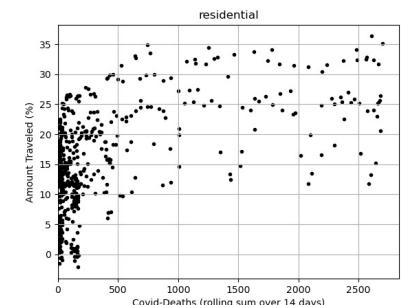
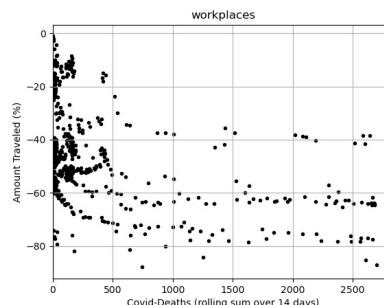
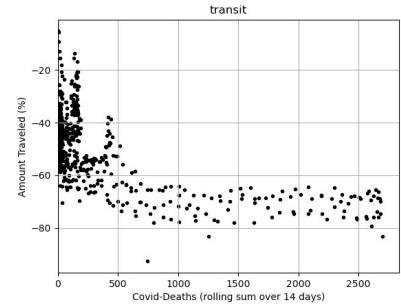
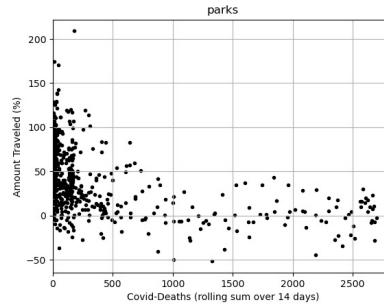
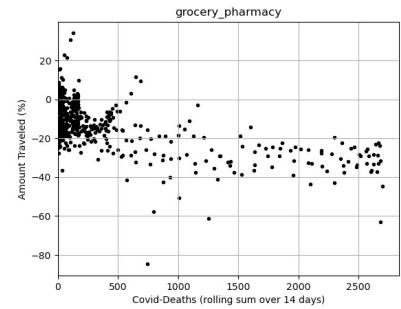
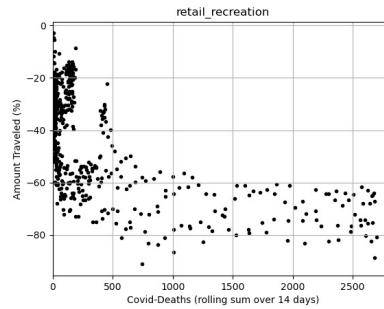
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# THE SEARCH FOR A CORRELATION



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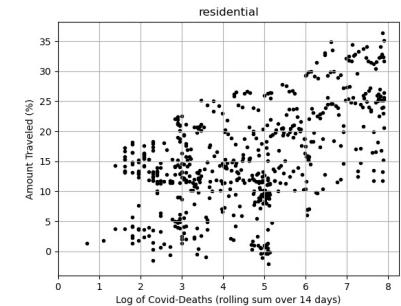
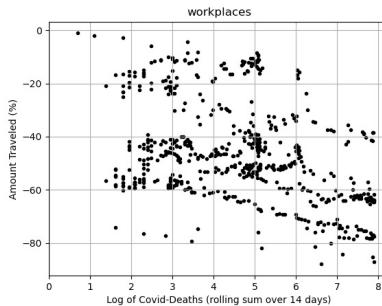
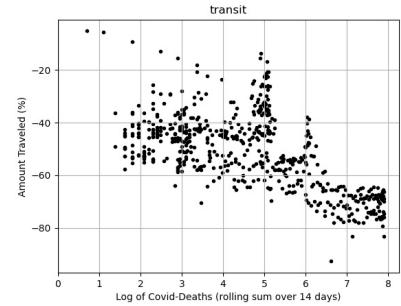
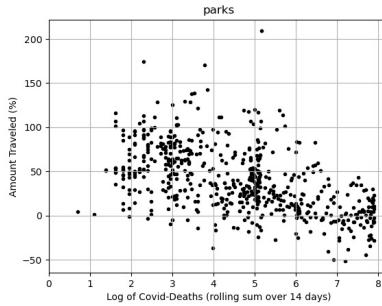
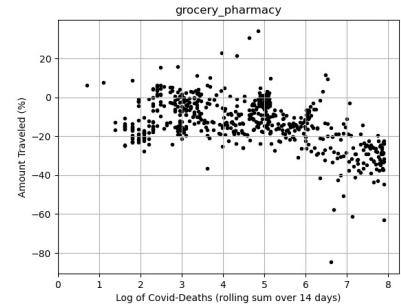
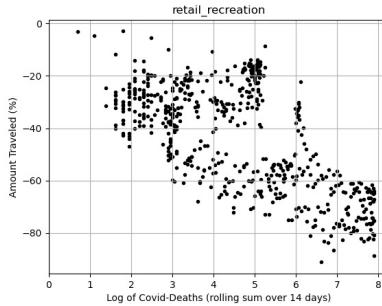
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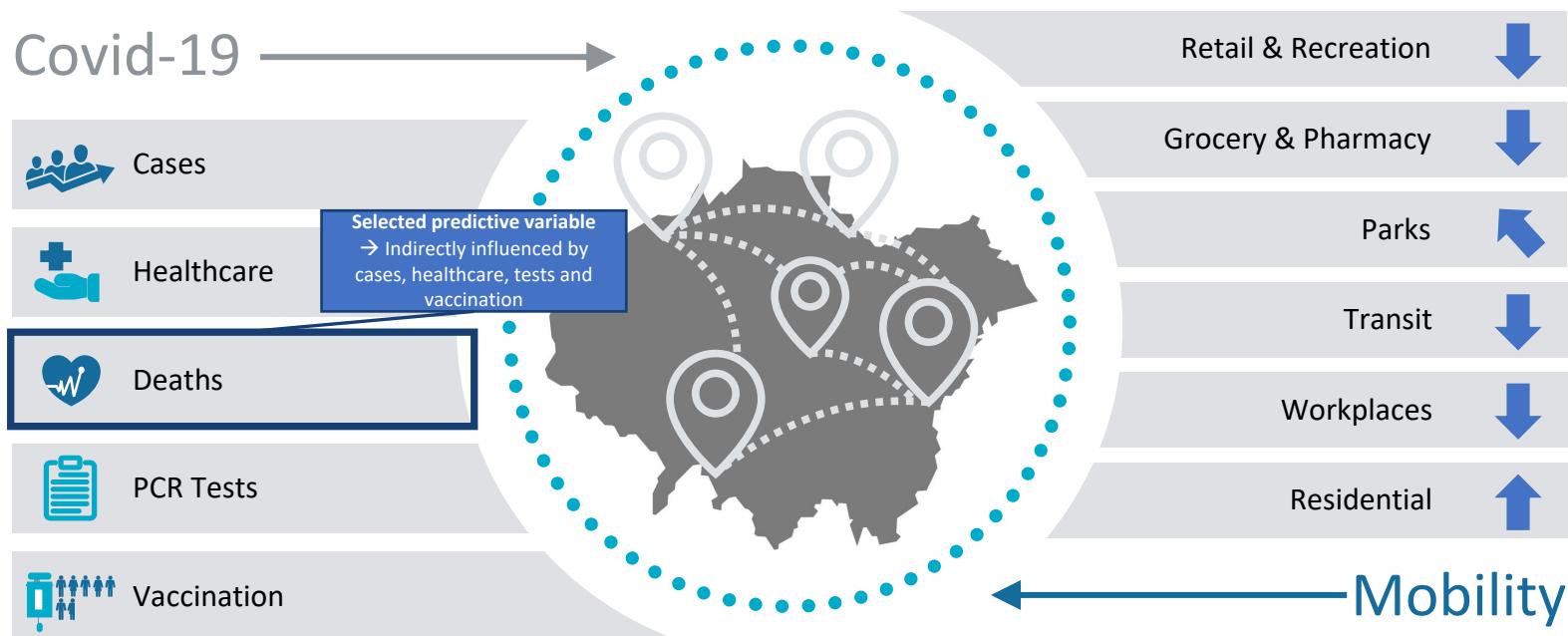
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**USE LOG**



# VARIABLE OVERVIEW & PREDICTOR SELECTION





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**PART 2 B: TRACKING MOBILITY  
WITH COVID-19 DEVELOPMENT –  
*OUR MOBILITY TRACKER***

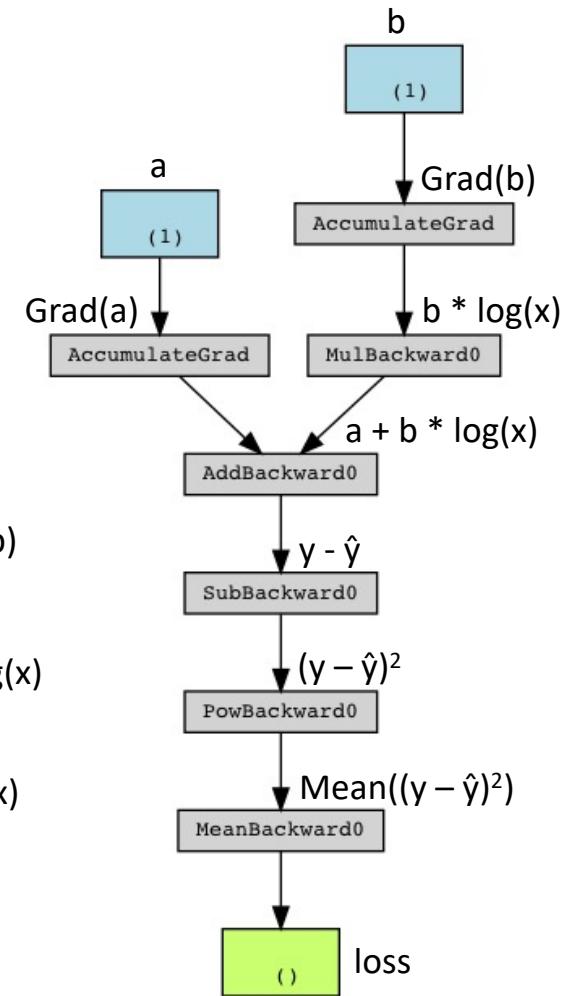
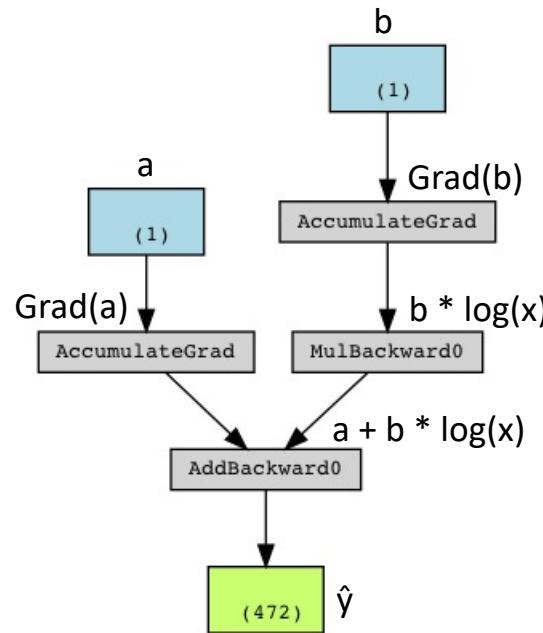


# MODEL SPECIFICATION

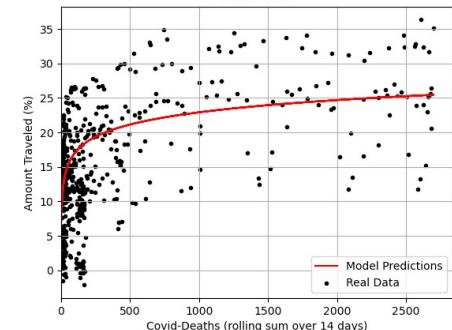
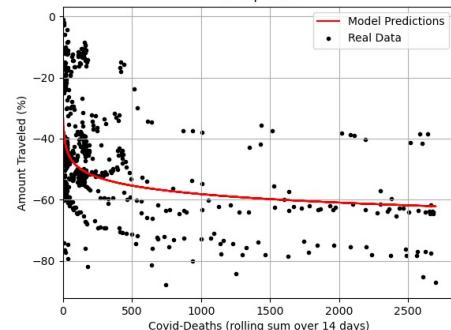
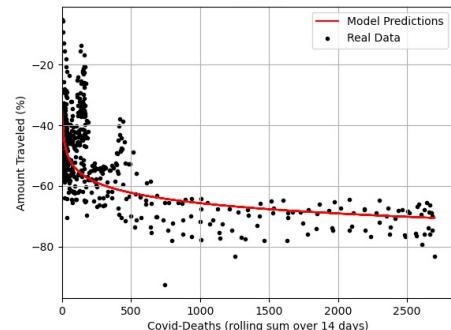
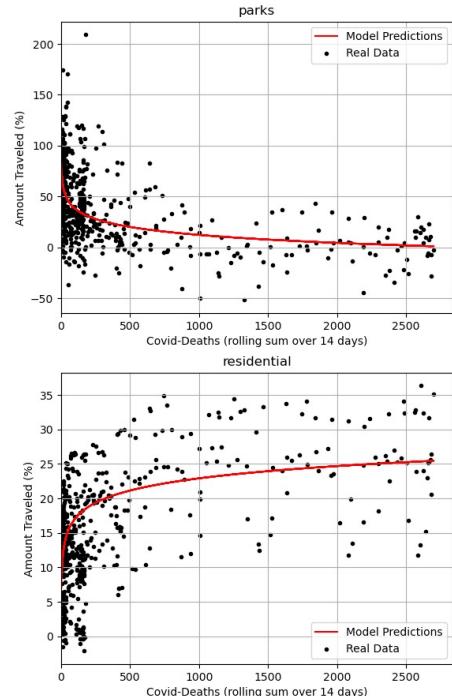
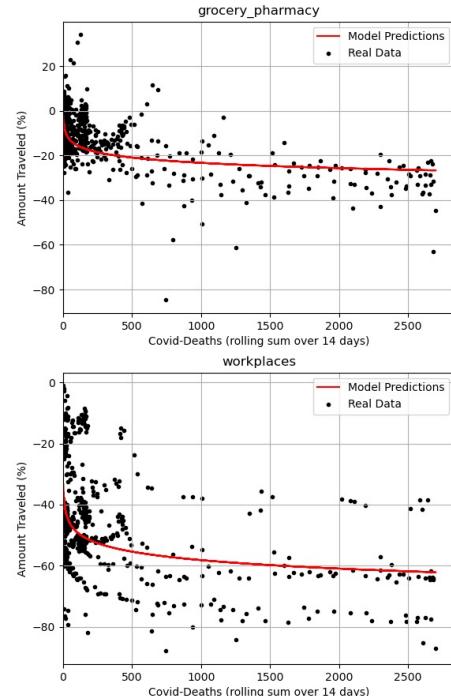
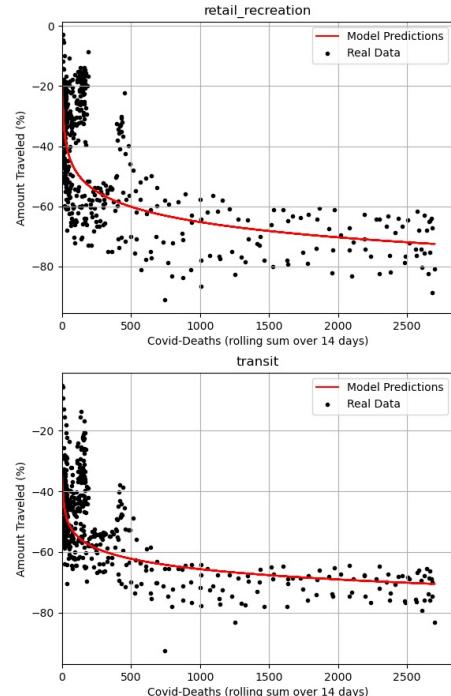


$$a + b * \log(x)$$

- Supervised learning
- Gradient descent
- Optimizer = SGD
- Loss function = MSE
- $a = a - LR * \text{Grad}(a)$
- Learning Rate = 0.03
- 1000 epochs



# HOW DO THE MODELS FIT OUR DATA?



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## PART 3: ACKNOWLEDGMENTS & NEXT STEPS



# TECHNOLOGY 'N' STUFF

## Data preparation

1



Data Structuring

*Python 3.8*

2



Data Cleaning

*MS SQL Server*

## Data presentation

4



General Plots

*Python 3.8*

3



Heatmap

*SSRS  
GIF Tools*

## Application

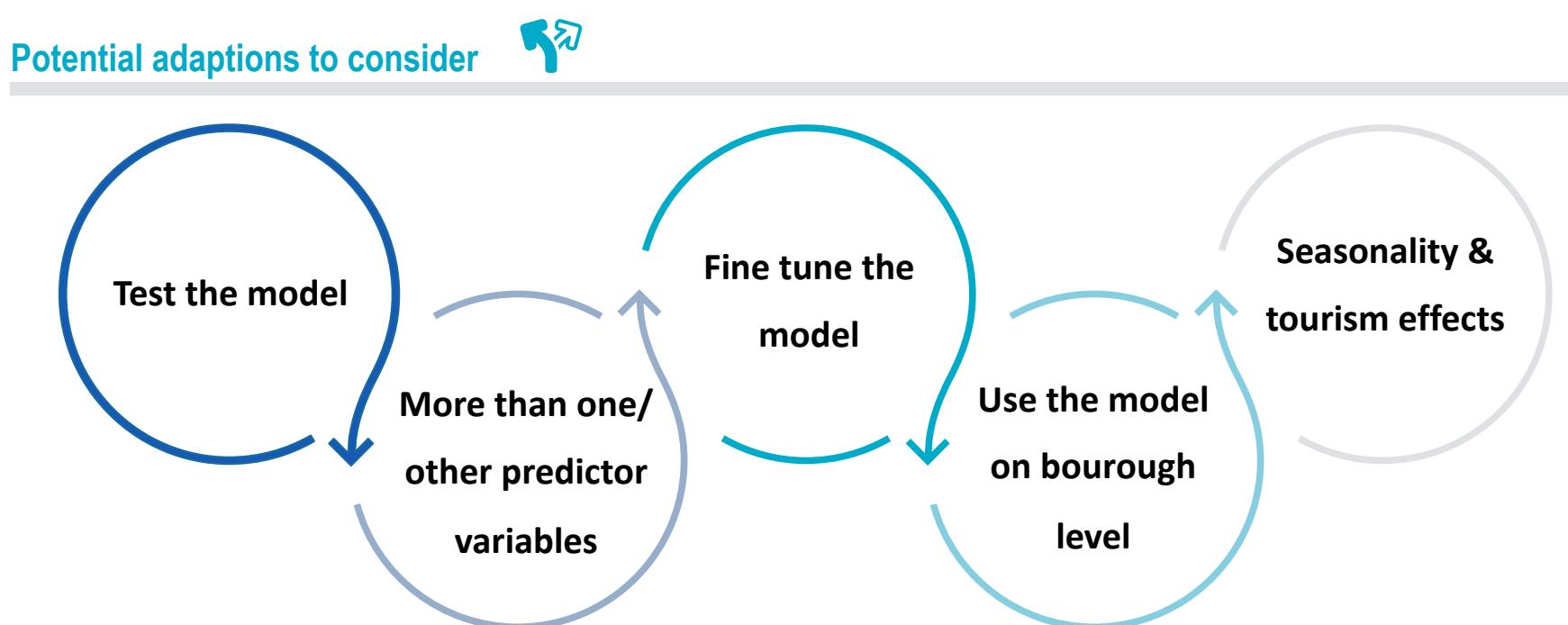
5



Model Creation

*Python 3.8  
PyTorch framework*

# OUTLOOK



# Q&A



Frankfurt School of Finance & Management gGmbH

Adickesallee 32-34

60322 Frankfurt am Main

Dennis Blaufuss

Nicolas Kepper

Sophie Merl

Applied Data Science (Intake 2021)

E-Mail: sophie.merl@fs-students.de

nicolas.kepper@fs-students.de

dennis\_simon\_merlin.blaufuss@fs-students.de

www.frankfurt-school.de



GitHub Repository:

[https://github.com/SophieMerl/DataAnalytics\\_London](https://github.com/SophieMerl/DataAnalytics_London)

