THE EFFECTS OF CONTAINMENT MEASURES ON COVID-19

PREPARED BY
TEAM 8

Presented by Klaudia Krawiecka, Vilda Markeviciute, Alina Petrova, and Sade Snowden-Akintunde

HELLO

WELCOME TO OUR PRESENTATION!

TODAY'S AGENDA

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INTRODUCTION

HISTORICAL CONTEXT

It's been a little over six months since WHO declared the spread of COVID-19 a global pandemic. Although everyone across the globe has been exposed to the same set of health threats, implications vary by country.

This analysis aims to understand these variations.

INTRODUCTION

TEAM 8 MEMBERS

We're a diverse team of PhD students and data scientists located between Europe and the U.S.

Our names are Klaudia, Vilda, Alina, and Sade (read images from left to right) and we'll be your presenters for the next 15 minutes.

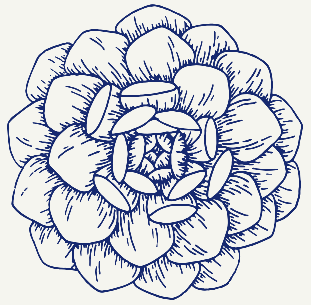
GOALS & OBJECTIVES

EXPECTATIONS AND OUTCOMES

The primary goal of this analysis is to understand which governmental measures have been the most effective in decreasing the number of COVID-19 cases.

Our secondary goal is to be able to predict the outcomes of enforcing specific measures and use them to suggest strategies for mitigating the number of new cases.

EXPLORATORY DATA ANALYSIS (EDA)



Data Sources

To begin our analysis, we combined datasets from Google, the World Bank, the University of Oxford, and Johns Hopkins University to analyze population and socioeconomic information as it pertains to the number of confirmed cases and deaths.

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Data Distribution

In total, we collected data for 182 countries. When producing the summary statistics, we witnessed a high degree of variance in respect to all variables and attempted to remove any outliers we saw. After doing so, however, we realized that they didn't have much impact on the overall analysis.

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Correlation Analysis

We also conducted correlation analyses to analyze the relationships between all variables. Despite mostly weak correlations, we noticed that the relationship between climate and COVID-19-related deaths - the warmer the climate, the lower the mortality rate.

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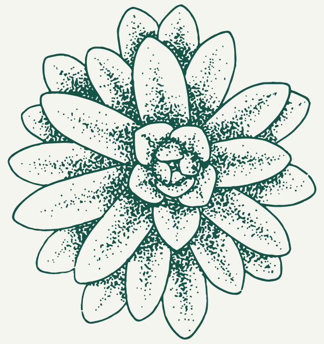
EXPLORATORY DATA ANALYSIS

The results of our Pearson correlation analysis demonstrated a weak negative correlation between temperature and COVID-19-related death rates.

EXPLORATORY DATA ANALYSIS

KEY INSIGHTS

Key Takeaway #1
Colder climates and denser populations are more likely to spread and become negatively impacted by COVID-19.



Key Takeaway #2
The fact that our initial correlation analyses could not explain much of the spread of the virus suggests that there must be other factors at play.

STATS & MACHINE LEARNING

POLICIES REFERENCED

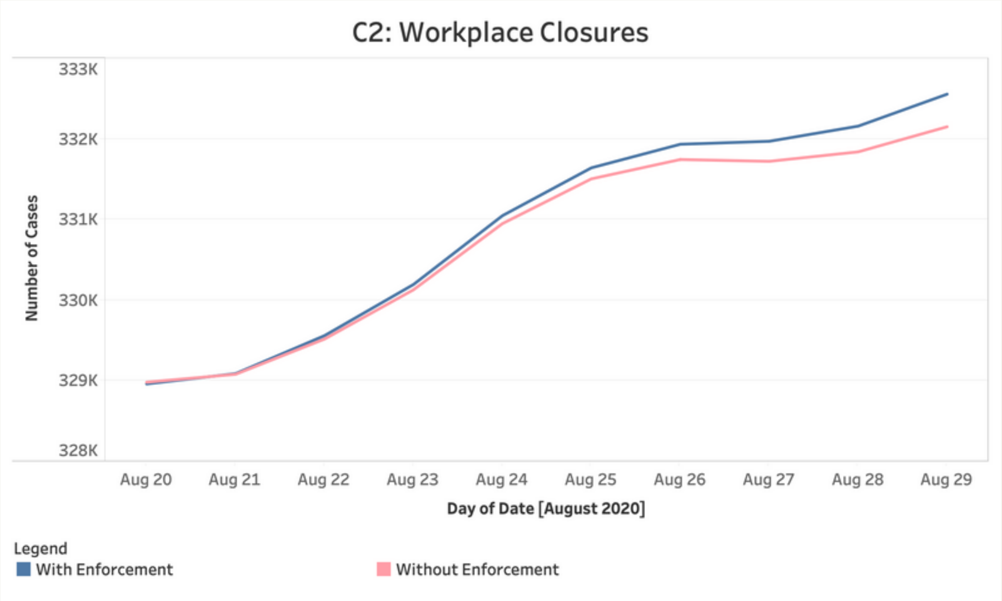
C1: School Closures
C2: Workplace Closures
C3: Public Events Cancellation
C4: Restrictions on Gatherings
C5: Public Transportation Closures
C6: Stay-at-Home Requirements
C7: Restrictions on International Movement
C8: International Travel Controls
H1: Public Information Campaigns
H2: Testing Policies
H3: Contact Tracing
H4: Emergency Investment in Healthcare
H5: Investment in Vaccine

STATS & MACHINE LEARNING

METHODOLOGIES

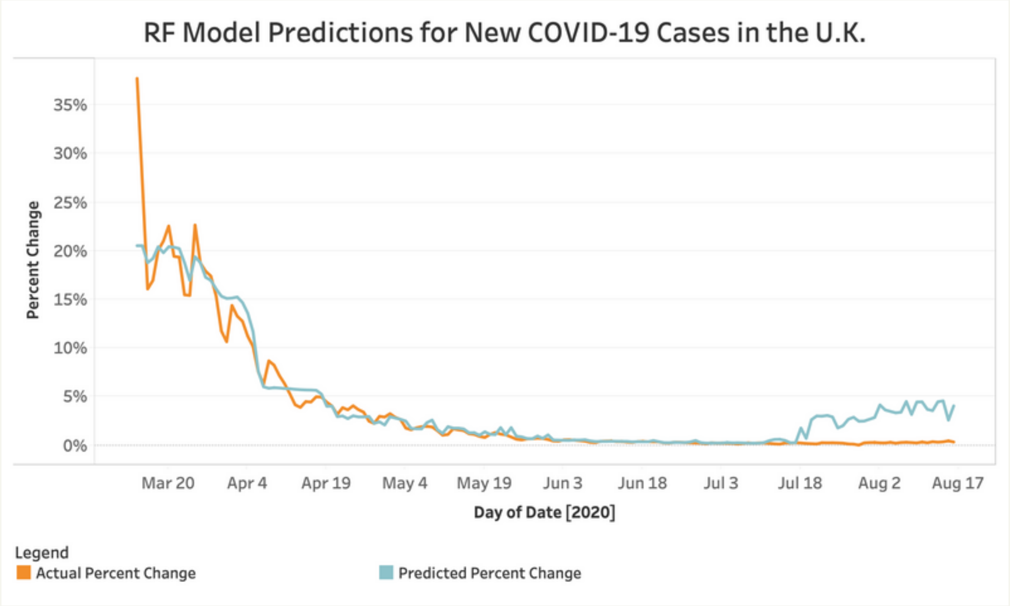
- Seasonal and Trend Decomposition
- Granger's Causality Test
- Johansen's Co-integration Test
- Autocorrelation and Partial Autocorrelation
- Augmented Dickey-Fuller Test
- Forecast Modeling using SARIMAX, VECM, and Random Forests

STATS & ML VISUALIZATIONS



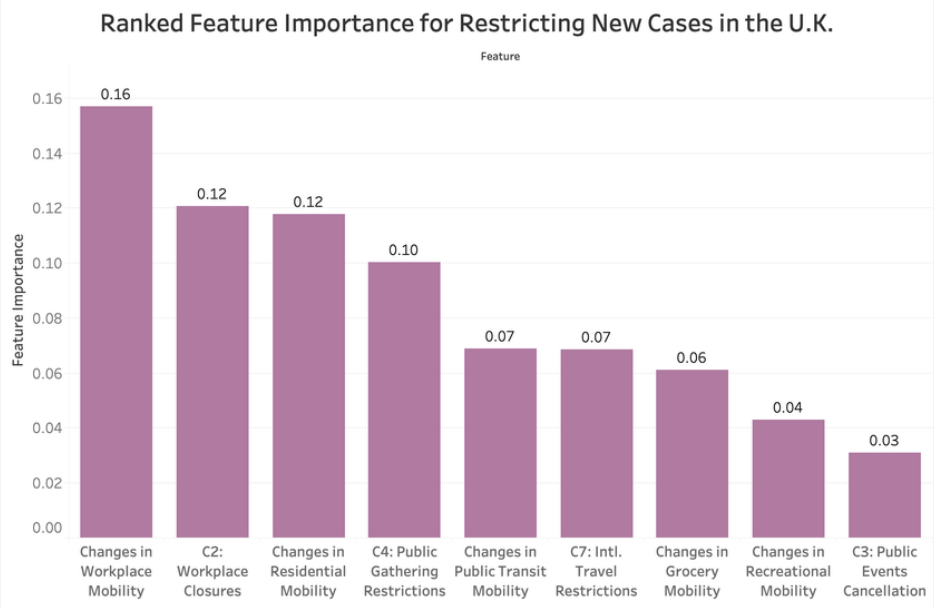
VECM Predictions for the U.K.

Here we compared true vs. predicted values for the number of cases based on grocery and pharmacy mobility data. These predictions further demonstrate that the data is positively correlated.



Random Forests Predictions for the U.K.

Results across the various countries we analyzed using Random Forests (RF) demonstrated that the model is fairly accurate at universally predicting the number of cases.

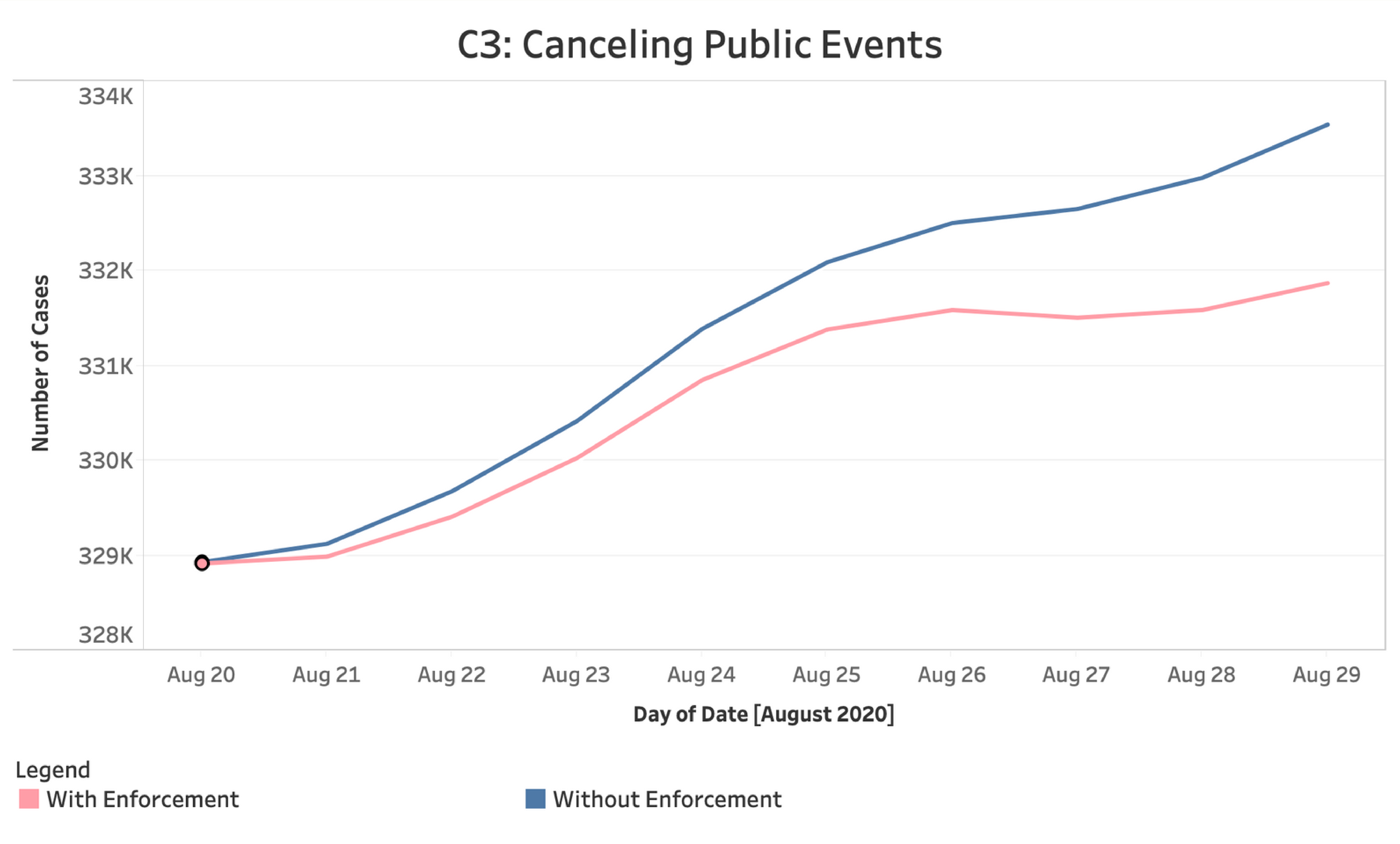


Feature Importance for the U.K.

Our feature analysis also signifies that reducing mobility in residential areas and placing restrictions on workplace travel and public gatherings appear to be the most important factors in predicting the number of future cases.

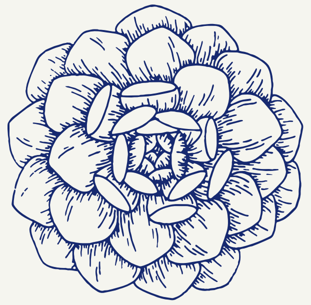
STATS & MACHINE LEARNING

This chart demonstrates how our models were able to predict the difference in the number of cases based on the enforcement of the cancellation of public events.



STATISTICAL ANALYSIS & MACHINE LEARNING

KEY INSIGHTS



01

Collective mobility around public and residential spaces greatly impacts the number of confirmed COVID-19 cases and deaths.

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02

Decreased mobility combined with the right prevention measures can decrease acceleration of the virus.

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03

Restricting residential mobility, workplace travel, and public gatherings is likely the most effective combined prevention strategy.

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CONCLUSION & KEY TAKEAWAYS

01

Contrary to our initial assumptions, population and socioeconomic factors do little to explain the number of COVID-19 cases and deaths across various European countries.

02

Moreover, much of the decrease in the number of cases and deaths is likely due to the right combination of policies and restrictions on public mobility.

03

While analyzing the data, we witnessed a ripple effect between the implementation of governmental policies, public mobility, and the spread of the virus.

04

The most important factors for prevention appear to be travel bans, school and workplace closures, and the cancellation of public events.

THANK YOU FOR YOUR TIME.

Q&A

We'd love to hear any and all of your questions regarding our analysis, methodologies, conclusions, etc.

ASK AWAY