We used multiple machine learning models to forecast cumulative COVID-19 cases in South Africa, and the Ensemble model outperformed the individual models by a significant margin.

Compiling COVID-19 models and creating a super robust predictive model to forecast cumulative COVID-19 cases in South Africa.

INTRODUCTION

- The COVID-19 pandemic began its devasting spread in South Africa in early 2020 and up to now it continues to disrupt all areas of healthcare, economy and broader society.
- Many COVID-19 case predictive models have since been build by researchers & professionals. However, individual models have shown limited predictive power in the dynamic environment and society within which COVID-19 spreads.
- Our first key objective was to identify some of the publicly available models and compile a repository of them.
- The second key objective was to create an Ensemble COVID-19 model which combines the predictive power of individual models and is able to more accurately forecast the COVID-19 cumulative cases in South Africa.

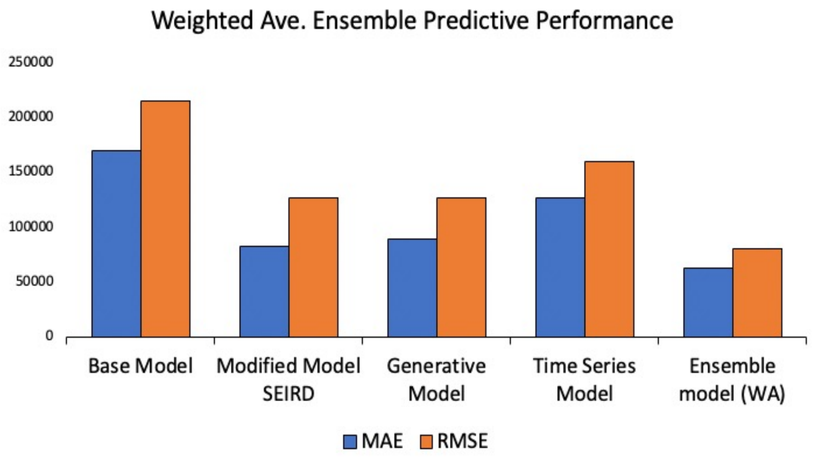
METHODS

1. The data for this study originates from South Africa's National Institute for Communicable Diseases (NICD), Department of Health(DoH) and other institutions and research centers
2. Before we tackled the Ensemble model's goals, we trained various machine learning models:
   - Base/Classic SEIRD Model
   - Modified SEIRD Model
   - Generative Model
   - Time Series Model
3. We built two Ensemble models:
   - Arithmetic mean Ensemble
   - Weighted Avg. Ensemble (Better performing)

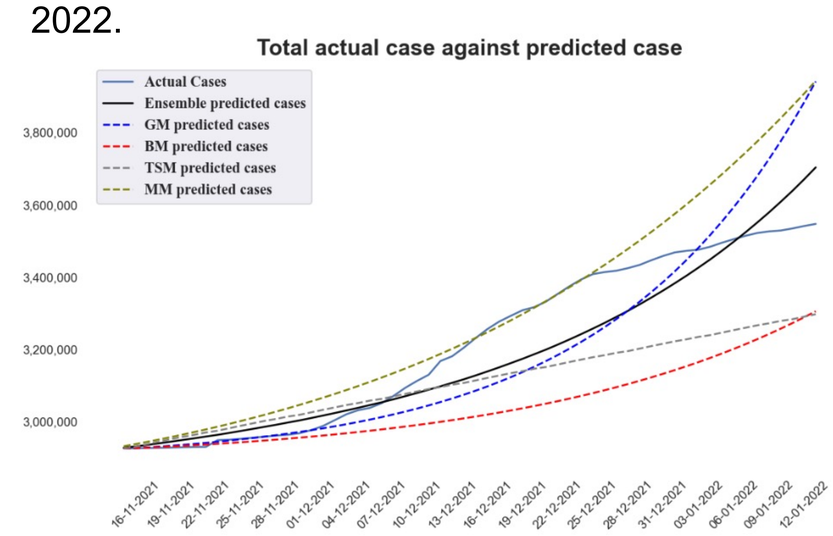
Takura Wekwete & Eddie Mathebana

RESULTS

- MAE and RMSE were used to measure the models' performances.

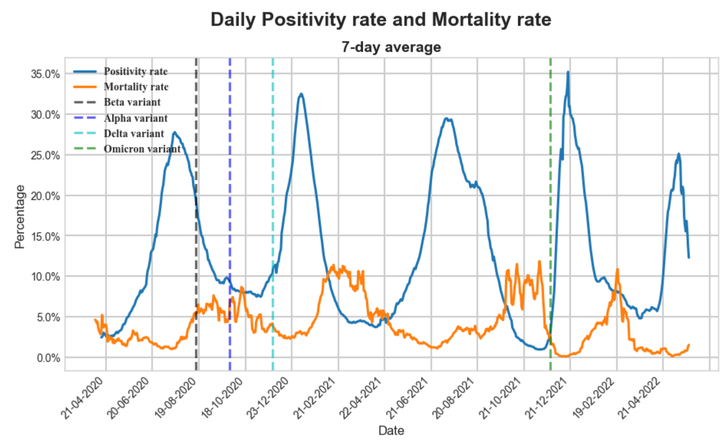


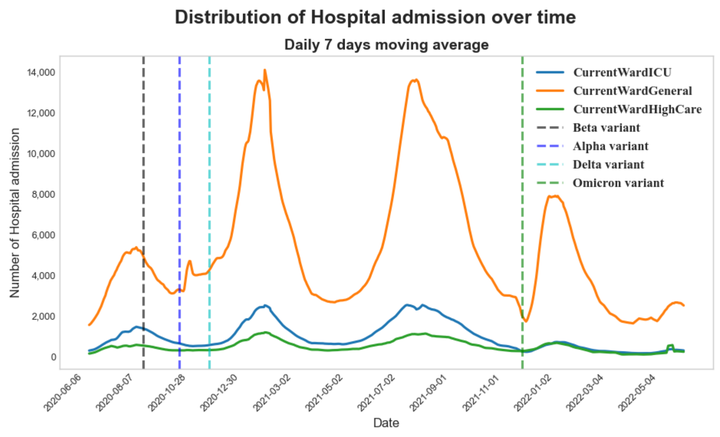
- Testing predictive period: 15 Nov 2021 – 15 Jan 2022.

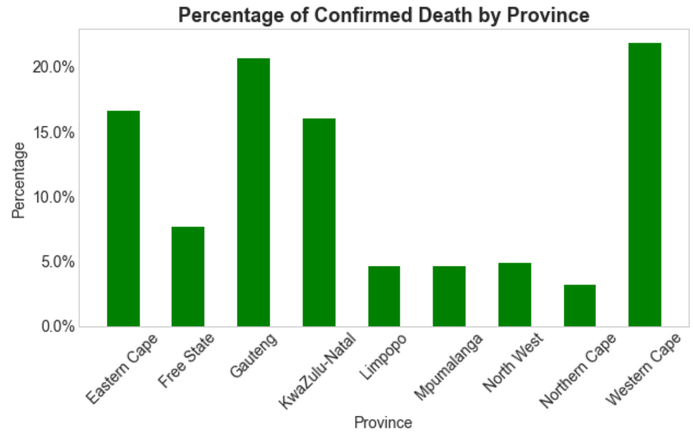


DISCUSSION

- The total number of actual cases was underestimated by the Base SEIRD Model and Time Series Model.
- The Modified Model SEIRD and Generative Model were overestimating the total actual cases.
- The Ensemble model outperformed the basic models, showing a significant performance. improvement.







UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Department of Computer Science

Faculty of Engineering, Built Environment and Information Technology

Fakulteit Ingenieurswese, Bou-omgewing en Inligtingtegnologie / Lefapha la Boetšenere, Tikologo ya Kago le Theknolotši ya Tshedimošo

Capstone Project - MIT 808

Course Coordinators:
Dr. Vukosi Marivate (vukosi.marivate@cs.up.ac.za)
Abiodun Modupe (abiodun.modupe@cs.up.ac.za)

Scan me