



9TH MALAYSIA STATISTICS CONFERENCE

Department of Statistics, Malaysia

Dealing with Uncertainties: Unearthing Measures for Recovery



A Predictive Analytics Model for Covid-19 Cases in Malaysia using Artificial Neural Network (ANN) to Deal with Environmental Uncertainties

Nurain Ibrahim^{1*}; Nur Fatin Nadhrah Zakaria¹; Siti Afiqah Muhamad Jamil¹

¹College of Computing, Informatics and Media, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia

Corresponding author* : nurainibrahim@uitm.edu.my



MOTIVATION

The Covid-19 epidemic, which began in Wuhan, China in December 2019, has infected millions of individuals globally. As a result, the creation of a vaccine was required in order to combat the virus, especially with more dangerous varieties developing over time. The Malaysian government began to offer vaccinations on 24th February 2021, and, the number of serious infections that resulted in hospitalisation and fatalities has fallen dramatically among those who received the shot. However, there is still environmental uncertainty about vaccine effectiveness, prompting us to conduct a study using data mining technique of Artificial Neural Network (ANN) model to predict the new cases of Covid-19 outbreak in Malaysia. Logically, the lower the error of the prediction and lower new cases, it relates that the vaccines are effective. Application of these methods would help communities in terms of environmental uncertainties related to Covid-19 issue.

INTRODUCTION

Majority of clinical variables used by researchers for the prediction of Covid-19 cases were challenging to acquire, especially the level of detail needed for such predictions. It was proven to be adequate and efficient in some studies based on the detailed and rich input data that their suggested model required. However, not all nations have access to rich data and statistics, therefore this study will evaluate the applicability of ANN to predict situations with a limited amount of data selections. Moreover, ANN have not yet been widely used to anticipate the Covid-19 epidemic, as far as we know.

METHODOLOGY

Three Artificial Neural Network models were used to predict new cases of Covid-19 and the models were evaluated and compared using Sum of Squares Error (SSE), Determination of coefficient (R-Squared), and Root Mean Square Error (RMSE) values.

Table 1. ANN models' description

Model	Description
ANN 1	$C_t = f_1(C_{t-1})$
ANN 2	$C_t = f_2(C_{t-1}, C_{t-2})$
ANN 3	$C_t = f_3(C_{t-1}, C_{t-2}, C_{t-3})$

RESULTS

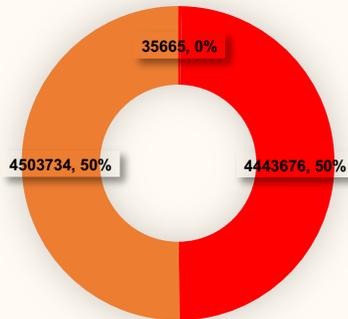


Fig 1. Sum of DDC, DRC and NDC

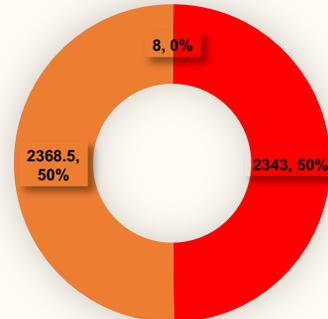


Fig 2. Median of DDC, DRC and NDC

DISCUSSION AND CONCLUSION

ANN 3 model is the best model in predicting Covid-19 with SSE, R-Squared and RMSE of 0.067, 0.6839 and 0.5379 respectively. It is the best model for predicting daily new Covid-19 cases in Malaysia. This study paints a clear picture of the significance of the responsibilities played by the government and other authorities in ensuring that the management of Covid-19 is effective and organised. A lot of parties would be impacted if the same precautions are regularly taken, thus it is also important to make sure that they are not.

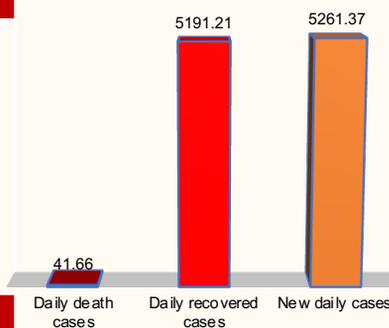


Fig 3. Mean of DDC, DRC and NDC

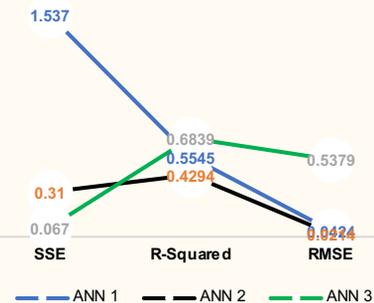


Fig 4. Performance summary of ANN models

REFERENCES

Azlan, A. A., Hamzah, M. R., Sern, T. J., Ayub, S. H., & Mohamad, E. (2020). Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia. *PLoS ONE*, 15(5), 1–15. <https://doi.org/10.1371/journal.pone.0233668>

Chicco, D., Warrens, M. J., & Jurman, G. (2021). The coefficient of determination R-squared is more informative than SMAPE, MAE, MAPE, MSE and RMSE in regression analysis evaluation. *PeerJ Computer Science*, 7, 1–24. <https://doi.org/10.7717/PEERJ-CS.623>

