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Forecasting Covid-19 New Cases in Slovenia

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***Abstract* - The need for forecasting the future pattern of COVID-19 is at its highest levels now. Predicting the disease progression will lessen the burden of health workers in terms of managing the pandemic. Slovenia, just like any other resource-limited country, is in need of accurate forecasts of the COVID-19 cases, in order to be "on top" of the virus. In this research paper, the ANN approach was applied to analyze COVID-19 cases in the country. This study is based on daily new cases of COVID-19 in Slovenia for the period 1 January 2020 – 25 March 2021. The out-of-sample forecast covers the period 26 March 2021 – 31 July 2021. The residuals and forecast evaluation criteria (Error, MSE and MAE) of our model indicate that the model is stable and acceptable for predicting daily new COVID-19 cases in Slovenia. It is projected the COVID-19 pandemic is likely to disappear in the country around mid-April 2021.There is, however, the need for continued implementation of control and prevention strategies in the country, especially the vaccinations. The public is also urged to exercise caution all the time and strictly adhere to sanitary rules established by WHO, in order to save lives.**

Keywords: ANN, COVID-19, Forecasting.

I. INTRODUCTION

Modelling and forecasting COVID-19 dynamics is fundamental to being able to act timeously and take the best safety measures for the population (Petrica *et al*., 2020). Surprisingly, the government of Trinidad & Tobago has not yet presented any official analysis or predictions for the evolution of the pandemic and yet forecasting the pandemic will inform policy on the way forward in terms of control and prevention strategy formulation (Antonescu, 2020). There is need to come up with a forecasting model with predictions that will aid public health policy dynamics in the country (Stochitoiu*et al*., 2020).. It is this informational hiatus that we attempt to address in this regard. Hence, we attempt to model and forecast daily confirmed COVID-19 cases in Slovenia.

II. METHODOLOGY

The Artificial Neural Network (ANN) approach, which is flexible and capable of nonlinear modeling; will be applied in this study. The ANN is a data processing system consisting of a large number of highly interconnected processing elements in architecture inspired by the way biological nervous systems of the brain appear like. Since no explicit guidelines exist for the determination of the ANN structure, the study applies the popular ANN (12, 12, 1) model based on the hyperbolic tangent activation function. This paper applies the Artificial Neural Network (ANN) approach in predicting new COVID-19 cases in Slovenia.

Data Issues

This study is based on daily new cases of COVID-19 in Slovenia for the period 1 January 2020 – 25 March 2021.The out-of-sample forecast covers the period 26 March 2021 – 30 September 2021.All the data employed in this research paper was gathered from the Johns Hopkins University (USA).

III. FINDINGS OF THE STUDY

ANN Model Summary

Table 1: ANN model summary

Variable	S
Observations	438 (After Adjusting Endpoints)
Neural Network Architecture:	

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Input Layer Neurons	12
Hidden Layer Neurons	12
Output Layer Neurons	1
Activation Function	Hyperbolic Tangent Function
Back Propagation Learning:	
Learning Rate	0.005
Momentum	0.05
Criteria:	
Error	0.074467
MSE	19254.315931
MAE	86.978725

Residual Analysis for the Applied Model

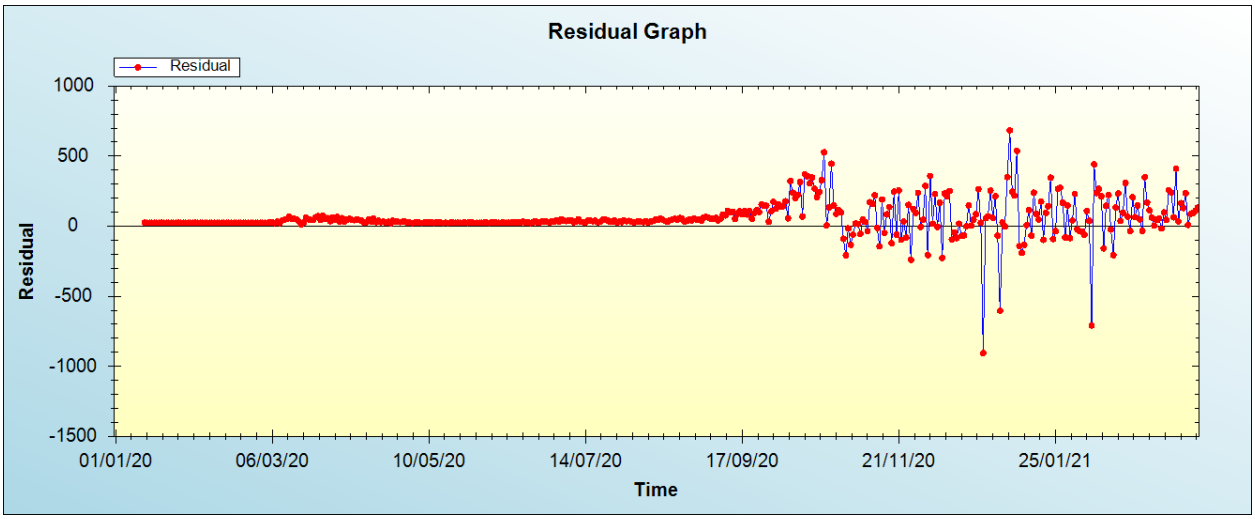

Figure 1: Residual analysis

In-sample Forecast for S

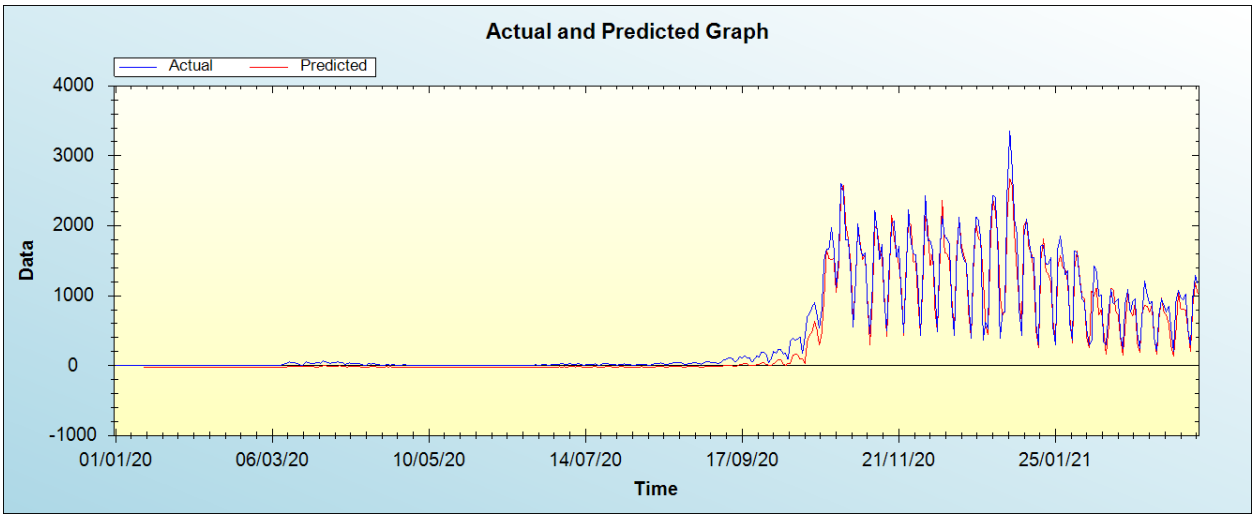

Figure 2: In-sample forecast for the S series

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Out-of-Sample Forecast for S: Actual and Forecasted Graph

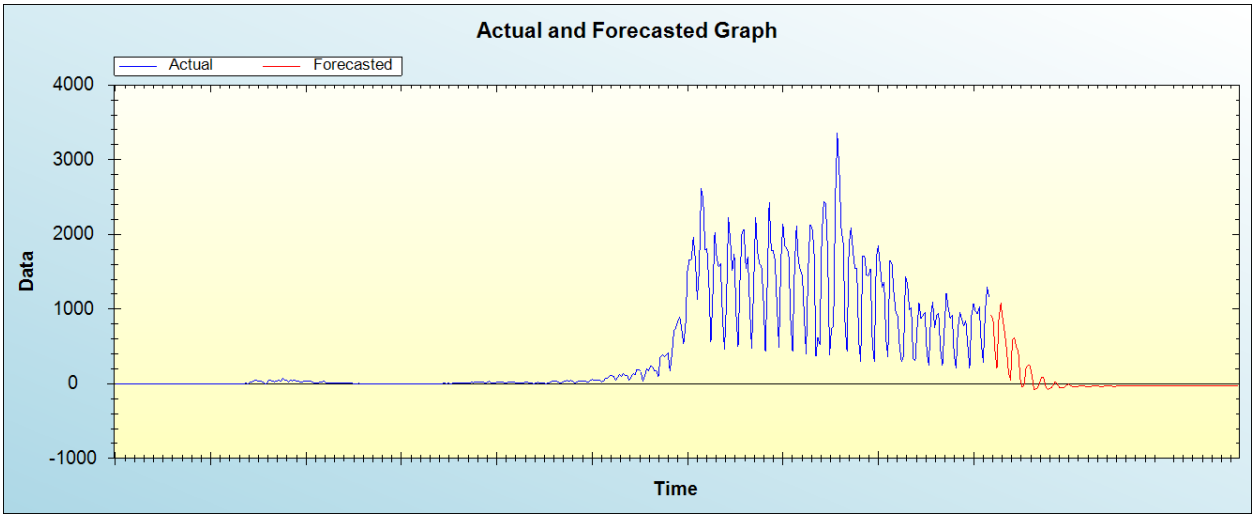

Figure 3: Out-of-sample forecast for S: actual and forecasted graph

Out-of-Sample Forecast for S: Forecasts only

Table 2: Tabulated out-of-sample forecasts

Date	Forecasts
26/03/21	922.9668
27/03/21	868.8402
28/03/21	449.1690
29/03/21	200.6144
30/03/21	856.4400
31/03/21	1078.5461
01/04/21	864.5497
02/04/21	681.0633
03/04/21	461.6294
04/04/21	142.3344
05/04/21	52.7048
06/04/21	594.4981
07/04/21	610.2946
08/04/21	484.0790
09/04/21	433.2041
10/04/21	60.8372
11/04/21	-41.2814
12/04/21	-12.0692
13/04/21	210.8918
14/04/21	247.4231
15/04/21	244.7237
16/04/21	108.9128
17/04/21	-74.5853
18/04/21	-69.6157
19/04/21	-45.9581
20/04/21	18.8099
21/04/21	94.9629
22/04/21	78.6721
23/04/21	-29.8766
24/04/21	-75.2637
25/04/21	-63.1142
26/04/21	-50.6422
27/04/21	-12.8137
28/04/21	30.5434
29/04/21	-0.5269
30/04/21	-46.1860
01/05/21	-54.5904

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02/05/21	-51.2153
03/05/21	-40.2712
04/05/21	-15.3953
05/05/21	-4.3078
06/05/21	-25.2803
07/05/21	-40.7422
08/05/21	-43.2695
09/05/21	-42.1311
10/05/21	-32.7039
11/05/21	-21.0663
12/05/21	-21.6786
13/05/21	-31.4118
14/05/21	-36.7703
15/05/21	-38.2422
16/05/21	-36.5127
17/05/21	-30.4886
18/05/21	-26.5884
19/05/21	-28.6787
20/05/21	-32.6171
21/05/21	-34.8591
22/05/21	-35.3996
23/05/21	-33.6282
24/05/21	-30.6699
25/05/21	-29.7586
26/05/21	-31.0945
27/05/21	-32.7466
28/05/21	-33.7693
29/05/21	-33.7118
30/05/21	-32.5000
31/05/21	-31.3012
01/06/21	-31.2193
02/06/21	-31.9124
03/06/21	-32.6741
04/06/21	-33.0861
05/06/21	-32.8526
06/06/21	-32.2026
07/06/21	-31.7754
08/06/21	-31.8487
09/06/21	-32.2057
10/06/21	-32.5630
11/06/21	-32.6841
12/06/21	-32.4850
13/06/21	-32.1827
14/06/21	-32.0435
15/06/21	-32.1190
16/06/21	-32.3054
17/06/21	-32.4611
18/06/21	-32.4723
19/06/21	-32.3497
20/06/21	-32.2198
21/06/21	-32.1799
22/06/21	-32.2344
23/06/21	-32.3287
24/06/21	-32.3885
25/06/21	-32.3722
26/06/21	-32.3072
27/06/21	-32.2539
28/06/21	-32.2469
29/06/21	-32.2814
30/06/21	-32.3261
01/07/21	-32.3454
02/07/21	-32.3290
03/07/21	-32.2971
04/07/21	-32.2763

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05/07/21	-32.2789
06/07/21	-32.2987
07/07/21	-32.3183
08/07/21	-32.3226
09/07/21	-32.3117
10/07/21	-32.2968
11/07/21	-32.2895
12/07/21	-32.2935
13/07/21	-32.3039
14/07/21	-32.3117
15/07/21	-32.3116
16/07/21	-32.3053
17/07/21	-32.2987
18/07/21	-32.2966
19/07/21	-32.2997
20/07/21	-32.3048
21/07/21	-32.3076
22/07/21	-32.3066
23/07/21	-32.3033
24/07/21	-32.3005
25/07/21	-32.3002
26/07/21	-32.3021
27/07/21	-32.3044
28/07/21	-32.3053
29/07/21	-32.3044
30/07/21	-32.3028
31/07/21	-32.3017

The main results of the study are shown in table 1. It is clear that the model is stable as confirmed by evaluation criterion as well as the residual plot of the model shown in figure 1. It is projected the COVID-19 pandemic is likely to disappear in the country around mid-April 2021.

IV. CONCLUSION & RECOMMENDATIONS

COVID-19, which has evolved as a worldwide public health emergency; has killed many people in the entire world and Trinidad & Tobago is not an exception. In this study, we attempted to model and forecast daily COVID-19 case volumes for the country with the purpose of informing policy. The study applied a generalized ANN model. It is projected the COVID-19 pandemic is likely to disappear in the country around mid-April 2021.There is, however, the need for continued implementation of control and prevention strategies in the country, especially the vaccinations. The public is also urged to exercise caution all the time and strictly adhere to sanitary rules established by WHO, in order save lives.

REFERENCES

[1] Antonescu, D. (2020). Supporting Small and Medium Size Enterprises Through the COVID-19 Crisis in Romania, *Central European Journal of Geography and Sustainable Development*, 2 (1): 38 – 57.

[2] Petrica, M., *et al*. (2020). A Regime Switching Model on COVID-19 Analysis and Prediction in Romania, *medRxiv*, pp: 1 – 6.

[3] Stochitoiu, R. D., *et al*. (2020). A Self-Supervised Neural-Analytic Method to Predict the Evaluation of COVID-19 in Romania, *medRxiv*, pp: 1 – 20.

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