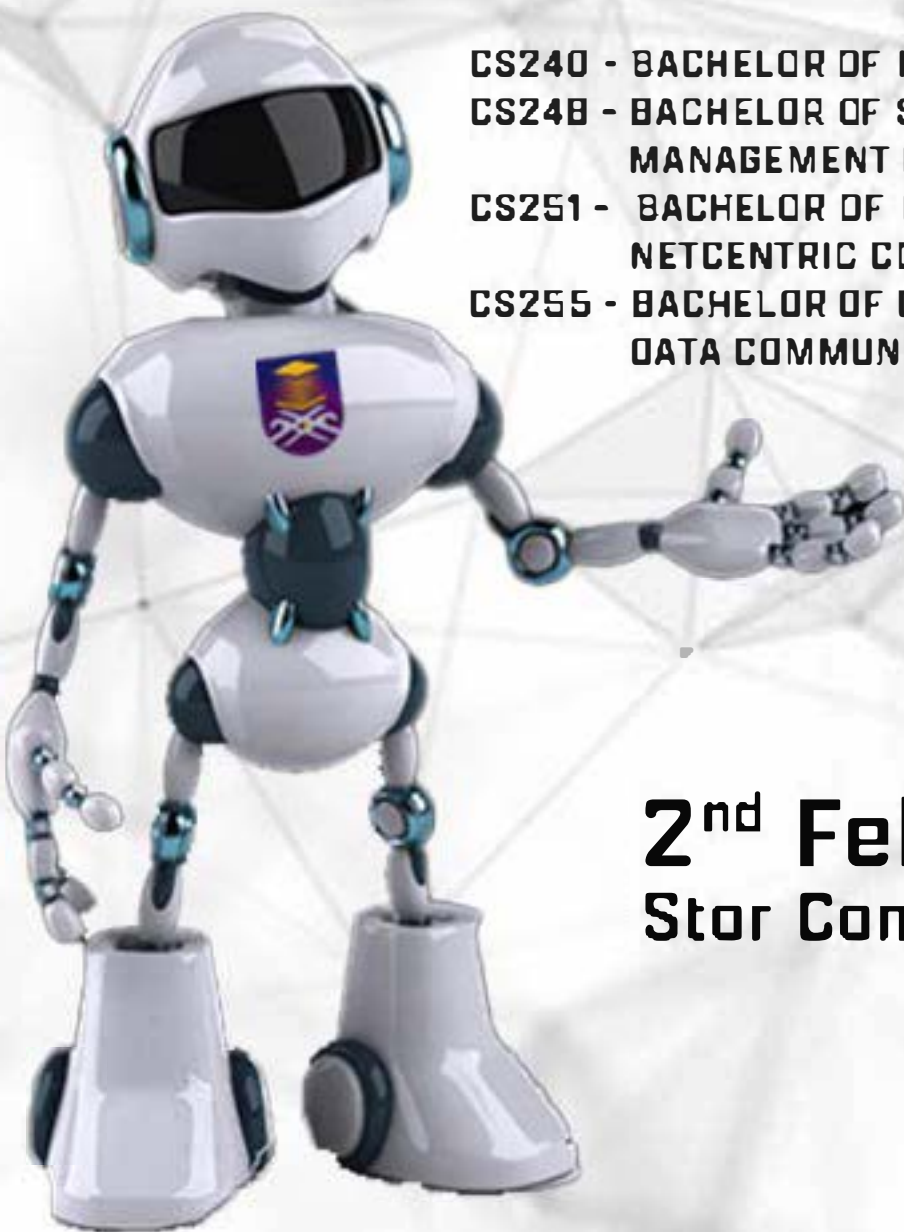

RESEARCH EXHIBITION IN MATHEMATICS & COMPUTER SCIENCES

REMACS 5.0



CS240 - BACHELOR OF INFORMATION TECHNOLOGY [HONS.]
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2nd February 2023
Stor Complex, UiTM Perlis

Organized by:
College of Computing, Informatics and Media
Universiti Teknologi MARA Perlis Branch

**Research Exhibition in Mathematics and Computer Sciences
(REMACS 5.0)**

Research Exhibition in Mathematics and Computer Sciences (REMACS 5.0)

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Preface

It is with great pleasure that we present this extended abstract book, titled "The 5th Research Exhibition in Mathematics and Computer Sciences (REMACS 5.0)". This book is a collection of research work in the fields of Computer Science and Mathematics, contributed by the final year students from Universiti Teknologi MARA, Perlis Branch. The aim of this book is to showcase the diversity and depth of research in these two interrelated fields.

Mathematics and Computer Science are two fields that have seen tremendous growth and advancement in recent years. With the rise of new technologies and the increasing demand for data-driven solutions, researchers in these fields have been working hard to develop new theories, algorithms, and models that can help solve some of the most pressing problems of our time. This book is a testament to their hard work and dedication.

The abstracts in this book cover a wide range of topics, including algebra, analysis, logic, computer architecture, algorithms, artificial intelligence, machine learning, computer network, netcentric computing and many more. The work presented here is both theoretical and practical, and has the potential to impact many areas of society, from finance and healthcare to education and security.

We hope that this book will serve as a valuable resource for future students in the fields of Mathematics and Computer Science. We also hope that it will inspire more students to pursue innovative and groundbreaking research in these two fields. Finally, we would like to express our gratitude to all the contributors for their hard work and dedication, without which this book would not have been possible.



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REMACS 5.0

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EVENT SCHEDULE

8:00 – 8:30 am

- Registration

8:00 am – 12:00 pm

- FYP Project Presentation

12:00 - 2:00pm

- Lunch Break

2:15 – 2:35 pm

- National & Wawasan Setia Anthems
- Doa Recitation

2:35 – 2:45 pm

- Welcoming Address by Director of REMACS 5.0

2:45 – 2:55 pm

- Officiating & Closing Remarks from Rector of UiTM Perlis

2:55 – 3:00 pm

- REMACS 5.0 Montage

3:00 – 4:00 pm

- Awarding of Winners:
 - Best Poster
 - Best Project Award
- Photo Session
- End of Ceremony

Dress Code: Formal / Corporate

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EXTENDED ABSTRACTS

RESEARCH EXHIBITION IN MATHEMATICS & COMPUTER SCIENCES
REMACS 5.0

EVALUATION OF FORECAST PERFORMANCE OF COVID-19 WITH DIFFERENT TIME HORIZONS

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Abstract

The first wave of the disease in Malaysia from 25 January to 16 February 2020 involved 22 cases. Accurate forecasting of COVID-19 case movements is crucial for the preparedness of the country's health systems in terms of outbreak management and resource planning. The study's main goal is to generate the forecast values for COVID-19 cases in Malaysia by using forecasting models. Data from the Malaysia's Ministry of Health (MOH) have been obtained from 2020 to 2022 with 1016 observations. This study aims to determine the best "win" model and produce forecast values by using Time-series Cross-Validation. Five models and three error measures have been implemented in this study. There are Naïve model, Mean Model, Single Exponential Smoothing Technique, Holt's method, and Box-Jenkins model. While the error measures used are Root Mean Square Error (RMSE), and Mean Absolute Error (MAE) and Mean Absolute Scale Error (MASE). To execute these models, RStudio software is based on R programming language 4.2.2. The results show that the best "win" model for COVID-19 cases in Malaysia is Naïve model, Single Exponential Smoothing Technique, Holt's Method and ARIMA(0,0,0) and mean model, respectively. The finding of this study will improve Malaysians' decisions and awareness.

Keywords: COVID-19, error measure, Time-Series Cross-Validation

1. Introduction

Threat of COVID-19 in Malaysia rose when Malaysia's neighboring country, Singapore, declared its first COVID-19 positive case on 23 January 2020. The first wave of the disease in Malaysia from 25 January to 16 February 2020 involved 22 cases. Accurate forecasting of COVID-19 case movements is crucial for the preparedness of the country's health systems in terms of outbreak management and resource planning. The study's main goal is to generate the forecast values for COVID-19 cases in Malaysia by using forecasting models.

2. Methodology

Data was collected from 2020 to 2022 with 1016 observations from the Official Github account of Malaysia's Ministry of Health (MOH). Research findings evaluate the COVID-19 cases have used five forecasting models which are the Naïve model, Mean Model, Single Exponential Smoothing Technique, Holt's method, and Box-Jenkins model. The forecasting process is prepared with Microsoft Excel and this study completed by using R Studio. There are three time horizons were selected for this study that are daily (short-range forecasting), weekly (medium-range forecasting) and monthly (long-range forecasting). At the beginnings of data modelling, the data have divided into estimation part and evaluation part to get the accuracy of forecast values.

3. Results and Discussion

As a result of this study, the forecasting methods used in this study which is Time-Series Cross-Validation to predict COVID-19 cases is suitable since the error measure of each method can be analysed. The results show that the best "win" model for COVID-19 cases in Malaysia is Naïve model, Single Exponential Smoothing Technique, Holt's Method and ARIMA(0,0,0) and mean model, respectively. Government agencies will be able to address the impact and awareness of COVID-19 cases earlier if Malaysia can predict the occurrence of the COVID-19 cases more accurately.

4. Novelty of Research / Product

There are many methods in forecast infectious diseases or pandemic, such as COVID-19 cases. This study create a new idea, which is proposed five statistical methods in order to forecast COVID-19 and evaluate each of the prediction methods. Previous researchers have attempted to forecast patterns in the future of unknown infectious diseases so that public health services can be prepared and can plan their responses (Petropoulos et al., 2022). Therefore, forecast of COVID-19 cases should be improved day by day to help the government agencies create plans for the future. This is line with previous study that compared forecast results based on three different time frames to prepare the government to make well-informed decisions to control COVID-19 and ease the way for the new-normal in the community (MA et al., 2020). All in all, the research aims to contribute to the government agencies in making decision for the future.

5. Conclusion

Accurate forecasting of COVID-19 case movements is crucial for the preparedness of the country's health systems in terms of outbreak management and resource planning. This study's main goal, to generate the forecast values for COVID-19 cases in Malaysia by using forecasting models has been achieved. This study proposes to adapt Time-Series Cross-Validation to get better accuracy of the predictions.

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