UNIVERSITI TEKNOLOGI MARA

PREDICTING INFLUENZA TRENDS IN SCHOOLS USING DATA ANALYTICS AND VISUALISATION

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ABSTRACT

Children at primary schools in Sarawak are at risk for influenza and can be severely impacted by this virus, especially in schools where transmission can be rapid and where students may experience absenteeism and disruption of learning activities. There is a limited capacity for monitoring possible increases at an early stage with existing influenza surveillance in Malaysia that is largely based on retrospective data. As a more proactive measure, this study created the School Health Monitoring and Influenza Prediction System (SHMIPS), a web-based system that integrates attendance data, Influenza-Like Illness (ILI) cases, and data on temperature, humidity, and rainfall to predict influenza cases. Collected data was preprocessed for further processing and fed to build a prediction model using Extreme Gradient Boosting (XGBoost). The influenza pattern and the prediction results were presented using visual analytics in the resulting model and integrated into an interactive dashboard. The mean absolute error (MAE), root mean square error (RMSE), and coefficient of determination (R^2) were used to evaluate the performance of the model and functional tests were performed to confirm the functioning of the developed system. The results indicated that the prediction model was able to make good forecasts, and SHMIPS could prove to be a platform for school influenza surveillance and early prevention decision making.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter presents the use of analytical and visualisation techniques for influenza trend prediction in schools. It starts with background of the study, which concerns the rising concerns on influenza outbreaks among Primary School students in Sarawak. The chapter also includes a definition of the research problem, objectives, scope and significance of the study. Concerns are also raised about using the machine learning approaches to forecast influenza in order to aid early intervention and prevention. To this end, the XGBoost model was chosen because it is able to learn from historical health and environmental data to predict patterns of influenza in the future.

1.2 Background of Study

Influenza is a viral infection affecting the respiratory system and remains a significant health problem, especially for children with immature immune function and frequent exposure to environments with close contact (Mohan et al., 2025). Influenza can be transmitted to children who may then become absent from school and disrupt their educational programs. Influenza-Like Illness (ILI) cases have been seen to be increasing in Malaysia including in schools. Epidemiological Week (EW) 40/2025 recorded 97 reported influenza outbreaks while EW 39/2025 recorded 14 such outbreaks, with educational institutions making up a large percentage of the reported outbreaks (Bernama,