

FORECASTING FRESH DURIAN EXPORT VOLUMES USING MACHINE LEARNING MODEL

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ABSTRACT

This study aims to develop forecasting models for the export volume of fresh durian from Thailand and to compare the performance of four forecasting models: Random Forest, Adaptive Boosting, Support Vector Regression (SVR), and a Combined Forecasting Model. The dataset comprises monthly export volumes of fresh durian from January 2013 to December 2024 (144 months). The data were divided into two sets: the first training dataset from January 2013 to December 2023 (132 months) to construct the forecasting model; and the second testing dataset from January 2024 to December 2024 (12 months) to compare the accuracy of each model. The performance of each model was compared by the Mean Absolute Percentage Error (MAPE), the coefficient of determination (R-Squared), and the Reduction Error Rate (RER). The results show that the Combined Model Random Forest and Support Vector Regression (SVR) is the best model for forecasting the export volume of fresh durian, with the lowest MAPE of the training set of 1.816% and MAPE of the test set of 1.918%, R-Squared of 99.73% and RER of 72.371%.

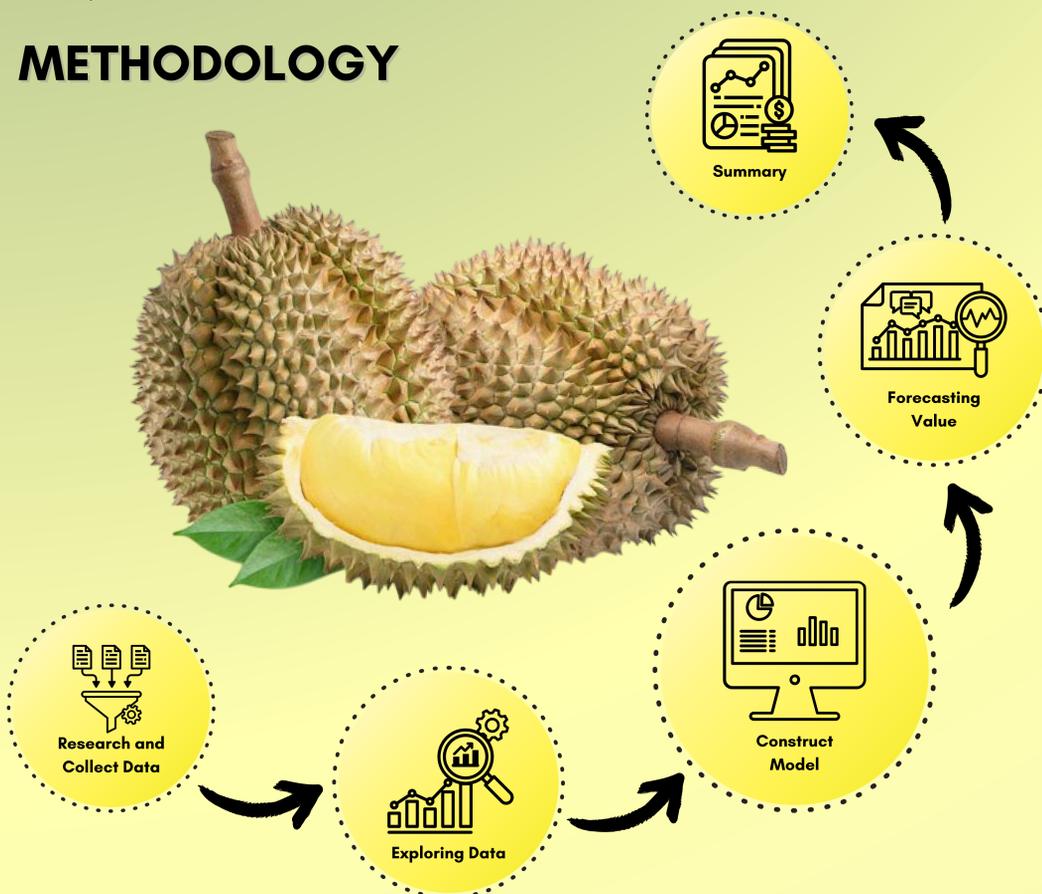
INTRODUCTION

Durian, Thailand's "King of Fruits," is a key economic driver. Its exports, which are vital to the Thai economy, have grown significantly, increasing by approximately 51.3% from 2019 to 2023. However, fluctuating export volumes create challenges in planning. This study compares Random Forest, AdaBoost, SVR, and an Ensemble model to improve the prediction of durian export volumes, aiming to optimize production, balance supply and demand, and enhance Thailand's global competitiveness.

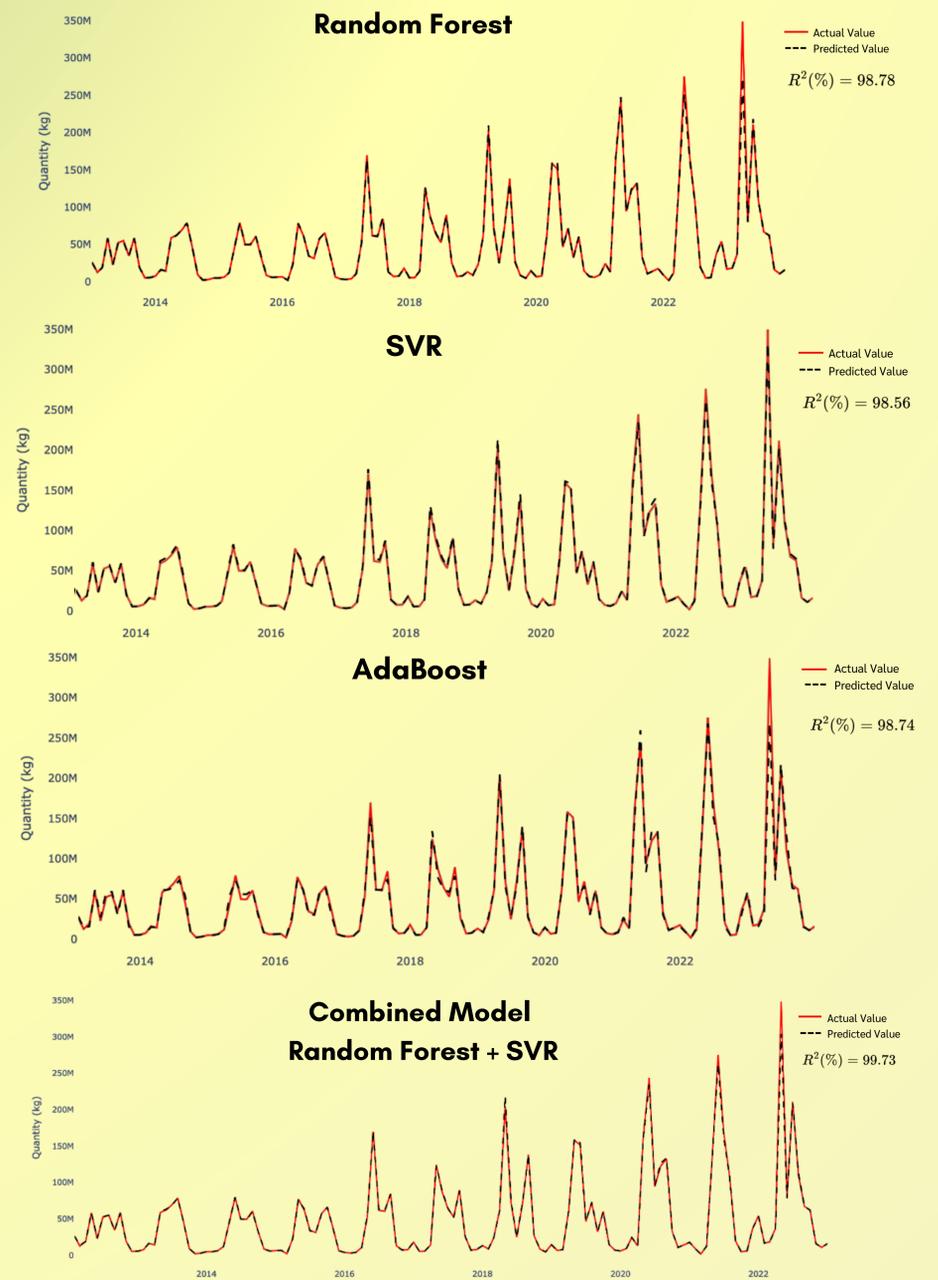
OBJECTIVES

1. To develop and compare the performance of forecasting models for predicting Thailand's monthly fresh durian export volume using four forecasting models: Random Forest, Adaptive Boosting (AdaBoost), Support Vector Regression (SVR), and a Combined Forecasting Model.
2. To select the best-performing model for forecasting the trend of Thailand's fresh durian export volume.

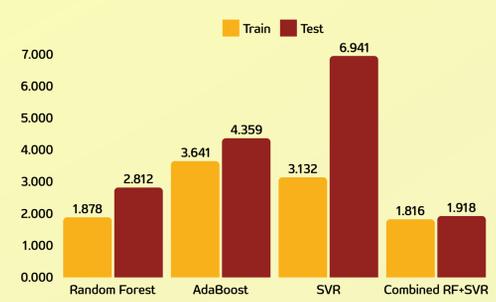
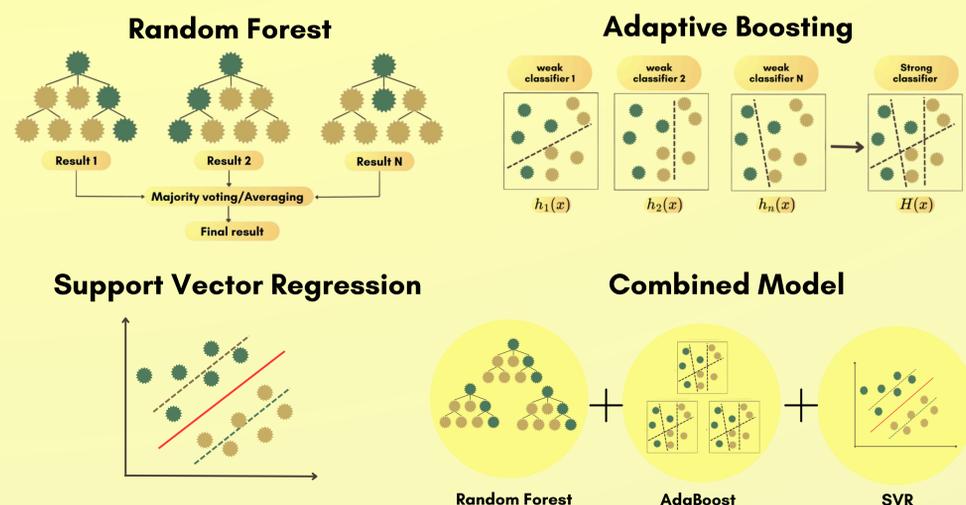
METHODOLOGY



RESULT AND CONCLUSION



MODELS



The results show that the **Combined Model Random Forest and Support Vector Regression (SVR)** is the best model for forecasting the export volume of fresh durian, with the lowest MAPE of the training set of 1.816%, MAPE of the test set of 1.918%, R-Squared of 99.73%, and RER of 72.371%.

EVALUATION CRITERIA

$$MAPE(\%) = \frac{1}{n} \sum_{t=1}^n \left| \frac{Y_t - \hat{Y}_t}{Y_t} \right| \times 100 \quad R^2(\%) = \left(1 - \frac{\sum_{t=1}^n (Y_t - \hat{Y}_t)^2}{\sum_{t=1}^n (Y_t - \bar{Y})^2} \right) \times 100$$

DISCUSSION

From the study, it was found that the Combined Model Random Forest and Support Vector Regression (SVR) suitable for forecasting the export volume of fresh durian from Thailand. This result is consistent with the research of (Paotai Vonglao et al. 2023) demonstrating the effectiveness of using the combined forecasting model in forecasting time series data. Combining the strengths of different models can lead to better results than using a single model.

REFERENCES

- [1] Vonglao, P., Somnat, K., Thepchim, S., & Sutthison, T. (2023). Enhancing Accuracy in Predicting Thailand's Rice Exports: A Hybrid Modeling Approach. Naresuan University Journal: Science and Technology, 31(4), 1-19.
- [2] Sutthison, T. (2024). Forecasting Thai durian exports using a hybrid time series SARIMA- SVR approach. Suranaree Journal of Science & Technology, 31(5), 1-13.