UNIVERSITI TEKNOLOGI MARA

REVERSE MIGRATION PREDICTION MODEL BASED ON MACHINE LEARNING

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ABSTRACT

Reverse migration in Malaysia is a relatively new emerging phenomenon where migrants intentionally choose to return to their hometown for better living. Thus, there is a demand to investigate the determinants that lead to these changing population mobility trends in Malaysia. Migration predictions are notorious for bearing high error rate because migrations are the most complicated and unpredictable of the key demographic processes. A significant way to minimize the errors is by using a machine learning approach that can predict reverse migration intelligently depending on the tested dataset. Thus, this research aim to develop a reverse migration prediction model based on machine learning. To fulfil this aim, this research proposed three (3) objectives. The first objective is to identify the factors influencing reverse migration based on the statistics from previous empirical studies through a systematic literature review. The second objective to analyse the relationship among the factors that influence reverse migration in Malaysia using empirical experiments performed through the Shapiro-Wilk and Spearman Correlation analysis. And the third objective is to evaluate reverse migration prediction model based on machine learning analysis. For this purpose, three (3) algorithms have been assessed, namely, the Random Forest, Decision Tree, and Gradient Boosted Tree. The findings of this research have provided new insights into the six (6) factors that could influence reverse migration. In addition, the results from the three (3) algorithms that were tested showed that Random Forest outperforms other algorithms by acquiring an accuracy and classification error to predict reverse migration. With the application of machine learning aligned with Industrial 4.0, this research would be advantageous to predict reverse migration in a more efficient way.

Keywords: Reverse Migration, Prediction Model, Machine Learning

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CHAPTER 1

INTRODUCTION

1.1 Chapter Overview

This chapter introduces the research topic in general. This introductory chapter introduces the main elements of the research, namely the research background, problem statement, research aim, research questions, research objectives, research scope, significance of research, and research process structure. This chapter closes with an explanation of the thesis structure.

1.2 Research Background

The process of urbanization creates a metropolitan area, a region referred to as containing at least a metropolitan city and its suburban area with a population exceeding one million people. Urbanization is a universal phenomenon that occurs as a result of population growth, increasing household incomes and rising standards of accessibility to transportation (Rofiei et al., 2016). This process is indirectly changing the lives of a society characterized by urban life. The transformation is triggered by the process of urbanization which in turn raises many issues to all levels of society, especially the quality of their lives. Harris and Ullman (1945) said the city may change from time to time and the importance of the downtown business area may deteriorate. The focus of development is not just around the city's central business district, but also in other emerging centres. The areas in the suburbs have advantages for certain land use (Rofiei et al., 2016).

Malaysia has been a regional champion demonstrating strong economic growth and eradicating poverty over recent decades. Indeed, rapid urbanisation has underpinned much of the narrative behind Malaysia's success and growth (UN, 2023) . However, there is evidence of emerging reverse migration in Malaysia, and many researchers have also identified the occurrence of reverse migration Malaysia (Anuar et al., 2021). This is also supported by the statistics produced by the Department of Statistic Malaysia which indicated the reduction of rural migration to urban migration in 2016, declining from 4.7% to 1.8% in 2018 (DOSM,2018). The migration trend