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ESTIMATION OF TOURIST ARRIVAL TO MALAYSIA BY USING LEAST SQUARE METHOD AND EULER METHOD

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ABSTRACT

The monthly number of tourist arrival in Malaysia within a year is inconsistent. The trend of data was contradicted according to the previous data. The Tourism Malaysia Industry are facing problem to estimate tourist arrival. This will be affected to the industry and stakeholder especially to their income and economic development. Malaysia nowadays needs to focus on tourist arrival from other country. Therefore, the country needs to measure and analyzed the number of tourist arrival in order to make sure the growing of economy industry. Accordingly, a solution is needed to overcome this problem. Tourism can be developed if the demanding of tourist increases and consistently. Moreover, it will help to improve the financial of the country. The objective of this research is to estimate the number of tourist arrival by using Least Square method and Euler method. In order to achieve the accuracy of the purposed method, result from the actual data will be compared to the numerical solution. Therefore, researcher can choose the most applicable method to predict tourist arrival for the next upcoming years.

Keywords: numerical method, least square method, euler method, estimation

1. INTRODUCTION

Tourism industry's rising growth was widely recognized for its contribution to the economic development of regions and nations worldwide. Visitor spending on lodging, food and drink, local transportation, entertainment, shopping, and others is an important component of their economies for many destinations, generating much needed jobs and development opportunities [1]. Tourism is international services trade and becomes an important global market activity. Factor influencing international tourism can be explained in terms of supply and demand which there are researchers that were focusing on the supply side [2],[3]. In estimating the demand for tourism, there are pull and push factors that attract tourists to a destination and encourage tourists to travel away. In this project, the next prediction of tourist arrival will be estimate by using data analyze of numerical method. The numerical methods that will be used in this research are Euler's method and Least Square method. The comparison of error between these two methods will detect which method was the best to estimate the number of tourist arrival for the upcoming year.

2. METHODOLOGY

In this research, two different numerical methods will be identified which is Least Square method and Euler's method. The Least Square method approach is composed of three types of polynomial which are linear (degree one), quadratic (degree two) and cubic (degree three). The pattern of tourist arrival in Malaysia will be analyzed by using these numerical methods. The graph for each method can be modeled

and the result for approximation will be calculated in order to differentiate the value of actual and estimation. This research focuses mainly on which method shows the best method by comparing both methods. In this way, error analysis is conducted to analyze the accuracy of the methods. Based on the error analysis, relative and absolute error were calculated and compared. The best-chosen method will be used to predict the number of tourist arrivals for the upcoming year 2020.

In this project, there are six stages that are used in order to evaluate the research report:

i. Project definition
ii. Collecting the data
iii. Use approximate polynomial to get the estimation data
iv. Graphing the data
v. Analyze the data
vi. Selecting the best model

3. RESULT AND DISCUSSION

The error was calculated for both numerical methods to compare between two methods which was the best method to estimate for the next year tourist arrival.

Table 1. Result on comparison of error

Method		**Total Absolute Error**	**Total Relative Error**
Euler's Method		39.2552	2.084702674
Least Square Method	Linear	34.57457894	1.71605291
	Quadratic	17.35078277	1.071662724
	Cubic	16.46654628	0.968464811

The Least Square method is the best method that can be used to evaluating the trend for the number of tourist arrivals compared to the Euler's method. To find the best fit model it depends on the error that was calculated. The Least Square method of cubic and quadratic polynomial shows the lowest error compared to the Euler's method. A higher degree of polynomial Least Square method which is cubic provides more effective fit line graph compared to quadratic and linear. Therefore, cubic polynomial of Least Square method is the best fit model, and the second-best fit model is quadratic polynomial of Least Square method. From the method that were chosen, the estimation of tourist arrival for the upcoming year 2020 can be calculated.

Table 2. Estimation result for year 2020

	Method	**Estimation**
Best fit model	Cubic polynomial	23.73015951
Second-best fit model	Quadratic polynomial	25.98946502

From the calculation by cubic polynomial of Least Square method, the number of tourist arrival for year 2020 is 23.73015951 whereas for quadratic polynomial, the number of tourist arrival for year 2020 is 25.98946502.

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