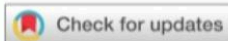


RESEARCH ARTICLE | DECEMBER 04 2023

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AIP Conf. Proc. 2834, 080019 (2023)

<https://doi.org/10.1063/5.0161478>



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The Use of Hierarchical Clustering and the Markovian Model in Study Tourism in Iraq

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Abstract. In this research, the hierarchical clustering method has been applied to classify the Iraqi provinces in the tourism aspect, which depends on the multivariate analysis specified depending on the points of similarity and difference between the data, using the statistical program (spss.v.23), in addition to using the Markovian model to estimate the matrix of transitional probabilities in a non-educational way. It was found that the Markovian model is compatible with the cluster analysis and the ease of using the outputs of the cluster analysis in calculating the transitional probabilities matrix.

Keywords: Hierarchical clustering, Markov model, multivariate analysis, transitional probability matrix.

INTRODUCTION

Cluster analysis is defined as a set of mathematical methods used to determine the structural properties of statistical data, by classifying them into groups (within clusters), so that the vocabulary within each group is similar to each other for the approved characteristics, (so that the groups are apparently different from each other) In other words, the objective of the cluster analysis is to collect the sample items and classify them into groups that are internally homogeneous and externally differentiated between each other.

Classification has been used since ancient times for the purpose of classifying humans based on the characteristics of color, gender, and others. One of the most important research in which classification scales were used is in the year 1960, a measure of similarity was found by researchers (Curtis and Bary) and it was applied in the field of education studies and in In 1961, the researcher (Solcal) was able to find a scale called (distance Euclidian), which measures the distance between the two comparative elements. (Mustafa, 2007)

The theory of Markov processes occupies a large place in the theory of stochastic processes. This position enhances the multiplicity of applications that use Markov processes in physical and biological models, sociology, engineering and management science, in addition to their multiple applications in many statistical and engineering models. (Idrissi, 2013).

The Russian mathematician (Andreevich Markov 1856 - 1922) came up with a new idea to facilitate prediction calculations in the style of time series after he was involved in the prediction calculations all the observation values of the studied phenomenon (the random variable understudy), in addition to that, obtaining the predictive values is very difficult. When the series is long and with large numbers, and therefore Markov came up with a new method, which states [In the analysis of time series it is sufficient to rely on current values to predict the values of the series in the future and not to rely on previous values or historical values of the studied series. (Al-Shamrty, 2017)

RESEARCH PROBLEM

Tourism is of great importance in supporting the national economy because of the financial resources it achieves, which contribute to the development process, and also contribute to increasing job opportunities due to its ability to absorb large numbers of manpower in various tourism activities represented in hotels, restaurants, commercial markets and popular industries. Since the hotel activity and tourist accommodation is one of the most important requirements for work in tourism, it is necessary to know the disparity and difference in hotel services between the governorates and to know which governorates are close and which are different. To raise the level of services provided and thus develop the tourism aspect in the country.