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面板数据的灰色矩阵相似关联模型及其应用

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Grey Matrix Similar Incidence Model for Panel Data and Its Application

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摘要

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摘要 根据灰色关联分析的基本思想,在定义了面板数据矩阵表现形式的基础上,以指标为研究对象,从个体和时间两个维度分别衡量了相关因素矩阵与系统特征行为矩阵之间的发展速度指数和增长速度指数的接近程度,并以此作为关联度的度量,将灰色关联分析由传统的向量空间拓展到矩阵空间,提出了面板数据的灰色矩阵相似关联模型,并讨论了其性质。最后以CO_2排放为例,通过测算中部六省2005-2012年碳排放量,建立了中部地区碳排放影响因素的灰色矩阵相似关联模型,实例表明,该模型简单,且具有良好的应用性。

关键词： 灰色矩阵相似关联度   发展速度指数   增长速度指数   碳排放

Abstract： Grey incidence analysis is an important part of grey system theory which is used to ascertain the relationship grade between an inflential factor and the major behaviour factor. However, most of grey incidence models are mainly applied to the field in which the operational behaviour factor and relational factor are the cross-sectional data or time series data in a given system. Therefore, the grey model on pannel data is worth exploring that is the asscociated content in this paper.According to the basic idea of grey incidence of grey system theory, the degree of relative closeness of the development rate and growth rate indexes between the relative factor matrices and characteristic behavior matrix of the system is measured from two dimensions of individual and time on the basis of the definition of the matrix sequence of a discrete data sequence. With the measurement of grey incidence degree, the grey matrix similar incidence model of panel data is put forward from the traditional vector space to the matrix space and its properties are discussed. Finally, CO_2 emission is taken as an example where the data of carbon dioxide has been calculated for six provinces by the IPCC method in 2006 and the other data are from the Statistical Yearbook. And a grey matrix similar incidence model is established by measuring the CO_2 emission in 2005-2012 of six provinces in the central region in China. The real example shows its simplification and practicability. The empirical results show that people may take some main factors into account to abate carbon dioxide emission which are an effective way to implement energy saving and carbon emission reduction. For example, the central region can appropriately control the population scale but also put intensive economic development way that guide residents to live low carbon and improve the consciousness of energy conservation and carbon emission reduction.

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