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The empirical research for taking technology innovation genes and forming chromosomes based on coal-bed gas mining

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Abstract

Innovation genetics is a new idea of explaining the rules of technology innovation based on genetics and suited to the technology innovation research fields. The basic problem of Innovation gene study is how to extract the genetic gene and reasonable clustering. Therefore, this paper starts from the carrier of patent technological knowledge and comprehensive analysis of the existing patent technology elements extraction method and text clustering method, then proposing patent retrieval strategy based on technical keywords for selecting innovation gene in related field. At last, using the K-means algorithm innovation gene clustering form chromosomes. The results of this study are preliminary reveals the rule of innovation gene combinations and laid the foundation for following study of innovation genetics.

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1. Introduction

Biological gene widely combine with the knowledge, economy, the mechanical design and form the theory of knowledge gene, evolutionary economics and product gene, providing a new train for social science research while produce a new way for the method and theory of innovation research. Innovation process need to find rules by the existing knowledge and material, then improve or create new things in specific environment and obtain the economic benefits^[1]. Further study found that different areas of innovation

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actually have certain objective laws that the nature is a process innovation elements and function, environment formed different product innovation through the interaction. This process is similar to life which is a process information and energy collect and process^[2]. Based on this, li-jie Feng puts forward the innovation theory of genetics and study the innovation genes, chromosomes and innovative algorithm which aims to explore the internal law of original innovation.

It is very important for Innovation gene selection and clustering as the basis of study. Innovation gene is the element controlling target attribute and stipulate the basic function of the provisions of the artificial system, structure, environment properties and its characteristic of the life cycle stages^[3]. So the selecting and clustering determines the quality and efficiency of the follow-up studies. The essence of innovation gene selection is effective mining of existing technical knowledge. Technical knowledge is usually in the form of journals, patents which hidden behind the huge amounts of data and the main form is patent. Therefore, how to use the technology of patent analysis extracting innovation genes and choosing suitable method to realize feature gene clustering then forming corresponding innovation chromosomes are important question to genetic theory research.

2. Background

There are more than 80% of the technical knowledge in the patent, so through patent analysis can conveniently and accurately realize current technology innovation situation of the related field^[4]. Therefore, patent document are increasingly able to fully reflect the technology development trend and become important source of intelligence^[5]. But the patent is usually existed in the form of text, so we need to take some analysis identify and extract related concepts, terminology, and attribute knowledge unit which can form required technical information. Through deeply analyze literature, we can get the following conclusion:

(1) Most patent analysis method focused on the data mining and literature metrology technology, but Less using patent retrieval strategy for patent analysis. At the same time, because the research need to get effective innovation gene from massive patent document data which can predict technology development. While the advantage of patent retrieval strategy is to integrate various resources, including expert opinion and feedback information to realize the patent data set of comprehensive and accurate.

(2) Existing patent analysis methods and steps are aimed at specific areas and do not form a fixed process. So it is weak to study the significance of other fields. Innovation genetics as a universal method hope to have more standard processes as support.

(3) In the existing text clustering method, K - Means operation simple and quick. When faced with large data sets is relatively scalable and efficient. So in the treatment of large number of text formed by patent analysis, K - Means algorithm has advantage compared with other algorithm with nonlinear complexity.

To sum up, this paper adopt data mining and literature metrology method, put forward specific patent retrieval strategy process, through the application of the existing patent retrieval tools to achieve the extraction of innovation gene. Then taking K-means clustering algorithm for clustering innovation gene group and formation of the corresponding innovation chromosomes to show the path of technological innovation.

3. Research Framework

3.1 Build Patent Retrieval Strategy

Because technology innovation genes come from features which are the technical key words in the patent, so this paper based on the keywords retrieval build patent retrieval strategy through word frequency analysis, comparative analysis^[6]. Specifically, clear target field and select the appropriate patent database (Derwent, Patentics), use the method of bibliometrics statistical high-frequency words and through literature analysis and expert consultation to determine initial keyword library, compare keywords retrieval strategy with

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