Research on the Framework of Edge Coloring Hypergraph Color Hamiltonian Cycle and H-factor Based on Combinatorial Mathematics of Graph Theory

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Abstract

Hamiltonian graph and its decision method can solve Chinese postal route problem, seat arrangement problem, travel salesman problem, the determination schema resolved through composite pattern, and other problems. Also, in the process of application, it has been gradually developed by many fields, forming the entirely new cognition towards combinatorial mathematics theory of graph theory. Based on related researches, this study analyzes aimed at formation mechanism of edge coloring hypergraph color Hamiltonian cycle and puts forward interacting relationship of H-factor. After the analysis on construction model of edge coloring hypergraph color Hamiltonian cycle and H-factor, as well as on forming conditions and constrained conditions under the theoretical framework, the edge coloring problem of combinatorial mathematics of graph theory is analyzed so that the reference in theory can be provided for relevant researches associated with edge coloring hypergraph color Hamiltonian cycle and H-factor.

Keywords: Combination of Graph Theory, Edge Coloring Hypergraph Color, Hamiltonian Cycle, H-factor, Function Model.

1. RESEARCH BACKGROUND

1.1 Literature overview

“Graph Theory” is an important branch in mathematical study. The research on theoretical model with combinatorial mathematical function adopted and its schema effect to the expression of objective things have become an important way in mathematical study and are the reference of mathematical model to improve the visual effect of which the research core is the application field taking the graph as the study object (Hou and Liu, 2014). In the development process of graph theory, point, line and surface are used to express the objective conditions for development of things and the forming conditions after combination, and is the necessary expression to describe specific relation (Huo et al., 2015). However, in the process of study on combinatorial mathematics of graph theory, the appearance of edge coloring hypergraph color Hamiltonian cycle affects the actual operation effect once again and H-factor is distributed in edge coloring and doesn’t form the relation definition aimed at objective things, even fuzzes the actual producing conditions of computing result. As a result, the questions with regard to the authenticity and objectivity of research result are presented as well.

1.2 Research purpose

Hamiltonian cycle is described by relation of things that is produced from circuit and Hamiltonian graph in which the combined condition of G node for each time is restricted only once by path, and then forming the Hamiltonian path (Yin et al., 2012). And the result of Hamiltonian circuit model is the extended condition of Hamiltonian cycle. When the internal forming condition of H-factor is restricted, different fixed-point vectors will be formed to restriction or limitation that cannot objectively express the development rudiment of things. How to solve the constrained condition of H-factor is the most critical development direction in current mathematical study as well (Hao and Gao, 2012). Based on the foundation of many theoretical researches, this study analyzes edge coloring hypergraph color Hamiltonian cycle and construction model of H-factor, as well as the forming conditions and constrained conditions under the theoretical framework, and then discusses edge coloring problem of combinatorial mathematics of graph theory so as to provide reference for related researches.
2. THE SUFFICIENT CONDITION AND NECESSARY CONDITION OF HAMILTONIAN GRAPH IN GRAPH THEORY MATHEMATICS

The Hamiltonian graph in graph theory mathematics was first put forward by American graph theory mathematician Ole in 1960 and he made the theoretical description for forming condition of Hamiltonian graph (Chen and Li, 2010). When the number of vertex exceed 2 in graph and different radian relation between any two points appears, the total value greater than or equal to this vertex can be regarded as a separate Hamiltonian graph. Compared with closed Hamiltonian, its path is called Hamiltonian cycle and, in a graph containing a Hamiltonian cycle, the vertex path is called Hamiltonian path. If the forming condition of Hamiltonian cycle were determined, the sufficient condition and necessary condition of Hamiltonian graph need to be fixed first. The schematic structure of Hamiltonian is shown in Figure 1.

![Figure 1. Schematic Diagram of the Hamiltonian Diagram](image)

2.1 The first theorem of sufficient condition

In the process of study on edge coloring hypergraph color Hamiltonian cycle and H-factor of combinatorial mathematics of graph theory, the sufficient condition can be analyzed in the framework of theoretical model and the forming mechanism of Hamiltonian graph needs to be considered (Lei et al., 2010). The undirected graph $G$ in graph theory mathematics is a Hamiltonian graph and the any nonempty subset in $V_1$ and $V$ can be considered as the sufficient condition of Hamiltonian graph, the theoretical model is:

$$P_{(G-V_1)} \leq |V_1|$$  \hspace{1cm} (1)

In this formula, $P_{(G-V_1)}$ is the vertex set removing the impact mechanism $V_1$ from $V$ and the schema obtained, after the set of vertex correlation degree has been banned, is provided with constrained condition of connected component (Zhang and Liu, 2016). Also, H-factor is involved in it as well. Therefore, it is not easy to fully describe the sufficient condition of Hamiltonian graph and the support point for the necessary condition of Hamiltonian graph must be found in other operation conditions so that it is in favor of the supplement condition for the accuracy requirement of operation result.

2.2 The theorem supplement of necessary condition

In order to achieve the supplementary effect for the sufficient condition of theorem 1, as well as to design supplementary operation effect for the considered condition of operation result, the precise measurement indicators should be set in the necessary condition, as the support effect of necessary condition. Supposing that $G$ is the forming condition of order undirected simple graph $n(n \geq 3)$ (Li et al., 2017). When the path searched is the property of typical NP-complete, it can be proved that the approximate ratio of Hamiltonian path is the approximation algorithm of constant, which is the important foundation to analyze its theoretical model. The related inferences show that $n(n \geq 3)$ order directed complete graph is a Hamiltonian graph. Hence,
Hamiltonian path is also called Hamiltonian chain, which refers to the path that visits each vertex exactly once along the edge in a graph. Given that any pair of vertices that are not completely adjacent in $G$ has met the cumulative condition, can be clear that $n$ is greater than or equal to the necessary conclusion under this condition and, now, $G$ is provided with the necessary foundation to construct a Hamiltonian graph (Ma et al., 2016). So the reasoning process can first suppose that $G$ is $n(n\geq 2)$ order undirected simple graph so as to clarify the production and derivation process of the necessary condition. However, $D$ is unnecessary reference item in order directed graph of $n(n\geq 2)$, when all the directed edges are replaced by undirected edges, the operation result obtained is not the expected one. For this reason, the necessary condition containing spanning subgraph should be designed in the undirected graph so that the production mechanism of Hamiltonian graph can be restricted in the undirected graph.

3. THE FORMATION MECHANISM OF EDGE COLORING HYPERGRAPH COLOR HAMILTONIAN GRAPH AND F-FACTOR

3.1 The research direction of edge coloring hypergraph color Hamiltonian cycle

In the study on the formation mechanism of edge coloring hypergraph color Hamiltonian cycle and $H$-factor, the assumptions can be fixed to find the sufficient condition and the necessary condition of internal relation for both (Ning and Ning, 2014). If the property of a graph shows vertex and edge, when the latter one produces nonlinear random rule between internal relation of both, it can be deemed as a random graph. In the study on random graph theory, Erdős and Rényi first put forward in the early 60s of 20th century and published related research productions, showing that the internal connection between probability method and processing graph information was inseparable and some problems are provided with more sophisticated internal relation. Currently, the application direction of random graph theory is extremely widespread and the results of theoretical research can be used as distribution process for the study on random graph production or evolution, as well as on the expression form in limit distribution. Although the construction conditions of subgraph theory have not been effectively analyzed, the polar graph theory, Jimsey theory and other studies have proved the forming conditions of edge coloring hypergraph color Hamiltonian cycle in the random graph. Edge coloring hypergraph color Hamiltonian cycle, as an important branch of discrete mathematics, must research the application form of random graph in other subjects based on objective data analysis results, and then satisfy the support dimensions of academic research (Huang and Chang, 2017). For example, in Computer Science, Biology, Chemistry, Human Engineering, Statistics, Economics, Sociology and others, there are wide involvements in the direction of random graph study. The most apparent feature lies in that probability theory pays high attention to graph theory study and treats it as the most important research tool and theoretical model.

3.2 The analysis on formation mechanism of Hamiltonian cycle and $H$-factor

Although this study debugs the distribution rule of random multiple graphs and does not directly acquire the distribution rule for degree sequence of random hypergraph, the explanation can be provided for the formation mechanism of $H$-factor in the forming condition. Though, most of studies cannot provide the theoretical support for the problem of edge coloring hypergraph color Hamiltonian cycle and forming condition of $H$-factor (Yang and Guo, 2015). However, in hypothetical random graph model, the specific relation schema can meet the property condition, in the distribution rule of known item condition within its distribution rule, where the operation model is:

$$\lim_{n \to +\infty} P(Q) = 1$$ (2)

The constrained condition of space geometric graph can be derived from its theoretical model and the unknown condition with $Q$ property can be deeply explored in random graph. Therefore, the theoretical model similar to the result of empirical study is the effect constraint to initially study Hamiltonian cycle and formation mechanism of $H$-factor (Huang and Xu, 2015). Supposing that the unknown condition with $Q$ property appears in study on variable properties and is expressed as consistency natural number condition, the fixed natural number in $F$ can be deemed as the conclusion of $G=m(n)(1 \leq i \leq r)$. A series of internal relations can prove that the formation mechanism of Hamiltonian cycle and $H$-factor is not provided with schematic structure of nonlinear relation. Under the condition satisfying non-negative integer-valued function, the classical random bipartite graph will be expanded and promoted as well. At this time, the random variable is provided with a certain consistency condition and can be expressed as random mathematical matrix of subvariable in random hypergraph model, and then to describe the expression form and constraining force of the formation mechanism of Hamiltonian and $H$-factor in

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the forming process.

3.3 The consistency relation of Hamiltonian cycle and H-factor

It can be found in analysis on formation mechanism of Hamiltonian cycle and H-factor, when the sample \( i \) space is provided with vertex partition condition, the multiple consistency condition can be satisfied: \( V=(V_1, V_2, \ldots, V_n) \). The single edge structure can support the description of other fixed-point vector and can complete the verification to consistency (Zhu and Shi, 2011). Thus, there is the expression form that the exactly one endpoint is located in mathematical set in its each hyper edge set vector, which is consistency hypergraph composition condition of \( V(1 \leq i \leq r) \). The probability of hypergraph that is composed by each edge selected from all the edges can be denoted as \( P(0<P<1) \) and the selection of different edges is provided with a mutually independent formation effect relatively.

3.4 The algorithm level for formation mechanism of Hamiltonian cycle and H-factor

Although the consistency for formation mechanism of Hamiltonian cycle and H-factor is clarified in known conclusion, it cannot stand for the current H-factor and the search of Hamiltonian path. Therefore, in the process of determined algorithm, more operations and expressions of auxiliary items have to be coped with in order to reach the expected operation result and accuracy. Here, the time benefit is the most complex, but it does not mean that only the time complexity as the relation can be discriminated. If the state compression dynamic programming is applied, the forming condition with lower complexity can be found in the time stage (Shen and Li, 2010). In the process of analysis on the formation mechanism of Hamiltonian cycle and H-factor, the establishment of specific algorithm needs to be obtained from equation set \( G=(V, E) \). Instead, the squared condition of \( E \subseteq [V] \) is realized in the operation process of second tuple \( (V, E) \), so \( E \) can be used as the forming condition to fix H-factor in binary subset of known parametric element. Meanwhile, in order to avoid misunderstanding due to symbol, the default expression of subset is set as: \( V \cap B = \phi \).

4. CONCLUSION

To sum up, it can be found in the process of study on the framework of edge coloring hypergraph color Hamiltonian cycle and H-factor based on combinatorial mathematics of graph theory that the set in its computing environment forms the basic interacting property with known element so that the fixed point distance or node direction can be deemed as a known item. It can also be expanded and promoted through satisfying the condition of non-negative integer-valued function to link random bipartite graph so as to restrict the consistency condition of random variable \( r \) to achieve the random mathematical matrix of subset that can be expressed in random hypergraph model, and then to describe the expression form and constraining force of formation mechanism of Hamiltonian cycle and H-factor in the forming process. Also, the expression form of set in element edge can be satisfied at the same time so as to clarify that the method to describe a graph is to take the fixed point as a cycle. And additional edge condition can be added between corresponding vertexes and two cycles are connected by a line in order to protract the connection condition between cycles and the key value of H-factor, and to express whether the current vertex constrained condition is provided with the features of Hamiltonian cycle, as well as whether the invalid edges among these vertex pairs are being. The operation result obtained should designed as the necessary condition of subgraph in the undirected graph, and then to satisfy the production mechanism of Hamiltonian graph and H-factor in graph.

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