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Optimizing Sports Tourism Development Through Search Algorithms: Strategies for Market Integration and Economic Growth

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ABSTRACT

The paper examines the integration of sports and tourism as a driver of economic development and public health improvement in China. It outlines how the fusion of physical activity with leisure and travel meets evolving consumer demands and supports national strategic goals. The study proposes leveraging search algorithms particularly hash function based approaches to optimize sports tourism planning, market prediction, and digital platform integration. Methodologically, the research evaluates algorithm performance on datasets of varying sizes (50,000 to 200,000 records), demonstrating high reliability (up to 0.94) and improved computational efficiency, reducing processing time from 100 to 30 seconds for 3,000 complex data points. The analysis also evaluates tourist satisfaction factors such as comfort, ease of search, and acceptability across multiple teams. Drawing on recent literature, the paper affirms that data-driven strategies, supported by AI and big data, can significantly enhance destination management and market responsiveness. Despite promising results, the author acknowledges a gap in assessing the algorithm's adaptability across diverse contexts. Overall, the study presents a practical, technology enabled framework to advance sports tourism through intelligent search systems, contributing to both economic growth and sustainable tourism development.

Keywords: Sports Tourism, Search Algorithms, Hash Function, Market Integration, Economic Growth, Digital Platforms, Tourist Satisfaction, Data-Driven Optimization

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1. Introduction

John Toffler introduced the idea of the tourism economy, which first appeared during a period of social advancement. He posited that several pivotal technological revolutions in human progress encompass the Industrial Revolution, the Information Technology Revolution, and the Network Technology Revolution [1].

Nowadays, tourism has evolved into a more significant form of travel. With swift economic growth, China's tourism sector has also expanded rapidly. The demands of individuals in their everyday lives continue to rise. The primary conflicts in our nation have shifted to the tension between the increasing desire for an improved standard of living and uneven development [2]. The public's interest in mass sports further drives the growth and evolution of the sports industry [3].

At the national level, as the socialist market economy flourishes, the State Sports General Administration emphasizes that physical activity should be a primary focus in enhancing citizens' fitness. The National Tourism Administration has also established special tourism and leisure initiatives to ignite public enthusiasm for travel. Nevertheless, the innovative fusion of physical exercise with the tourism sector as a cohesive entity is a remarkable innovation of the new era [4]. Building on this foundation, China's sports tourism industry has been experiencing rapid growth and evolution, with a smooth exchange of various tourism information and concepts [5]. On one hand, promoting a stable transformation and advancement in China's economy is highly significant. On the other hand, the integration of sports and tourism will enhance overall public health.

2. State of the Art

The sports tourism sector can be seen as fulfilling the needs for physical activity and merging exercise, tourism, and leisure. Different forms of physical activity are employed to achieve objectives related to exercise, leisure, and entertainment, ensuring that travelers enjoy both physical and mental comfort [6]. Thus, the three types of civilizations spiritual, material, and political progress in harmony. Through diverse sports activities, we fully realize their functions and roles, enriching the cultural and spiritual life of the public and fostering the pursuit of fundamental values [7]. Its distinctive traits are embraced and acknowledged by the populace. It represents the ideal fusion of sports and tourism. With the rapid advancement of industrial technology, individuals have become accustomed to its conveniences, often at the expense of their health and physical well being [8].

Merging physical activity with leisure and entertainment offers substantial development opportunities and tangible economic benefits [9]. It also allows participants to engage in physical pursuits that satisfy their mental and physical desires. Furthermore, individuals can fulfill their spiritual needs, contributing to better health. Within communities, there is a growing emphasis on healthy physical activity, complementing the sports, tourism, and leisure industries [10]. This approach also caters to personal emotional needs. In our rapidly advancing society, everyone has unique aspirations. Each person addresses varying spiritual and material requirements through customized experiences. We set specific goals for different consumer segments, thereby significantly advancing the nation's sports, leisure, and entertainment industries.

Sports tourism development can be optimized through advanced algorithmic approaches that integrate market prediction, digital platforms, and strategic economic planning. The evidence spans multiple strategic dimensions: 김헌일 et al. (2020;) [11] developed a complex linear regression algorithm that incorporates macroeconomic and sports-market factors, demonstrating potential for precise market prediction. Zuofu Zhao et al., (2023) [12] validated an integration model with spatial spillover effects, achieving a model fit of $R^2 = 0.8884$, indicating strong predictive capabilities. Ying Zhu et al., (2024) [13] further reinforced the approach by showing how digital platforms can enhance sustainable development through personalized services and data-driven decision support. (M. Idrees et al., 2021) [14] empirically confirmed sports tourism's positive economic impact, suggesting strategic investments can drive growth.

A moderated model explains how different sport tourism segments influence economic development in destinations, supported by existing literature, to maximize economic impact through targeted marketing strategies (Roche S, 2013) [15] Sports development is seen as a solution for economic growth challenges in developing countries, with ten complementary strategy and recommendations for investment and governance being critical for success. The study uses a narrative overview approach. (Acquah-Sam, E. (2021) [16] Integration of cultural heritage with sports tourism is a promising strategy for sustainable destination management, offering socio-cultural and economic benefits, such as community empowerment and tourism revenue growth, as supported by a systematic review of 63 peer-reviewed articles. [17] (Yoki Afriandy Rangkuti, 2025).

Sports tourism offers opportunities for local development by broadening outdoor activities and integrating local resources, potentially enhancing economic growth through market integration [18] (Elena Radicchi. 2013).

Search optimization strategies such as keyword usage, product descriptions, image optimization, and customer reviews can improve product rankings ; integrating data analytics and machine learning can enhance effectiveness. The study employs a descriptive qualitative method, incorporating literature reviews and secondary data analysis. [19] (Zafira Naja Sakina)

While promising, these approaches require continued validation through big data and artificial intelligence systems to fully realize their potential for comprehensive sports tourism development.

3. Methodology

3.1 Search Algorithm Research

The search algorithm is a technological approach used in computing and on the Internet to enumerate all potential solutions to a given problem, which are subsequently refined by software applications. This approach requires substantial computational resources and thus necessitates a powerful computer for effective operation. Numerous primary methods exist, including the enumeration search algorithm, the hash function search algorithm, the depth first search algorithm, the breadth first search algorithm, the A* search algorithm, and the backtracking search algorithm, among others. This article mainly focuses on the hash function search algorithm, which operates on a linear number of tables. In tree calculations, all recorded positions are generated at random using various keywords. There are multiple relationships at play; therefore, when selecting a structure for locating these records, it is essential to capture the unique keywords and phrases that highlight these differences. By retrieving the necessary data and its corresponding record on the first attempt, we can greatly enhance search efficiency and ease.

Given this context, we must design a new relationship f : a comparative application. We convert the data between each correspondence and map them to the prior input and output locations. The hash function search process proceeds as follows: The primary expression formula is outlined.

$$Addr = H(key) \qquad (1)$$

The hash function determines the hash table elements. The data element's key K is used as an argument. We compute the value using a specific function (a hash function). This element is the storage address. The problem before designing and building this formula is how to set up a hash function that fits our needs and to get the resulting values of $H(key)$ evenly distributed across our hash table to improve our operation and search speed to solve our problems and difficulties. However, the hash table also has some numerical representations of conflicts. For example, we identify the keywords and key sentences that indicate a conflict.

$$K_1 \neq K_2 \quad H(K_1) = H(K_2) \qquad (2)$$

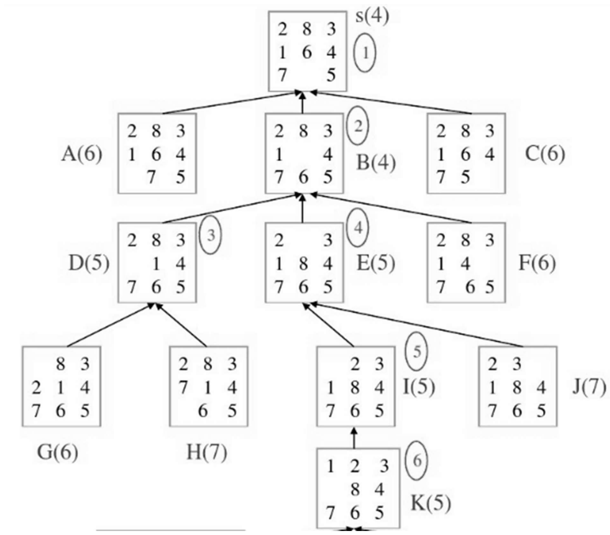

Figure 1. The Computational Theory Diagram of the Search Algorithm

For instance, in an open numerical calculation method, if identical numerical values are logged within the same hash table tree group, the remainder-based selection is not implemented. By utilizing a different sequence to examine the combination of methods, such as the following search method sequence, we can significantly minimize the search space and time, making it a straightforward solution for those in need. This enables us to pinpoint the information search results we require accurately.

$$h(k) = p(i) + (-1)^n \qquad (3)$$

Each of these data has a different meaning. $h(k)$ is the primary search function, he is the main component of the hash function and $p(i)$ is the search function. The added value is the number of searches. If a conflict arises during the search, a second search is conducted based on the feedback. The search stops until all the search targets are completed. The method of secondary exploration primarily involves identifying the exploration hash target based on changes in the random number table. For example, the other number of explorations to determine the results of the second exploration is valid, and the search algorithm can achieve the desired goal. The secondary exploration method of calculation and calculation formula is:

$$p(i) = (-1)^2 (i-1)^* (i+1)/2 \qquad (4)$$

With a sufficient play area, if all necessary addresses are already occupied, additional addresses can be opened to enable search algorithms to identify the challenges we must tackle. At various points in the diagram, while we each address the linear exploration method, the conflict issue must also be resolved individually. This does not imply that all search methods are flawless. Each search method has its own strengths and weaknesses. Our goal is to select an optimal search method to address the many challenges of our real-world operations. We then evaluated the program's advantages and disadvantages across all levels and summarized them in tabular format in Table 1.

Tourist factors(%)	Intuitive performance	Degree of comfort	Easy search	Acceptability	Achievements
Team(1)	32.7	76.3	54.1	78.2	66.5
Team(2)	38.2	79.6	55.0	70.5	70.7
Team(3)	31.2	85.2	59.4	68.2	73.2
Team(4)	10.3	82.1	66.5	69.2	63.1

Table 1. The optimized Algorithm Compares the Test Results

These algorithms utilize heuristic functions but adopt different strategies for choosing the optimal search node. For example, the local optimal search method selects the "best node" during the search process after eliminating other sibling and parent nodes, continuing the search thereafter. The outcome of this search is clear. As other nodes are discarded, the best node might also be overlooked, as the best node at this stage is the only one available, which can effectively prevent the loss of the "best node."

3.2 Based on the Search Algorithm of Sports Tourism Status Quo and Development Strategies

All search algorithms can be categorized into two main parts: the control structure and the production system, when viewed from the standpoint of the end algorithm. As previously mentioned, the search algorithm essentially exhaustively lists all possible scenarios to identify the correct solution. The core challenge lies in enumerating all potential situations. This constitutes a production system. When tackling the problems we need to address, we can apply various methods to classify them for consideration. In the final phase of the work, this can be done seamlessly. We are likely to have more options available. We outline these options in different contexts. Analyzing these possible outcomes across various scenarios is a simple method. Alternatively, we can start from the ground up, identify the lowest control node, and propose alternative control strategies as the search progresses. Considering the previously mentioned scenarios, we can identify multiple developmental solutions. All alternative solutions are included in the list. We extract the necessary content from these collections, which often helps us resolve search issues more efficiently. At the root calculation stage, we cannot address the problem of returning to the previous node to continue operations, which is a form of reverse reasoning. In this framework, the search algorithm can more effectively assist us in addressing real-world challenges and achieving our desired objectives.

The results of each parameter are weighted, and the three-dimensional structures in all directions are arranged. Var represents the average value, xi yi represents the horizontal and vertical tourist base, k p represents the horizontal and vertical tourists, gj βj represents. Its integration coefficient, j 0 j represents the number of all levels, and represents the horizontal base. We will combine them with the portfolio structure and weighted integration, and then take the average. The calculation results are as follows:

$$Var(x_i) = \sum_{j-1}^{k} g_j^2 + \sum_{i-1}^{p} \beta_i^2 \qquad (5)$$

$$Var(yi) = \sum_{j-1}^{k} gj^2 + \sum_{i-1}^{p} \beta j^2 \qquad (6)$$

During the initial regarding the aforementioned content, one can explore the search algorithm. Through the practical application, we gain a deeper understanding that enables us to proceed to the next phase of work, thereby facilitating the smoother completion of our objectives. By implementing a tourism demand plan based on an analysis model of influencing factors, it is feasible to develop a tourism demand strategy tailored to the travel agency's system, thereby enhancing the overall travel experience for tourists. The design foundation of the influencing factor analysis model is grounded in computer technology and can be adapted to meet tourists' travel and psychological needs. From a mathematical standpoint, for each factor under review, our goal is to ensure the scientific validity of the overall findings. The complete model program is presented below:

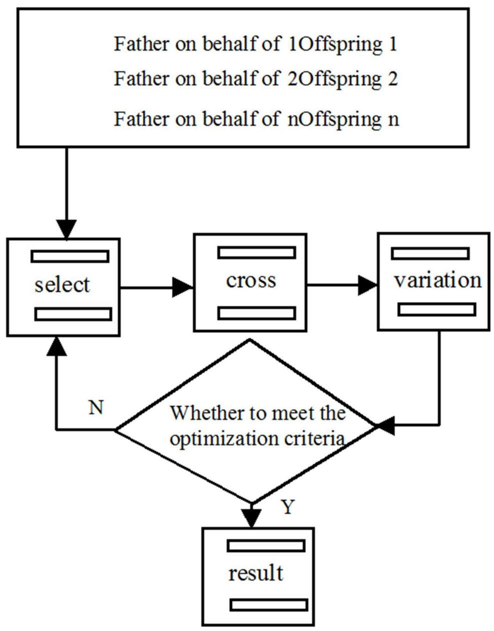

Figure 2. Reliability analysis of tourism online evaluation

4. Result Analysis and Discussion

Once the algorithm research is concluded, the subsequent algorithm test randomly selects the initial data node from the database as the test sample. It has been evaluated, and the algorithm's performance has proven to be more favorable. Simultaneously, in the weighted distance algorithm, we compare the current iteration with the previous one. To guide the search based on the current status and the evolution of sports tourism research, we will provide a set of initial data to aid in the initialization of the algorithmic model and address this issue. Naturally, all factors are considered. Hence, we employ standard decision tree methodologies. Through our enhancements, we align it more closely with the search algorithm and incorporate it into the algorithm. Based on the test outcomes, we are pleased. After decentralizing the search algorithm, it will not hinder the functionality of each aspect of the search algorithm model. We set the number of data sets to observe the final gap between the data and the real situation to determine the level of credibility. We used 50000, 100000, 150000, and 200000 tasks for data processing. We then assess credibility based on the processing results and the actual situation, and verify the evaluation system's feasibility using the search algorithm.

project	50000	100000	150000	200000
Data mining algorithm result ratio	47655	86231	113422	144871
Real situation	50000	100000	150000	200000
reliability	0.94	0.86	0.75	0.72

Table 2. Model evaluation model test result table

In the table above, it is evident that the data model we created demonstrates high accuracy. There is minimal discrepancy between the computed data node value and the actual value, indicating that this algorithm experiences slight and stable fluctuations. This error value was anticipated by designers from the outset. Certain subjective aspects in the credibility assessment are beyond our influence and are deemed acceptable. The side effect tests evaluate whether our algorithm model can perform calculations swiftly.

The testing procedure for the algorithm is outlined as follows: Firstly, we adjust the parameters of the algorithm. We identify the relatively optimal data set within the maximum cycle count and closest to the central cluster as the termination criteria, then consider these data sets as optimal data nodes. The data derived from these nodes and the runtime comparison highlight the strengths of this model. We conduct a series of tests to examine the algorithm's convergence. Convergence is crucial for search algorithms. If the convergence occurs too rapidly, the algorithm may fail to yield the final optimal result. Conversely, if it converges too slowly, it could result in lengthy computation times. Instead of relying on the rapid processing of previous technologies, passing the test enables us to refine the algorithm steps. In assessing the overall performance of the algorithm during the test, we compile statistics based on scores. The data involved in the testing spans from 1000 to 6000 cycles, with the results displayed below:

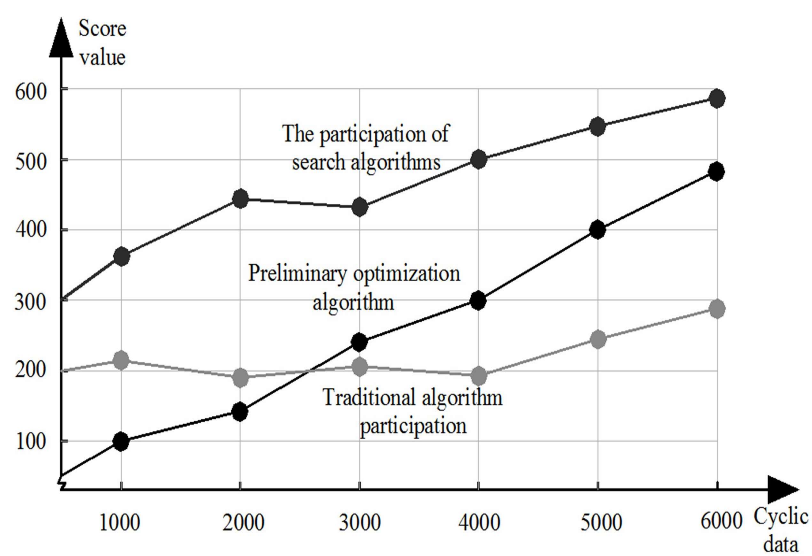

Figure 3. Comparison diagram of true value and calculated value

In observing this experiment, we can discern the overall satisfaction of tourists' travel needs and the feedback from the questionnaires completed by the participating tourists. We will ensure that tourist demand satisfaction is at the core of the results. In further validating the accuracy of the parameter pose, we utilize the three line translation theory to calculate the optimal value, which is essential for the final computation of tourist travel requirements. The resulting computational efficiency outcomes are illustrated below.

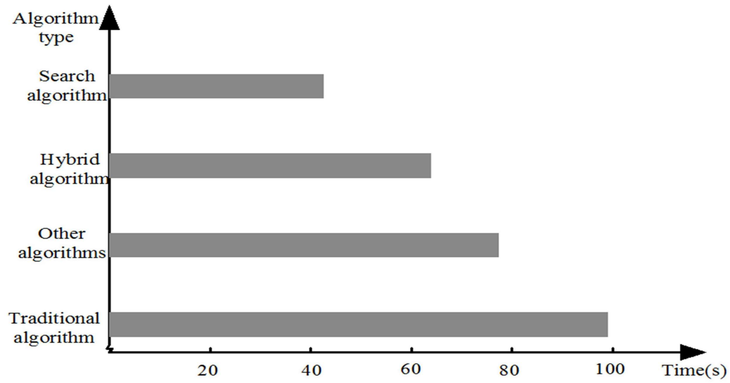

Figure 4. Efficiency comparison Test of search algorithm

As depicted in the figure above, after selecting 3000 complex data points, the computation time of our optimized calculation has decreased from 100 seconds to 30 seconds. The enhanced search algorithm exhibits a shorter initial calculation time compared to the traditional algorithm and also significantly reduces speed. The computed slope in the figure above is shown.

5. Conclusion

As living standards continue to rise, new avenues for sports tourism can be consistently explored; however, there is currently a lack of research models to inform corresponding strategies. Consequently, this paper introduces a search algorithm tailored to the current state of our sports tourism and its development strategies. In this study, we first conducted a thorough theoretical exploration of the search algorithm. When applying the search algorithm, we were able to offer a diverse range of options for tourists. To implement a travel demand plan based on the influencing factor analysis model of the search algorithm, we designed a travel demand strategy suitable for the travel agency's system, enhancing the overall tourism experience for travelers. During the evaluation of the search algorithm, we initially assessed its reliability using datasets of 50,000, 100,000, 150,000, and 200,000. This allowed us to determine reliability by comparing multiple datasets with the actual situation. We conducted a process evaluation and developed our algorithm model, which proved to be highly accurate. In the efficiency assessment, after selecting 3,000 complex data points, we found that the computation time of our optimized algorithm decreased from 100 seconds to 30 seconds. The initial computation time of the optimized search algorithm was significantly less than that of traditional algorithms, demonstrating the advantages of our method. Overall, the testing indicates that our research is practical, though this study lacks an evaluation of the algorithm's adaptability.

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