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Synthesize a Conceptual Framework for Athlete's Selection with Data Fabric Sports Statistical Technique

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Abstract: The purpose of this research is to present an overview of the conceptual framework of sports statistical data fabric techniques as an approach for using information technology systems for analyzing sports statistical data to develop athletes' potential. This literature review shows that the development of advanced statistical methods for match prediction and selection of athletes by using sports statistical data to analyze the correlation and correlation of the data creates an information system with sports statistics data fabric techniques provide excellent cognitive results. The information obtained is accurate and accurate. From the results of the study, it was born as a new body of knowledge with in-depth conceptual frameworks in sports and scope of information as a basis for development sports with specific characteristics of physical fitness. The knowledge gained from the conceptual framework, this research can create new norms and knowledge in sports toward the development of athletes to their highest potential.

Introduction

Sport is a health-promoting activity that builds strength for people of all genders and ages. It can also make income and fame for professional and amateur athletes. The goal in a competition is to win, which is the highest

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priority in the sport. Because the winner will receive reputation and rewards. Each country's participation in sporting events is seen from competition in a global sport such as World Cup, Olympics. The Summer Olympics begin for the first time in 1896 (Zhenyu Gao, 2020). This competition is a platform for every country to show their sporting potential and talent. This causes competition that has trends and approach for development of athletes towards excellence.

Now, the benefits of objective analysis of data to find answers or solutions are becoming popular because of the accuracy and precision of the results. Sports organizations and institutions that operate with a focus on resource management as well as human capital development. Therefore, actualize studies and research by analyzing information about athletes and sports competitions such as sports statistics, competitions, physical fitness, sports skills training, sports psychology, etc. (Chou; et al., 2021). Combination aesthetic studies and sports is rhythmic body movements provide mental enrichment and physical fitness are consistent. It is the harmonious development of body and mind, the highest embodiment of sports aesthetic education and sports science information, mainly focusing on erection the potential of athletes. The elements that influence the peak performance of athletes such as skill and technique, physical fitness, mental performance, a person's physical strength. It determines his athletic abilities. Statistical analysis was used to specify the effects of time and condition on neuromuscular assessment parameters, anthropometric data, and physical performance. It is a performance measure that has a strong correlation between the amount of technical and tactical training and the anthropological performance variables. The body's function amount and skill training techniques and tactics showed an extreme correlation with aerobic fitness tests (Da Silva et al., 2022).

According to research studies on sports data analysis, recent research was conducted to predict the outcome of football matches basketball player prediction (Chou; et al., 2021) and player ranking in e-sport and other sports research (Umemura; et al., 2021). In addition to the findings in these studies, the results are excellent. The findings from this study also serve as further development approach for data analysis and a knowledge leading to the development of the research conceptual framework in this research. The resulting in a new knowledge and approach to develop athletes to their highest potential. The resulting in a new knowledge and approach to develop athletes to their highest potential. This conceptual framework can be applied to the development of other similar sports. Because in the research, there are groups of sports that have the same or similar characteristics such as competition, time, equipment, and environment into categories clearly.

Research Objectives

The research objectives are:

   - To analyses component of sports statistics, physical fitness, sports technical skills, data fabric and decision support system.

   - To synthesize a conceptual framework for athlete's selection with Data Fabric Sports Statistical technique.

Related Work

Sport statistics

According to the relating literature, the analysis of sports data consists of physical fitness data such as sports skills, mental skills or mind, sports statistics information, which applied to develop information technology systems related to data analysis and data management. There is a semantic data structure that is related by separate the data relationships or merge data relationships together. Characteristic of the data can be either structured, semi-structure and unstructured. In data correlation analysis is will continue to organize information that is continuity and complex data to be able to extrapolate the data. Therefore, data can be deployed in any environment (Portanova, 2021a). Based on several research studies related to the development of advanced statistical methods for football match predictions or use it to create a strategy from a score-driven model can get accurate forecasts (Mattera, 2021). The key factors in influencing athletes were age and gender, which were related to the competitive level of each sport (Götze; & Hoppe, 2021). Matching analysis, it can be performance emphasized using statistical and mathematical criteria. It is not only during the competition used at high speed that determines. Though, at each interval is the acceleration and slowdown values will also cross above the high intensity threshold (R.; et al., 2021). Therefore, sports statistics are performance parameters and influence the performance of athletes. Preparation of good techniques and tactics, this creates effective competitive behavior and leads to success.

Physical fitness and Sports technical skills

Generally, physical fitness refers to the effects of motor skills that are fundamental to sports training, regardless of sport type (Ambroży et al., 2022). Physical fitness are data on body proportion and physical fitness that are related. Relationship between anthropometric measurements physical fitness and performance indicators from physical training. This is a variable of anthropological efficiency. Performance assessments such as strength, endurance and power muscle, performance of movements, joints, etc. Test activities include Vertical Jump, CMJ Standing Long Jump, Short Run, Long Run, Running Anaerobic Sprint Test. Fatigue Index can also be measured by calculation of best running and worst running (Sattaburuth & Wannapiroon, 2021). Sports technical skills in relationship to physical fitness performance are essential to movement for effective sports performance. Especially sports that are technically, tactically, structurally complex, intricately movement, and requires a sufficient level of motor skills to provide a basis for activities during competition (Ambroży et al., 2022). The development of an athlete's motor skills varies depending on the sport. There are elements of technical skills such as tactics, structure of movement. Levels of sports skills classified in each sport include assessment fitness, flexibility, dribble, balance, etc. These unique technical abilities need to be properly trained in order to maximize their performance in each sport. Therefore, technical skills in sports are important skills and have a unique influence on the success of each sport. Improving an athlete's performance is both physical and technical (Gidu et al., 2022).

Data Fabric

Managing data and databases with Data Fabric technology is a rationalism concept of a technological approach that includes the process of separation data into segments. To support the process of datafication in the computer system (Portanova, 2021b). The goal of Edges of Internet Computing is to offload the computational load of IoT data streams to Cloud Computing for computation. Data storage, reasoning and intelligence Based on the Computing Fabric's complex, high-performance computing architecture, big data streams provide fast connectivity for storage (Xhafa, 2020). Big data platform with organized cloud computing nature. In which the data lake architecture is a storage area. Imported data is organized to avoid large volumes of data overflow, which is structured data semi-structure and unstructured a fast-growing that comes from a variety of sources. A data lake architecture is data storage that is consistent and available. It has access for end-to-end analytical applications, therefore making the most benefit (Munshi & Alhindi, 2021). A data lake is therefore a logical view of all data sources and raw datasets accessible to a data scientist or statistician. All types of data are merged Logical and physical. It can resize the storage and processing of data (Sawadogo; & Darmont, 2021). Data lakes are therefore an important part of data management. Adopting a data fabric that resembles an enterprise data structure, where data often resides in different legacy systems and has different sources. A focus on data source integration through semantic data structures, the data fabric supports the creation of valuable insights and a consolidated views of data through integration, requiring knowledgeable technical expertise and specific model only (Ghiran & Buchmann, 2019).

Decision Support System: DSS

Use of Decision Support System (DSS) as a decision-making tool to eliminate potential bias. There are several techniques for decision support systems that help make decisions depending on the suitability of each situation (Planas et al., 2022). The model used is based on decision analysis and multi-attribute utility theory, such as Multi-criteria Decision Analysis methods: MCDA or Multi-Attribute Utility Theory: MAUT, mainly based on criteria and indicators to assess the impact of variables on decision making. In addition, decision support systems can help with highly complex decisions (Labella et al., 2020). Multi-criteria decision analysis (MCDA) is a method that considers decision elements with many alternatives to find the best possible solution. Each criterion must be measurable either quantitatively or qualitatively to what extent each option will achieve objective outcomes. The significance of the criteria and alternatives is in the form of a score or as a weight value (Urbaniak et al., 2020). Although the so-called multi-criteria decision-making method Characteristic Objects METhod (COMET) is a method for specifying a decision model to solve a multi-criteria decision based on a set of basic expert rules. This is not the same as the multi-criteria decision analysis (MCDA) method. But the COMET method does not have a problem with ranking lists and this technique uses associations with decision makers. The COMET method does not use any significant weights. Rather, the proposed approach makes it possible to estimate significant weights. The Analytic Hierarchy Process method (AHP) is also used as a possibility to analyze time-extended decisions. For explain which aspects influence the final, result to Spearman correlation coefficient was used to measure the correlation of input data and output data. It can be concluded

that there are three main concepts and methods for multi-criteria decision analysis: Method 1. Simple Additive Weighting (SAW) use the principle based on the weighting average. Method 2. Analysis Hierarchy Process (AHP) pairwise the decision components one by one and sort the alternatives. Method 3. Ideal Point Technique this method focuses on the determination of positive and negative ideals. The best option is to get as close to the positive ideal and as far away from the negative ideal as possible.

Research Methodology

The technique of systematic literature search and review by analytical method Meta-analysis by synthesizing and analyzing information from documents, textbooks and research articles from international research databases including Scopus, SpringerLink, Science Direct, Web of Science, Wiley, IEEE. According to the method of content analysis of documents according to the steps of PRISMA analysis as shown in Figure 1. Show the process of searching and selecting research articles by following the steps below. Step 1: Define the scope of the synthesis. Step 2: Conduct research and collect research papers according to the screening criteria by using Boolean operation (AND OR, NOT, ADJ) according to the advance search principle. Step 3: Perform qualification screening by studying, analyzing, discriminating, screening, and categorizing, i.e., crude extraction from abstract content (Abstract screen), selection and evaluation from research content (Full-text) and analyze all contents by Content Analysis method.
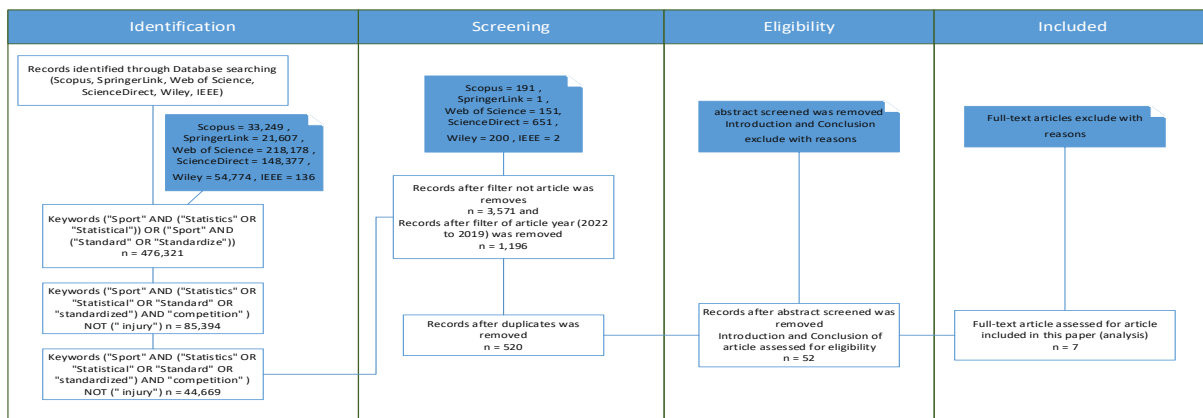
Figure 1. Procedure for research articles selection to synthesize the characteristics of sports statistics

From figure 1 shows the process of selecting research articles for data synthesis and analysis. In searching for documents and research articles, different search terms are used according to the purpose of the synthesis as follows: 1) Synthesis of attributes of sports statistics, using the keywords namely sport, statistical, standard, standardize, competition without the keyword injury. 2) Synthesis of elements of physical fitness and athletic technical skill, using the keyword namely sport, physical fitness, technical skills without the keyword injury. 3) Synthesis data fabric processes using the keywords namely data fabric, data lake, database, architecture. 4) Synthesis the processes of decision support systems using the keywords namely decision support system, multi-criteria decision making. Search for documents and research articles according to steps 1 to 4 for research article selection. Then the synthesis results

will be as shown in Tables 1, 2, 3 and 4 according to the objectives of the synthesis.

Research Results

1. The synthesis result of sports statistics characteristic

From Table 1, it can be concluded that there are 2 main characteristics of sports statistics, namely the individual statistics group and group statistics from the game the details are as follows: The first group, Athlete or Player statistics, consists of anthropological characteristics and physical components such as age, sex, experience, height, weight, limb length, stretching and flexion, body mass index, fat mass, movement, strength, etc. Sports skill level, player ranking, scoring performance, performance, success ratio, training, strength, power, endurance, distance, average speed, acceleration and deceleration, volume, intensity, accuracy, distribution of work during the match, defense, attack, pass ball, lose ball, sport-specific techniques or skills, tactic, penalties, or fouls, offside, etc. The second group, statistics from the game, consisting of competition results such as the best record (win, loss, draw, ranking, award, score, scoring ratio, etc.), difficulty or easy level of the game, the level of competition of sports in divisions (leagues, world levels. Asia, European level, etc.), ranking of teams, scoring goals (gaining and losing points, etc.), match statistics (defense and attack strategies, etc.), attack and defense ratio.

Table 1. The synthesis results of sports statistics characteristic.

Synthesis of Sports Statistics	AYDEMIR; ET AL., 2021	GÖTZE; & HOPPE, 2021	R.; ET AL., 2021	GARDASEVIC; ET AL., 2021	SALABUN; ET AL., 2020	ILJUKOV; ET AL., 2020	KESHTIDAR; ET AL., 2020	NAVARRO; ET AL., 2020	MARTINEZ-SANZ; ET AL., 2020	MOHAMMED; ET AL., 2020	FOXID; & BRUCE, 2020
Athlete or Player (Anthropological features, Physical composition, Skills level, ranking, Scoring, Match and Practice Statistics, Player's Position)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Competitions or Matches (Results (Stats. Record, win, lose, Scoring ratio), Level of game (difficulty or ease), Match Statistics, Attack and Defense Ratio)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

2. The synthesis result of the components of physical performance and athletic technical skills.

From Table 2, it can be concluded that physical fitness and sports technical skills It consists of three main groups: anthropological attributes, Sport-specific skills or technical skills and skill practice activities. The anthropological characteristics were gender, age, height, weight, experience, expertise, the aptitude for using body parts is a motor skill in humans, body fat mass, BMI, body proportions, muscular strength, power, flexibility, recovery, mobility, accuracy, agility, multi-directional movement, body endurance Including metabolism and oxygen consumption of the body, characteristics of the aerobic and anaerobic systems. Sport-specific skill groups or technical skills, including dribbling skills, hitting ball, strength, attacking, defending, agility, speed, balance, movement, motor skills, sport-specific techniques, strategy, experience, control. Finally, training activities group include jumping, endurance, muscle strength, fitness test, dynamic stretching, plyometric, handgrip exercises, joint movements (kicks, punches, body moves), core grip, balance training, change of direction, zigzag running, practice, agility test.

Table 2. The synthesis results of the components of physical performance and sports technical skills.

Synthesis of Physical Fitness and Sports technical skills	Pradas; et al., 2021	Cynarski; et al., 2021	Hammami; et al., 2021	Picabea; et al., 2021	Saiz De Villarreal et al., 2021	J. Li, 2021	Martínez-Rodríguez; et al., 2021	Arcos; & Gonzalez-Arenus, 2021	Prieske; et al., 2020	Huertas; et al., 2019	Botonis; et al., 2019
1. Anthropological features	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2. Sports Specific Skills or Technical skills	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3. Activity or Practice or Training	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

3.The synthesis of the data fabric process.

From Table 3, it can be concluded that the main components of data fabric are six groups: The first group, the user and administrator. The second group, devices used mainly are personal computers and mobile computers as well as host computers in conjunction with storage devices. The third group, software and systems or platforms such as cloud solution, tools, UI, DBMS, Machine Learning, DSS and OS etc. The fourth group, communication, network connection and services such as IoT, Internet, Cloud, XaaS (Anything as a Service), social media, etc. The fifth group data and databases such as metadata, raw data, data marts, data pond, data set, catalog data (i.e., smart grid data, SQL, Semi-structured, NoSQL) Database such as MySQL, PostgreSQL, Oracle, HDFS, MapR., CloudMdsQL, MongoDB, JSO, OLAP, Cloud Data Lake etc. Finally, the sixth group, performance and work overview the performance aspects are data volume, data transfer rate, data diversity, data reliability, data cleansing, security, data access, data processing. The overall performance aspects are data access, data ingestion, data discovery, data management, data orchestration, data processing.

Table 3 The synthesis results of data fabric process.

Synthesis of Data fabric	SANGSOO & DARBOOT 2021	BELOV ET AL., 2021	MUNSH & ALHINDI, 2021	MIRUGAN ET AL., 2021	DELIGIANNIS ET AL., 2020	THOROGOOD, 2020	YANG ET AL., 2020	RAMAKRISHNAN, ET AL., 2019	SCOTT, 2019
1. Personal (user, admin, administrator)	✓	✓	✓	✓	✓	✓	✓	✓	✓
2. Equipment (Computers, mobile server, data storage, proactive storage)	✓	✓	✓	✓	✓	✓	✓	✓	✓
3. Software and System/Platform	✓	✓	✓	✓	✓	✓	✓	✓	✓
4. Communication/Networks and Services (IoT, Internet, cloud, XaaS, social media)	✓	✓	✓	✓	✓	✓	✓	✓	✓
5. Data and Database	✓	✓	✓	✓	✓	✓	✓	✓	✓
6. Performance (volume, transfer rate, reliability, cleansing, security, access, processing)	✓	✓	✓	✓	✓	✓	✓	✓	✓

4.Process synthesis of decision support systems.

From Table 4, it can be concluded that the decision-making process has four main parts: 1) Preparation such as source of knowledge, collection, feature requirements and quality concerns, domain and solutions, deep information preparing, analyze alternative and requirements and decision criteria decision data set. 2) Criteria Creation such as decision model, generation of alternatives, identifying requirements and creating decision-making criteria, create metrics for evaluating decision-making criteria. 3) Decision-Making such as steps to use, Option comparison, ranking, classification. 4) Decision Support System such as reporting, evaluation,

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investigation, model improvements, Improving decision criteria, alternative improvements. A review of the synthesis literature based on Table 1 to Table 4 from the synthesis of sports statistics. Synthesize physical fitness and technical skills in sports, synthesize of data fabric, synthesize decision support systems were analyzed as shown in Table 5. It was found that the conceptual framework for athlete selection by data fabric techniques for sports statistics was shown in Figure 2.

Table 4 The synthesis results of decision support systems process.

Synthesis of Decision Support System	Farshidi et al.	Kazerooni et	Abdelkader et	Rahman et al.	Dzemydiené	Ziemba. 2021	Laballa et al
1. Preparation (source of knowledge, collection, feature, domain)	✓	✓	✓	✓	✓	✓	✓
2. Criteria Creation (decision model, generation of alternatives, identifying)	✓	✓	✓	✓	✓	✓	✓
3. Decision-Making (steps to use, Option comparison, ranking, classification)	✓	✓	✓	✓	✓	✓	✓
4. Decision Support System (reporting, evaluation, investigation, model improvements, Improving decision criteria, alternative improvements)	✓	✓	✓	✓	✓	✓	✓

Table 5 Synthesis of Conceptual Framework for Athletes Selection with Data Fabric Sports Statistical Technique

Conceptual Framework	Independent variable	Process / Method	Dependent variable
Sports Statistics	Anthropological features, Physical composition, Sport Skills level, Player's ranking or Player's level, Results (Stats. Record, win, lose, Scoring ratio)		Score/ ranking of athletes and Selected athletes
Physical Fitness and Sports technical skills	Anthropological features and Sports Specific Skills or Technical skills	Activity or Practice or Training	
Data fabric		Personal, Equipment, Software and System/Platform, Communication / Networks and Services, Data and Database, Performance and Overview working	
Decision Support System		1. Preparation, 2. Criteria Creation ((decision model), 3. Decision-Making, 4. Decision Support System	

Figure 2 shows the conceptual framework of athlete selection by data fabric techniques for sports statistics, the primary variables or input factors were sports statistics, physical fitness, sports technical skills, principles of data fabric and principles of decision support systems. The methodology of the athlete selection system was used by data fabric techniques of sports statistics data by using athlete model analysis according to sports statistics to work together in the system. The dependent variables or results were shown athletes who were selected and athletes ranked according to their performance in each sport.
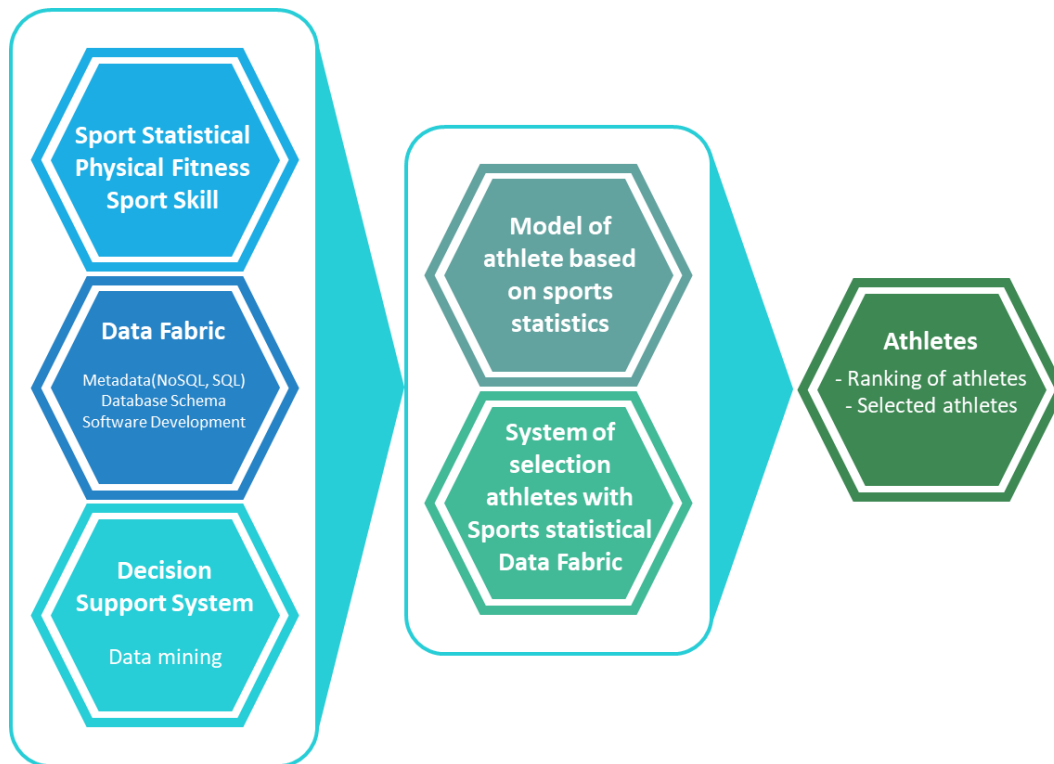

Figure 2. Propose Conceptual Framework for Athletes Selection with Data Fabric Sports Statistical

Discussion

In this study, the results of the synthesis of the conceptual framework for athlete selection by data fabric techniques of sports statistics revealed that the important input factors affecting the model of athletes with high potential in each sport were sports statistics, physical fitness, sports technical skills. The sports statistics are information about physical fitness and technical skills in sports. It has the same elements and looks and varies according to the type of sport. Because each sport has a different playing style and duration. Makes it emphasize the use of physical skills and various organs and varies depending on the sport. For example, speed skills are used in group sports such as water sports, athletics, flexibility skills are used in the sport of beautiful arts, muscle strength skills are used in martial arts, and agility skills are used in net or racket sports and all skills are used in team sports or on the field, etc. These data are important factors that can be used to analyze and create a model of athletes according to sports statistics and to develop an athlete selection system by data fabric techniques of sports statistics. Prepare athlete ranking reports to select athletes with the highest potential in each sport.

Conclusions

The conceptual framework of athlete selection by data fabric techniques of sports statistics is a approach for developing athletes to achieve their highest potential. Due to the process of synthesis and analysis of information from documents, textbooks, and research articles from the research database with the technique of systematic literature search and review by analytical method meta-analysis and content analysis according to PRISMA analysis and the content about the attributes of sports statistics. The components of physical fitness data fabric process and process of decision support system. Analyze the relationship between physical fitness data and sports statistics to find indicators that influence the development of athletes' potential. The concept of data fabric sports statistics can be used as a guideline for development athletes of all types to reach their full potential. The discovery of the conceptual framework in the research is very useful for developing athletes to achieve the goal of competition, such as winning, getting promoted to a higher ranking, a world record, or a competition, etc. Therefore, the conceptual framework of data fabric sports statistics in this research will be a framework or path for developing athletes of all types in the future. In addition, the researcher will use this conceptual framework to further develop and study the research results.

Acknowledgements

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