

## Research Article

### The Design of the Athlete Nutrition Analysis and Catering System Based on B/S Architecture

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**Abstract:** The use of computer and network technology for accurate nutritional analysis for athletes and the rationale for the development of scientific co-meal plan is very important for grassroots athletes. This study combines sports training, sports nutrition theory and mathematical modeling ideas and discusses the nutritional analysis for athletes and catering system based on B/S architecture from requirement analysis, design, detailed design and other respects in detail. Implementation of the system will provide a stable, scientific and accurate nutritional analysis monitoring and reasonable diet structure platform for the athletes.

**Keywords:** Athlete nutrition analysis, catering system, comprehensive integration, hybrid intelligent system

## INTRODUCTION

A scientific nutritional configuration, maintaining a balanced diet and proper proportions supplied with essential nutrients needed between various nutrients, is the important material foundation to ensure the health of athletes, enhance physical fitness and promote recovery after training and competition. Achieving a reasonable allocation of food to meet the nutritional needs of athletes is the most critical issue. Therefore, nutritional and dietary currently at a high level for athlete teams has been done well, there are researchers dealing with the team and sports medicine specialist or dietician will be at their service. But at the grassroots level sports teams, due to financial constraints and conditions, the nutritional dietary for the athletes is difficult to get service support from experts. In this study, we are to build an intelligent athlete nutrition catering system that provides a reasonable diet plan for athletes of every need of services with the help of computer and network technology, so that the nutritional intake and training need to be more matches to achieve the best training effect.

## MATERIALS AND METHODS

**JSP technology:** JSP (Java Server Page) is a Java servlet-based and developed with dynamic page generation technology, is a new generation of web development technologies daemon. Its bottom layer is the implementation of JavaServlet. After the client JSP page is requested, the server will process the Java code, then the generated HTML page goes back to the client browser (Alur *et al.*, 2011). It is characterized by: an

object-oriented, cross-platform and Servlet as stable, you can use the API Servlet provided by Servlet to overcome shortcomings.

**SQLServer2000 database:** SQLServer2000 is latest large-scale database management systems offered by Microsoft, it is built on a mature and strong relationships based on the model, is able to be a good support for client/server network model, to meet the various types of enterprises and institutions to build a network database needs and established a world-leading position in the ease of use, scalability, reliability, data warehousing and so on. SQLserve2000 with its powerful features and superior performance, is being applied more and more standardized (Davis and Fisher, 2005).

**B/S architecture:** B/S structure is currently a more advanced collaborative application development model. In essence, it is also a C/S architecture, an application on the Web developed from the traditional two-story to C/S three-tier architecture. The architecture is advanced in technology and more mature. Using B/S architecture, the client is a "thin client", the client program is only a browser. Application developers do not need to be maintained. Just to maintain and upgrade the system in the middle layer, in line with the user for system maintenance requirements (Erie and Jennifer, 2005). The business logic is encapsulated in the business logic layer, presentation layer is responsible only for the display of data processing operations. Business logic and display phase separation, that is, data processing and display phase separation, it is easy to develop and maintain the system. When the user application works,

the use of business logic will change frequently, such data result is obtained by the calculation formula, the formula may change, so that this logic is encapsulated in the calculation of the intermediate layer, to make the logic it will not affect the corresponding change to the client. Therefore, system maintenance is very good (Jun, 2014). Meanwhile, developers only need to focus on the middle layer of business logic encapsulation; for applet program and JSP design shown by good user interface design staff development, it is easy to develop a division of labor, can accelerate the development of the system.

## RESULTS AND DISCUSSION

**The analysis of demand:** According to sports training and competition needs of the athletes, the main functional requirements of the system are as follows.

**Be able to analyze dietary athletes:** A comprehensive nutritional assessment for athletes of different projects, analysis of the nutritional status of athletes. Dietary nutrition monitoring tools can be monitored for a period of self-monitoring, analysis of which nutrition bias, if there is insufficient intake of certain nutrients or excessive intake of three substances for energy intake is balanced and to whom provide comprehensive nutritional analysis and nutritional recommendations.

**Ability to automatically nutritious meals:** Food intake calculated uses the intelligent way, without their own set entirely generated by the system, automatically calculating the intake based on those standards catering can also be supplemented by a small amount of manual fine-tuning.

**Can be hand-catering:** For example, according to the special individual circumstances injury recovery, weight control, nursed back to health and other diseases, nutritionists and coaches can be targeted for special catering manually.

**Be able to achieve a clear improvement in the reporting system include:** Comprehensive evaluation of nutrition, lack of harm and the uptake of nutrients and more guidance, recommended recipes, production methods and so on.

**Enable network operation:** Athletes can achieve their nutrition and diet tracking via the Internet as well as to the timely nutritional analysis and meal arrangements.

**To establish information database athlete:** Athletes established libraries can provide many useful analytical data for the trainers.

**System architecture design:** According to the developer's request, athlete nutrition and catering

systems to be run in the form of the site on the Internet, so the use of the web design structure is the more popular B/S structure. Front desk writes JSP pages posted on the web, using background JAVA code and interaction as well as interactive and user databases. SQLserver2000 is used as database backstage database.

**System module and functional design:** The athlete nutrition catering system on the one hand is ready to achieve in the online nutritional analysis for athletes and nutritious meals, on the other hand it should be used in the dietary management of athletes and practical training, so the function of the first is the separation of the user, the system users types are divided into: nutritionists, athletes, the system administrator. According to different functions can be user specific and detailed as follows: nutritionist system modules, athlete system module and System Administrator module.

**Nutritionist system modules:** Mainly used in the dietary management of athletes. The user is a nutritionist, the system mainly manage the nutritionist's daily work and the basic system information. Nutritionists enter their user name and password then can go directly to the main information among dietitians. One of the features are as follows.

**Access to information:** Input basic information is part of the daily work of a nutritionist, dietitian are the rights as increases, delete, modify and others here on the basis of information features that make dietitian can then continue up some basic information on the whole system has been the basis of information among defective parts, to make information more accurate and effective. And it also brings some dietitians management flexibility.

**Athletes information includes:** Gender, age, height, weight, engagements in sports and other basic nutritional needs and diet information and other information.

Basic information are as follows.

**Types of food:** The food is divided into different categories, you can easily and quickly search classified information.

**Food information:** Record nutritional content of food.

**Dishes species:** The dishes are divided into different categories, you can easily and quickly search classified information.

**Dishes information:** Record nutrients and practices dishes.

**Food equivalent exchange of information:** Record nutritional equivalent exchange relations between things.

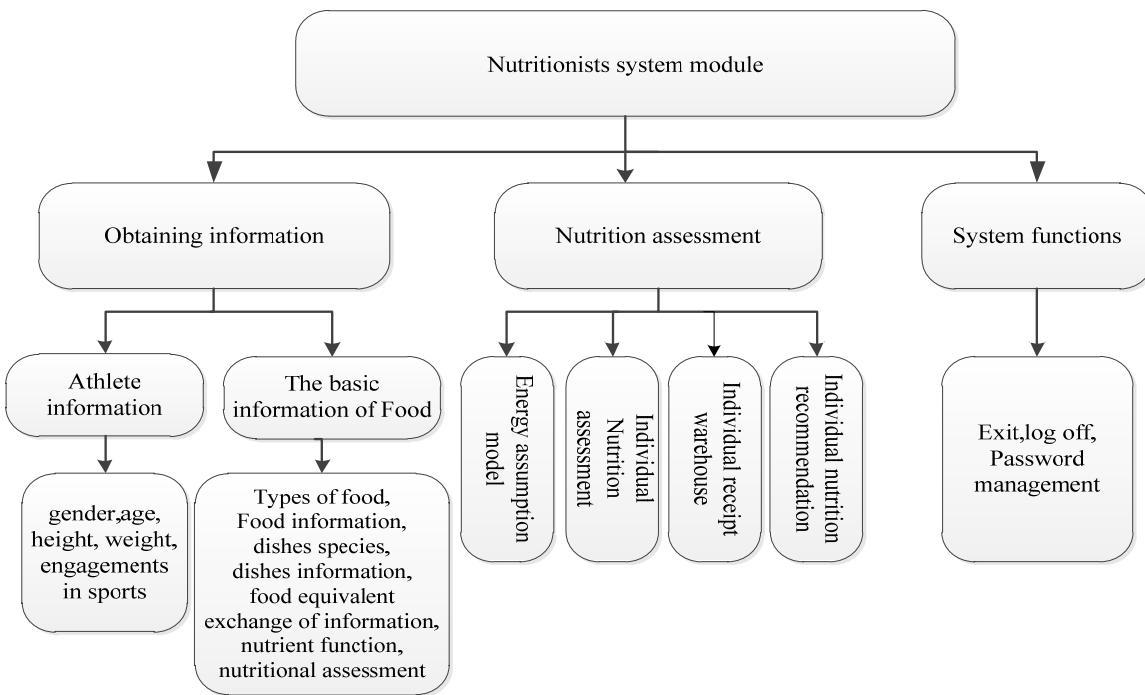


Fig. 1: Nutritionist system model

**Nutrient function:** Recording function for each nutrient.

**Nutritional assessment:** The use of information access to users to classify and the use of mathematical modeling for user customized personalized energy consumption model for the athletes to do with arranging meals and nutritional analysis. At the same time create a personalized food bank food varieties for athletes based on the information provided by the database. In addition, dietitians through humane system platform for recipes manually fine-tune the system based on fine-tuning every time, using the learning algorithm automatically adjusts the energy consumption and improve the previous model, personalized food bank and personalized assessment model, making programs more catering scientific and reasonable and in line with the needs of athletes.

The main exit the system, log off and change the user's password.

According to the above design there can be a Fig. 1 presenting nutritionist functional block.

**Athlete system module:** The system provides the user with a separate module athletes, athletes can get the password after landing sites designated to enter athletes nutrition analysis system. Enter your account can enter the athletes functional modules.

In athletes module athletes can see their basic information in the system and can see their track record. Players can continue to fill in the current dietary, nutritional intake and the entry tracking information.

Nutritional analysis can be made immediately after the results of the tracking information to make Meal Plan based on the results.

Its main features are as follows.

**Nutritional assessment:** The system can now give players nutritional status, for example, an athlete in training camp before whether it is reasonable nutrition, nutritional intake during training is scientific and gives the nutritional status of athletes for comprehensive evaluation.

**Meal entry:** Athletes record three meals daily dietary variety, quantity intake, dietary records being entered into and can give the results of nutrition analysis.

**Automatic and manual to accompany the meal to accompany the meal:** Result The system through nutritional analysis can be done automatically for athletes Nutrition Catering, athletes can also manually catering according to your taste. This will better enable the athletes have a choice.

According to the above design there can be a Figure showing a functional configuration diagram athlete system module (Fig. 2).

**System administrator module:** System Administrator module is mainly for entry and maintenance of some of the basic information, nutritionists, athletes user maintenance and so on. Users of this module for system managers and senior management. Its main features are as follows.

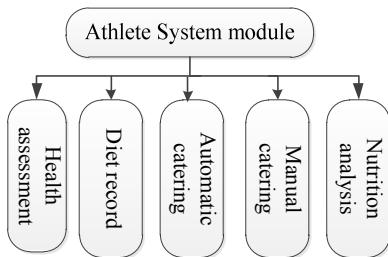


Fig. 2: Athlete system model

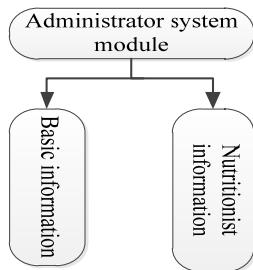


Fig. 3: Administrator system model

**Basic information:** It has the same basic information features as the nutritionists'.

**Dietitian information:** For dietitians user to add, delete, modify and other maintenance operations. Sports teams talent flow is normal, so nutritionist in order to maintain security while replacing the system information, want to leave the nutritionist delete users do work. This allows the system to leave the nutritionist unable to modify and access information through their accounts, to protect the interests of the normal sports teams.

According to the design above, the function of administrator system management can be given in Fig. 3.

**Database design:** Nutritional assessment and supporting systems need to maintain a large number of recipes and information data user profile information and other data and therefore there must be a strong background in database. Database design, including logical and physical database design, database design, logical database design task is to create a stable structure of the database so that the demand for the right and the main objective of physical database design is efficient processing of data. In the system, with the support of SQLServer database technology, the database logical and physical structures were designed, which can meet the needs of analysis requirements, enabling users to enjoy fast, accurate data processing and tracking, but also improve the catering system operating efficiency.

Catering module database entries for each function are described as follows:

- Material data table records ingredients, including produce category, name, content of various nutrients
- Treetype table to record the ingredients and recipes classified information
- Menu table data recording recipes, including recipes category, name, material information, user-defined signs
- Menu-dtl dish table records the specifics of each track, including raw materials of each dish, the weight of the user-defined signs
- MemberPeople dining staff record user-defined information, including gender, training intensity and age
- MemberDislike record user-defined meal catering staff at the time did not like the food should be excluded from the program information
- Normbz table record date standard amount of intake of nutrients
- Maxbz table records the maximum daily intake of nutrients amount

#### Algorithm design:

**Algorithm:** Nutritional assessment and support systems catering algorithms.

**Enter:** Week/Day Catering logo flag, dine number n, sex and physical exertion, etc. Table MemberPeople, dish meal number k, the weight of each dish w (n), a user-specified destination table exclude food, whether high glucose mark staple food choices.

**Output:** Catering output needs to be user Week/Day recipes. Includes breakfast, lunch, dinner and vice meal. Dinner includes a staple food and dishes, including Vice meal with fruit and other dairy products.

#### Algorithm:

- According to the number n, gender and physical exertion, such as table and calculate the maximum demand and the demand for the sum of the inputs.
- The above results deduct the staple food, non-staple food contains nutrients, get a standard amount of food intake sum Need [i] and the maximum amount of the sum NeedMax [i] \* i is the serial number of the nutrient requirements.
- Analysis Need relationship [i] / n and NeedMax [i] / n with the nutritional food dishes library averages Avg [i] between. The nutrition provided the average coefficient for k [i], the following relationship is derived:  

$$\text{Need [i]} / \text{n} \leq \text{k [i]} * \text{Avg [i]} \leq \text{NeedMax [i]} / \text{n}$$
Further push:  

$$\text{Need [i]} / (\text{Avg [i]} * \text{n}) \leq \text{k [i]} \leq \text{NeedMax [i]} / (\text{Avg [i]} * \text{n})$$

The meaning of the formula is the ratio between the average value and the intake of nutrients between the standards.

- Set the appropriate time to make  $k P[i] = \text{Need}[i] / (\text{Avg}[i] * n)$ , then select each dish in the catering process [i], that is, the sum of the requirements to make the intake of food nutrition the range and upper bound that is not necessary to consider the maximum intake.
- Analysis  $k[i]$  Relationship between  $P[i]$  of:  
 $P[i] = 1$ , then take a nutritional item i of the average value for all of the food dishes can meet the standards.  
 $P[i] \neq 1$ , then take a item i of nutrition for the average of all the dishes  $P[i]$  times the food can meet the standards.  
 $P[i] > 1$ , described in item i should get rich in nutrition dishes.  
 $P[i] < 1$ , instructions should be taken with a small amount of food item i nutrition.
- Obtained  $P[i]$  after its descending sort. Catering for the selected logical considering  $P[3k]$  in all dishes in [i] value of the maximum number of persons, the smallest number, the average of the remaining selection. The sum to meet the demand.
- Order  $k[i] = P[i] \pm t$  increases dishes range of options. Wherein  $t$  is a certain parameter, such as 0.3. Such as when the user selects a high sugar, the sugar items increased by 0.3 k.
- To prevent food through the large discrete sample data, select dishes  $\gamma$  times should be less than a certain nutritional requirements and to remove the exclusion of user-specified destination dish. Wherein  $\gamma$  for certain parameters, such as 0.8.

- According to the above results and the weight of each dish  $w(n)$  is calculated elect a 3k dishes. If the user selects a weekly catering, then repeat this step 6 times.
- Pair high nutritional food with low nutritional food, fill staple food, non-staple food randomly into them to complete catering process.

## CONCLUSION

In this study, Using the more popular and sophisticated Browser/Server (B/S) structure, nutritious meals for athletes intelligent system has been designed according to the needs of different users into the three modules of system function nutritionist, athletes functions and system administrator functions and each module in detail. Finally, the design and algorithm design system database for further system implementation provides support.

## REFERENCES

- Alur, D., J. Crupi and D. Malks, 2011. Core J2EE Patterns: Best Practices and Design Strategies. Pearson Education Inc., New Jersey, pp: 2362-2368.
- Davis, S.M. and J. Fisher, 2005. Store and display SQL Server images using the stream and response objects. *Active Server Developer J.*, 9(1): 1-5.
- Erie, A. and B. Jennifer, 2005. The J2EETM 1.4 Tutorial. China Railway Press, Beijing, China.
- Jun, D., 2014. Consulting company office automation system based on J2EE design and implementation. Jilin University, Jilin, China.