

## Research Article

### Analysis on Transport of Food Logistics Based on Web and GIS Technology

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**Abstract:** The transport of food logistics has higher requirements on the design and selection, path customer's geographical information positioning, etc. The application of network and GIS technology in the field of logistics transportation of food will enhance the efficiency of delivering food logistics, which can lower the cost of the transportation logistic of food at the same time. This study is based on Web and GIS, taking them as the key point, through the analysis of the effect of network and GIS technology on food logistics transportation system, discussing the application of network as well as the application of GIS technology in food logistics system.

**Keywords:** Food logistics, network and GIS, transportation

## INTRODUCTION

Considering the factors of geographic spatial data, among all aspects of food transportation logistics and distribution, it will greatly improve the transportation of food logistics and distribution process, the rationality of decision-making, which will reduce the cost of logistics (Hong-Minh *et al.*, 2000). As the professional tool to deal with geographic spatial data, namely Geographic Information System, shorted for (GIS), it has powerful analysis function on geographic spatial data, with the help of Web and GIS technology, it can solve a series of complex special problems, so as to make reasonable decisions.

## MATERIALS AND METHODS

**The interpretation of web and GIS technology:** Web and GIS technology is the product of applying Internet technology in geographic information system. GIS can be extended by means of WWW function, so as to become a truly tool for public use, from any point of WWW, the Internet users can browse the GIS site as well as the spatial data, so as to make the thematic maps and have space retrieval and spatial analysis (Hale and Moberg, 2005).

**The structure model of web and GIS technology:** At present, the typical structure of Web and GIS technology can be divided into three layers, namely, client terminal, server terminal and database. As for the server terminal, it can be subdivided into WWW server, GIS application server, etc., which can be shown in Fig. 1.

As for the products of specific Web and GIS technology, their structure will be a little different, but

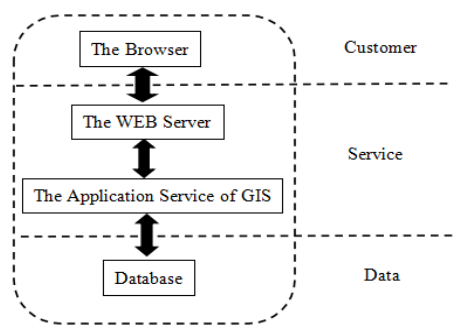


Fig. 1: The typical structure of web and GIS technology

in fact, their structure still can be divided into three layers, which can be shown in Fig. 1.

**To ensure the integrity of the traceability of food supply chain:** As an important part of physical transport system of the traceability of food supply chain, the system can achieve centralized procurement, unified distribution, unified management over food and other goods, which can also be used for the re - processing of food, so as to ensure food quality and health standards and fully play the role of modern circulation patterns in the implementation of traceability in order to better ensure the safety of food (List, 1998).

**Reducing the cost of logistics and transportation of food enterprises:** The amount of food logistics transportation is great, which also exists some problems such as the loss of transportation is great; it is very easy to have corrosion; during the long time of transporting, it easily leads to a variety of food poisoning problems; enterprises do not achieve standardization for the transportation which is without

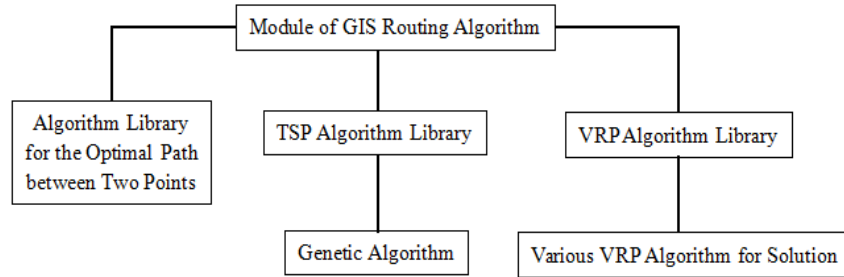


Fig. 2: Structure diagram of scheduling path

good quality cost controlling plan (Fu and Qingyun, 2005). However, through the use of food logistics system, it can monitor the goods as well as the operation of enterprise's vehicles in real time. It can adjust the usage of vehicles combined with the optimal path to schedule the route of vehicles. In this way, it can realize high-quality, standardized control over the cost of logistics enterprises, so as to improve the quality of food (ARTEM, 2000).

**Practical application ability of optimal path algorithm:** WEB and GIS technology as well as the related food transport vehicles can achieve real-time monitoring of food goods and transport vehicles with the function of scheduling optimal path, combined with more comprehensive practical environment, which can implement the application model function with scheduling dynamic optimal path.

**Selecting the location of distribution center of food logistics:** WEB and GIS is usually used to identify the location of one or more distribution centers. In the logistics system, distribution center, logistics center, customers and transport routes can consist of logistics network. Since the distribution center, logistics center, as well as customer is in the network node and the node can determine the route of network. The reasonable number of distribution centers, logistics centers and customers can be set up in a limited range, which can meet the actual needs of customers, so as improve the economic benefits with minimum logistics cost; at the same time, it can determine the location of distribution center, size as well as the relationship between logistics. These problems can be easily resolved with the help of WEB and GIS.

**Path planning:** With the distribution pattern of one to many and many to many, WEB and GIS can make path planning reasonable. For example, in the processing of dealing with one starting point, with multiple terminals foods transportation, it can solve the problem of how to reduce logistics cost and guarantee the quality of service issues, including the decision of using the number of vehicles, as well as the route of each vehicle. The use of GPS and electronic map can display the actual position of the vehicle or freight with navigation

service, which can query the vehicle and goods, so as to make reasonable scheduling and management.

Vehicle routing and scheduling problem is so called VRP problem. The multi-vehicle path planning can be divided into vehicle path scheduling plan with time window constraints and vehicle path scheduling plan without time window constraints. With time window constraints can take the limitation of delivering goods into account, which can help managers to make a reliable decision. Based on the above analysis, the establishment of the path scheduling module structure diagram can be shown in Fig. 2.

In the realization of genetic algorithm, we carried on the concrete realization in the algorithm library with the process of abstract function algorithm. For example, the process functions:

```

public void Create Next Generation ()// it is used to
generate the next generation. Taking the key
function as the principal such as:
public delegate void Fitness (GA Chromosome
m_gachromosome)// commission of fitness function,
GA can represent a species or a path
public delegate void Mutate (GA Chromosome
m_gachromosome)// commission of variation
function
public delegate void Cross Over (GA Chromosome
Dad, GA Chromosome mum, ref GA Chromosome
child 1, ref GACHromosome child 2)// commission
of cross function
Public delegate void Initializer (GA Chromosome
m_chromosome)// commission of initial path function
Application developers can provide more effective
function for specific application, which also can
use the function defined by framework. In the
genetic algorithm library, it also defines some of
the common functions, such as:
private int Roulette Selection ()// Roulette
Selection Method
private int Tournament selection ()// Tournament
Method and so on.
    
```

## RESULTS AND DISCUSSION

**Positioning customer's geographical information:** Using WEB and GIS can establish electronic map that management is required for a city or region, which can

accurately reflect the buildings, roads, streets and other information, according to the description of the geographic coordinate of the electronic map as well as the geographic coordinates, it can locate the location for new customers on the map or modify the old customer' location so that enterprises can timely and accurately determine the distribution center, logistics center as well as the location of customer.

**Simulation and decision of locating the layout of food logistics network and distribution center:** By using the information, such as long-term customers, vehicles, orders and geographic data and so on to set up model of logistics network. Simulating the layout of logistics network, according to the actual demand of distribution, planning the route of distribution center as well as the transportation line, it can make electronic map show the design of network nodes on the display, at the same time, it can show the location of the distribution center as well as the operation way of vehicles. The optimization of logistics node can be based on taking advantages of WEB and GIS, which can make resource consumption minimized. In an effort to establish the decision supporting system, thus it can provide more efficient and intuitive base for decision making.

#### CONCLUSION

With the rapid development of information technology and network technology, Web and GIS technology has become an important development

direction of GIS technology. Compared with the traditional GSI technology, it has the following advantages such as: wide range of accessing, independent platform, greatly reduced cost and maintenance, easily to upgrade and so on. With the development of Internet and communication technology, cross-platform, with the gradually mature component GIS and WEB technology, it can construct competitive and transparent logistics enterprises based on the application of WEB and GIS.

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