Scholar Publishing Group
Nature Environmental Protection
https://doi.org/10.38007/NEP.2022.030206
ISSN 2790-2684 Vol. 3, Issue 2: 50-57

Nature Conservation Environment Based on Forestry Ecology in the Context of Internet+

Xiaolong Zhang*

School of Physical Education, Northeast Forestry University, Harbin 150040, China

zhangxiaolong20112@163.com

**corresponding author*

Keywords: Internet + Background, Forestry Ecology, Protection Environment, Forest Area Inspection

Abstract: With the continuous crossover and integration of information technology and ecological station construction, forestry ecological stations have been improved in monitoring technology and instrumentation, laying a solid foundation for ecological benefit assessment, ecological early warning and ecological strategic decision analysis, which are of great importance for accelerating long-term positioning research and building green ecology. The purpose of this paper is to study the nature protection environment of forestry ecology based on Internet+. Based on some forestry ecological station data, the system is designed and implemented to help ecological station staff improve the efficiency of statistical analysis and visual display of monitoring data, historical data query and real-time understanding of changes in station conditions, etc. The forest area algorithm is proposed to achieve image compression and loading, and the experimental results show that the "Internet+ ecological station "management system can effectively realize the natural protection environment of forestry ecology.

1. Introduction

With the establishment and development of the national long-term ecosystem research network, the management and construction of ecosystem observatories have received increasing attention from forestry-related government departments and researchers [1, 2]. Not only the number of stations is increasing year by year, but most of the stations have established their own data management systems according to their data management and analysis needs. However, this single-station information management system and the lack of data confidentiality measures have prevented the timely sharing of index data among stations and gradually formed the phenomenon of "information silos". The development of the "Internet+Ecological Station" management system has freed up a large number of technical experts in the ecological field, who no longer need to spend a lot of time on managing and maintaining ecological index data and can devote more energy to research [3]. Not only that, the system also provides encryption and backup technical support for the confidential data of ecological stations to protect the scientific research tasks in the ecological field, and the processing and analysis of the log records in the background of the system for user behavior preference analysis and data pushing is in line with the current development trend of the Internet wave, which largely improves the user experience [4, 5].

Forestry ecological construction is the main body of ecological environment construction. In recent years, the concept of "green water and green mountains are like golden mountains" is deeply rooted in people's hearts. Francesco Saverio Tortoriello explained the current situation of environmental protection in China, analyzed the main problems and shortcomings in afforestation, proposed the role of afforestation construction, and made a strategic thinking about environmental protection and afforestation [6]. The relationship between forestry production and forestry ecological development exists as a mutual constraint and mutual promotion.Mohammed Amine Yagoub, through the relationship between forestry production and forestry ecological construction, has gradually elaborated how to better achieve sustainable development and promote forestry ecological construction on the path of scientific and social development, and has analyzed the sustainable development problems between the two accordingly[7]. Sake Madhu analyzed the necessity of building forestry ecosystems in Heilongjiang province in the new historical period and put forward some feasible and reasonable opinions on how to better build forestry ecosystems [8]. Therefore, it is important to propose a set of construction concepts and methods for the construction of forestry ecology in China in order to improve the quality of forestry ecology construction in China rapidly and as a whole [9].

From the perspective of Internet+, this study focuses on the ecological index data of forestry ecology to realize the "Internet+Ecological Station" system, which can help the ecological station to carry out statistical analysis of data, obtain index data in real time, and push messages for changes in the operation of the station, which is useful for This is of great importance for the information construction and management of "Internet+Ecological Station".

2. Research on the Nature Protection Environment of Forestry Ecology Based on the Background of Internet+

2.1. Definition of "Internet+"

The Internet is a vast international network, an inter-network of networks linked by TCP/IP protocols between various countries and regions. The main function is to enable the rapid transmission of information through physically connected networks, forming a fast channel for the dissemination of information between information demanders and information suppliers [10, 11]. "Internet+" is the combination of the Internet and traditional industries, which is not simply the addition of the two, but the use of information and communication technology as well as the Internet platform to deeply integrate the Internet and traditional industries to create a new development ecology [12, 13].

2.2. System Functional Requirements

(1) Identity verification

Since the system integrates data from several ecological stations, the system needs to divide the user's rights and read the data of the corresponding station according to the rights to prevent the leakage of data [14, 15]. In addition, the users of the "Internet+Ecological Station" are only for the staff of the ecological station and do not support the access and registration of visitors. If users accidentally forget their passwords, they can use their own email information to change their passwords.

(2) Site monitoring

The system should have good real-time, and should be able to listen to the "Internet + ecological station" data receiving platform that receives ecological station data in real time, so that the changes in the operation of the station can be fed back to the user through message pushing, and the operation of the station and the equipment status of the station can be displayed to the user.

(3) Data query

Data query through the interface to display the combination of site monitoring data, to achieve the daily changes, weekly changes, monthly changes and the latest data collected relative to today's convenient display, while supporting the form of a map to show the location of monitoring points and data information [16, 17].

(5) Statistical analysis

The data used for statistical analysis are mainly the mean values and other data calculated from the collected monitoring data, and the collected data need to be processed according to three time granularities: hourly, daily, and monthly. The graphical visualization component allows users to quickly discover the trends and potential values of the data [18]. According to the business requirements for current forest ecology stations, four statistical analysis functions are provided: multi-station comparison, single-station analysis, year-on-year comparison and annual statistics.

3. Investigation and Research of Nature Protection Environment Based on Forestry Ecology in the Context of Internet+

3.1. System Framework

The "Internet+Eco Station" management system is designed based on B/S architecture, and the system development is completed by choosing the front-end and back-end separated architecture. In traditional web project development, most of the front-end pages are designed using JSP. Each page will have a separate js file, and the interface will be re-rendered once in each service request, causing great pressure to the server side. In addition, the coupling of traditional development is too high, and the code is too strongly related to each other, which is not easy to maintain later and the variables are easy to cause global pollution. The front-end and back-end development architecture is a good solution to the problems of the traditional development model. The front-end pays more attention to the page style and user experience, while the back-end pays more attention to the performance and processing logic of the service.

3.2. Forest Area Algorithm

In the management of forest area, the calculation of forest area such as the area of returned forest is the focus of management. In this system, the positioning coordinates obtained by BDS/GPS are used to design and realize the calculation method of area of local area of forest area, and the corresponding function is realized in the patroller terminal.

The trajectory of forest inspection is actually an irregular polygon. For the irregular polygon area calculation processing, the most commonly used method is the triangle segmentation method. But this kind of algorithm has certain defects, mainly in that the polygon is a polygon with concave corners, where the concave corners that the polygon has an internal angle greater than 180 degrees. In this case, the area calculated by the triangle segmentation method will be larger than the actual area, and the error is larger, which does not meet the engineering requirements. For the above problems, vector product triangulation is used in this system.

ABCDEFG is an irregular polygon, and each fixed point is connected to O as a line, so that it constitutes seven triangles in the figure, and the area of the polygon becomes the sum of the vector areas of these seven triangles. The vector area is the area found by using the two-dimensional vector fork product. For the area of AA, it is shown in Equation 1:

$$S_{OAB} = \frac{1}{2} \times \left| \overrightarrow{OA} \times \overrightarrow{OB} \right| \tag{1}$$

The formula for the area of an irregular polygon:

$$S_{\Omega} = \frac{1}{2} \sum_{k=1}^{\infty} S_{\Delta OP_K P_{K+1}} = \frac{1}{2} \sum_{k=1}^{\infty} x_k y_{k+1} - x_{k+1} y_k \tag{2}$$

Using the above equation, the forest patrol area can be calculated by combining the coordinate set of the planar kilometer network.

4. Analysis and Research of Nature Protection Environment Based on Forestry Ecology in the Context of Internet+

4.1. Automatic Positioning

The most basic function of the "Internet+Ecological Station" management system is to record the location information of rangers at any time. This interface is realized by using GPS/BDS to obtain location coordinates and other information, combined with Baidu map SDK and positioning SDK.

As the main interface, the automatic positioning and punctuation interface needs to establish entrance links with other functional interfaces. As shown in Figure 1, this interface is the entrance interface of all interfaces, providing the entrance of inspection query, forest navigation, forest area mapping, inspection planning, data management and Beidou short messages through menu controls. At the same time, you can call the system camera and shoot images and then go to the text information recording interface.

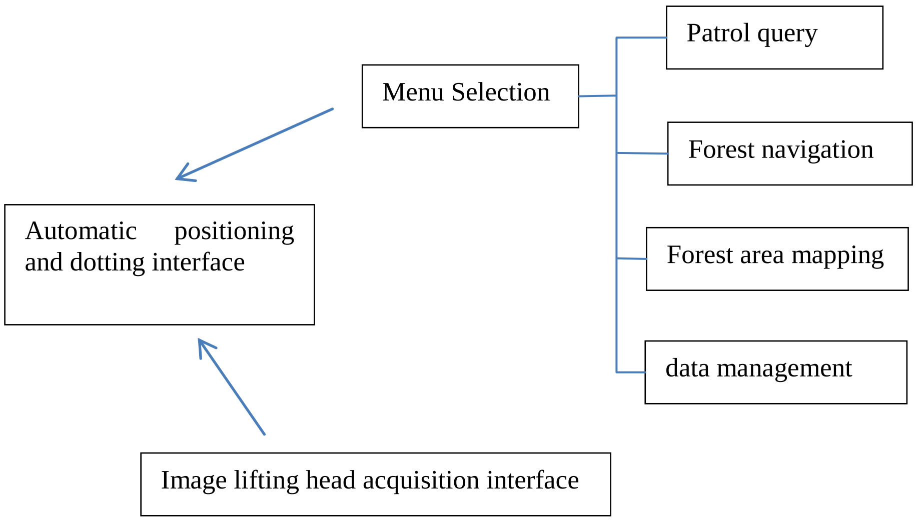

Figure 1. Composition of positioning interface

4.2. Image Compression and Loading

A large amount of on-site image information needs to be collected in the forest patrol process. The camera quality of the current intelligent terminal devices is high, and the size of the original image is generally above 3M, which easily affects the normal operation of the software for large size image resource files. In this system study, the direct loading display of pictures utilizes the Glide framework. Glide utilizes an excellent caching mechanism in its internal in loading pictures, and uses RGB_565 as the basic format of Bitmap to reduce the resource consumption, thus achieving a low memory consumption and ensuring the smoothness of picture loading and the stability of operation in the program. Glide also simplifies the operation of loading and displaying images, as shown in the following example:

Glide.with(context).load("image_resource").into(Img);

In addition to the introduction of the Glide framework to optimize the documentation process, the system also uses Luban to directly compress the images to optimize the network transmission of images. After the introduction of Luban compression algorithm, the compression effect of some images tested in the system is shown in Table 1 and Figure 2:

Table 1. Image compression results

Picture number	original size (M)	Compressed size (K)
1	3.55	95
2	3.78	100
3	4.79	108

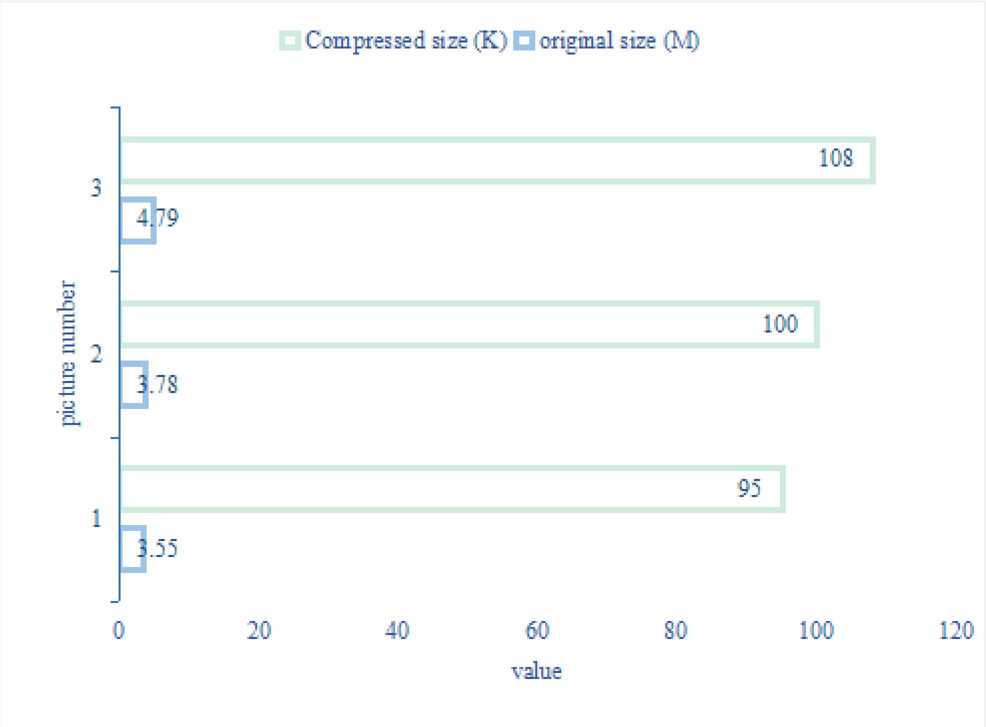

Figure 2. Size before and after image compression

4.3. System Logs

The information recorded in the logs of the "Internet+Eco Station" big data platform mainly includes user id, user name, user host IP, request URI, requested method type, request time, website source and request parameters. The system logs of the big data platform are stored in HBase. The system integrates HBase with Hive to facilitate offline analysis using HQL corresponding to the log information in HBase. Although the log information is large and complex, it contains a lot of valuable information. By analyzing the URIs and request parameters of the logs, the user's behavior preferences can be analyzed to some extent. For example, based on the request URI or the id information of the data indicators in the parameters, we can get the information of the indicators that users are more interested in. The backend of the management system sets a regular task to push the weekly changes of the data indicators of interest to the users by email at 12 noon every week. The format of the email in Excel is shown in Table 2 and Figure 3.

Table 2. Excel format of data push

M Negative ion concentration in forest area/piece.cm(-3)			
time	average value	Maximum	minimum value
January 1st	146	532	57
January 2nd	78	126	49
January 3rd	112	367	55
January 4th	158	462	64
January 5th	85	221	44

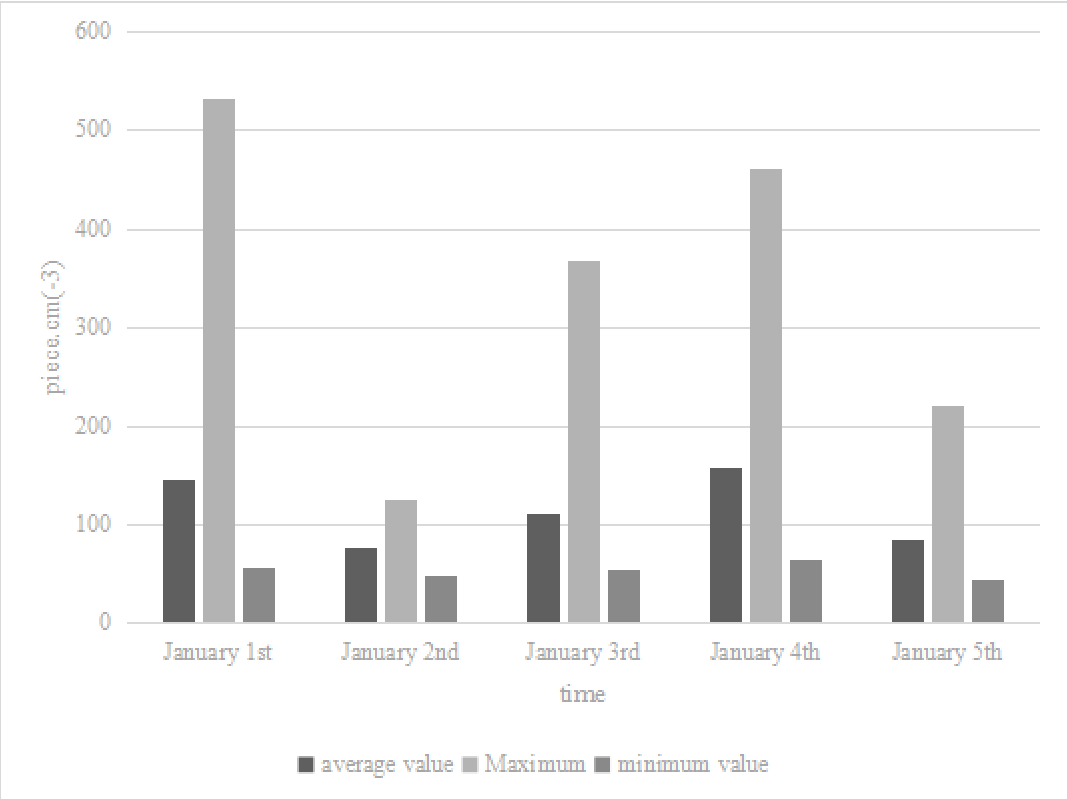

Figure 3. Logging

5. Conclusion

In recent years, with the growing national economy, the national investment in the construction of forestry ecological projects has increased year by year, which has strongly promoted the construction of forestry ecological projects. This paper analyzes and points out the current problems in forestry ecological construction, and puts forward corresponding countermeasures, discusses its new ideas and new views, some improvement measures and programs have certain feasibility and operability, and hopes to play a certain role in forestry ecological construction. However, because the topic of this paper is too large, the content is too wide and deep, my contact range is narrow, the basic theoretical level and textual level is limited, coupled with the research time and financial constraints, this study only covers the relevant aspects of the problem, the persuasive power of the data still needs to be improved, to form a theory and method that can guide the practice, there is a need to further do some positioning quantitative research, through the analysis of the coarse and refined Research, from practice to theory, and then from theory to practice process, in order to form a strictly localized version of forestry ecological project management specifications to guide the management of forestry ecological construction in a scientific manner.

Funding

This article is not supported by any foundation.

Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

References

[1] Guillermo Vega-Gorgojo, José M Giménez-García, Cristóbal Ordóñez, Felipe Bravo. Pioneering Easy-To-Use Forestry Data with Forest Explorer. Semantic Web. (2022) 13(2): 147-162. https://doi.org/10.3233/SW-210430

[2] Andreas Beckmann, Uthayasankar Sivarajah, Zahir Irani. Circular Economy Versus Planetary Limits: A Slovak Forestry Sector Case Study. J. Enterp. Inf. Manag. (2021) 34(6): 1673-1698. https://doi.org/10.1108/JEIM-03-2020-0110

[3] Antonio Alonso-Ayuso, Laureano F Escudero, Monique Guignard, Andrés Weintraub. Risk Management for Forestry Planning under Uncertainty in Demand and Prices. Eur. J. Oper. Res. (2018) 267(3): 1051-1074. https://doi.org/10.1016/j.ejor.2017.12.022

[4] Heikki Hyyti, Ville V Lehtola, Arto Visala. Forestry Crane Posture Estimation with A Two-Dimensional Laser Scanner. J. Field Robotics. (2018) 35(7): 1025-1049. https://doi.org/10.1002/rob.21793

[5] Kazuo Ishii, Eiji Hayashi, Norhisam Bin Misron, Blair Thornton. Editorial: Advanced Robotics in Agriculture, Forestry and Fisheries. J. Robotics Mechatronics. (2018) 30(2): 163-164. https://doi.org/10.20965/jrm.2018.p0163

[6] Francesco Saverio Tortoriello, Ilaria Veronesi. Internet of Things to Protect the Environment: A Technological Transdisciplinary Project to Develop Mathematics with Ethical Effects. Soft Comput. (2021) 25(13): 8159-8168. https://doi.org/10.1007/s00500-021-05737-x

[7] Mohammed Amine Yagoub, Okba Kazar, Mounir Beggas. A Multi-Agent System Approach Based on Cryptographic Algorithm for Securing Communications and Protecting Stored Data in the Cloud-Computing Environment. Int. J. Inf. Comput. Secur. (2019) 11(4/5): 413-430.

https://doi.org/10.1504/IJICS.2019.101931

[8] Sake Madhu, Ranjit Midde, Gandikota Ramu, Appawala Jayanthi, Jalari Somasekar, Gajula Ramesh, Pallela Reddy. A Secured Framework to Protect Association Rules in the Big Data Environment Using Fuzzy Logic. Ingénierie des Systèmes d Inf. (2019) 24(5): 531-537. https://doi.org/10.18280/isi.240511

[9] David J Arnold, Dayne Fernandez, Ruizhe Jia, Christian Parkinson, Deborah Tonne, Yotam Yaniv, Andrea L. Bertozzi, Stanley J Osher. Modeling Environmental Crime in Protected Areas Using the Level Set Method. SIAM J. Appl. Math. (2019) 79(3): 802-821. https://doi.org/10. 1137/18M1205339

[10] Marina Malamud Environmental Ethics in the Military: Between Warfare and Ecosystem Protection. Int. J. Technoethics. (2018) 9(2): 51-61. https://doi.org/10.4018/IJT.2018070105

[11] Steve Mansfield-Devine. The Intelligent Way to Protect Complex Environments. Netw. Secur. (2018) 2018(5): 13-17. https://doi.org/10.1016/S1353-4858(18)30045-X

[12] Amit P. Sheth, Hong Yung Yip, Saeedeh Shekarpour. Extending Patient-Chatbot Experience with Internet-of-Things and Background Knowledge: Case Studies with Healthcare Applications. IEEE Intell. Syst. (2019) 34(4): 24-30. https://doi.org/10.1109/MIS.2019.2905748

[13] Anique J Scheerder, Alexander J A M van Deursen, Jan A G M van Dijk. Negative Outcomes of Internet Use: A Qualitative Analysis in the Homes of Families with Different Educational Backgrounds. Inf. Soc. (2019) 35(5): 286-298. https://doi.org/10.1080/01972243.2019.1649774

[14] D Radha, M G Kavitha. Deep Learning Enabled Privacy Preserving Techniques for Intrusion Detection Systems in the Industrial Internet of Things. Ad Hoc Sens. Wirel. Networks. (2022) 52(3-4): 223-247.

[15] Neda Mehdizadeh, Nazbanoo Farzaneh. An Evidence Theory based Approach in Detecting Malicious Controller in the Multi-Controller Software-defined Internet of Things Network. Ad Hoc Sens. Wirel. Networks. (2022) 51(4): 235-260.

[16] Fulvio Corno, Luigi De Russis, Alberto Monge Roffarello. How do End-Users Program the Internet of Things? Behav. Inf. Technol. (2022) 41(9): 1865-1887. https://doi.org/10.1080/014492 9X.2022.2071169

[17] Jina Kim, Eunil Park. Understanding Social Resistance to Determine the Future of Internet of Things (IoT) services. Behav. Inf. Technol. (2022) 41(3): 547-557. https://doi.org/10.1080/ 0144929X.2020.1827033

[18] Alaa Omran Almagrabi, Rashid Ali, Daniyal M Alghazzawi, Abdullah Albarakati, Tahir Khurshaid. A Reinforcement Learning-Based Framework for Crowdsourcing in Massive Health Care Internet of Things. Big Data. (2022) 10(2): 161-170. https://doi.org/10.1089/big.2021.0058