

Research on Visual Nursing in the Context of Big Data

Wang Fengyun*, Gao Juan, Li Weihong

School of Nursing, Henan Technical Institute, Zhengzhou 450042, China

*Corresponding Author.

Abstract:

With the development of big data technology, data fusion and analysis technology are more and more applied to visual nursing. With the emergence of unstructured massive data, the importance of big data is not only reflected in the huge amount of data, but also how to analyze and visualize massive big data to obtain more intelligent, in-depth and valuable information. This paper systematically summarizes the main internal and external characteristics of the included literature, and intuitively presents its institutional cooperation, research hotspots and development trend, so as to comprehensively understand the relevant research status of wisdom education in nursing education in China. This paper discusses the advantages and disadvantages of the application of visual analysis in the field of nursing under the background of big data, in order to provide reference for the research of visual application in the field of nursing.

Keywords: *Big Data, Data Fusion, Nursing, Visual Analysis.*

I. INTRODUCTION

The nursing service system is the driving force for the sustainable development of the hospital, the direct embodiment of the medical quality of the hospital, and the important basis for establishing a benign doctor-patient relationship [1-2]. The Affiliated Hospital of Shandong Academy of Medical Sciences has established a hospital nursing system on the basis of fully recognizing the significance of nursing work, but there are still many disadvantages in the nursing work of the hospital [3]. It has seriously affected the quality of hospital nursing management, reflecting the lack of standardization of nursing behavior, difficult to trace nursing responsibility, lack of timeliness of nursing work and so on.

Applying visualization, information and other means to the hospital nursing system is one of the effective means to solve the above problems: on the basis of meeting the hospital evaluation standards, it can reduce the cost of hospital nursing work [4-5]. And improve medical efficiency and quality, reduce doctor-patient disputes and enhance the industry image of the organization on the basis of ensuring medical safety [6]. Through the application of information form, we can optimize the nursing workflow and reduce the work intensity while improving the work efficiency [7-8]. The application of information technology can improve the inpatient satisfaction, effectively improve the interconnection of information between doctors and patients, nurses and patients, improve the medical quality on the basis of improving the humanized components of nursing work, and help to build a harmonious and stable relationship between

doctors and patients [9]. The Affiliated Hospital of Shandong Academy of Medical Sciences is currently committed to the information construction of nursing system. Based on the current needs of the hospital, the development of hospital visual nursing system is carried out.

II. SYSTEM REQUIREMENTS ANALYSIS

2.1 Overview of system requirements

There are many problems in the nursing system of the hospital. Nurses lack effective means in the process of comparing infusion, liquid preparation and other information, and most of the records of nursing signs, nursing measures and other contents adopt traditional methods; It is difficult for nurses to quickly query the basic information of patients, medical orders, examination information and other important contents in their daily work. At the same time, they are unable to count the workload completed in a fixed stage through the basic settings. Head nurses, nursing department and other managers lack systematic means to manage nursing document information [10]. At the same time, there are problems of imperfect basic nursing management system. Therefore, the development of hospital visual nursing system is carried out.

The comparison management module of the system includes the relevant requirements of managing liquid preparation, infusion, specimen and doctor's order at the app end; The record management module includes the need to manage nursing signs, nursing documents and nursing measures at the app end; The query management module reflects the needs of the app side to manage patient information, doctor's order information, special patients and other contents; The basic setting module reflects the needs of APP side statistical performance, monitoring nursing links and application settings; The nursing document management module reflects the needs of Web-based management of nursing records, nursing education sheets and nurses' shift handover reports; The basic nursing management module reflects the needs of Web-based management of nursing documents, adverse events, nursing performance, head nurse work, scientific research and education.

2.2 System role analysis

The roles of the hospital visual nursing system include nurses, head nurses and nursing department. Nurses can handle comparison management, query management, record management and basic settings through app. And handle the nursing document management task of the web end, while the head nurse can handle the nursing document management, nursing basic management and other modules of the web end; The nursing department handles the web-based nursing management module.

2.3 System app end demand analysis

(1) Comparison management analysis

Comparison management is a functional module of the app side. After logging into the app side and entering the comparison management, the nurse user can handle the business related to liquid preparation and infusion: manage the sample information and handle the doctor's order management business on the basis of collecting samples.

(2) Record management analysis

The record management module at the app side reflects the nursing related needs of managing nursing signs, nursing documents and nursing measures, and can collect nursing signs and record nursing sign

information; Generating nursing documents and processing document information; In addition, management care measures.

(3) Query management analysis

The query business of app is reflected in the query of patient information, medical order information and diagnosis and treatment expenses. The above basic information is obtained through query and the details are viewed as an important basis for processing nursing business.

(4) Basic setup analysis

The basic setting part reflects the relevant needs of statistical nursing work, monitoring nursing links and obtaining push information. In addition, users can set according to their habits, such as sign keyboard, automatic data reference, writing and input, etc.

2.4 Requirement analysis of system Web

(1) Nursing document management analysis

The web-based nursing document management system involves nursing records, nursing education form, nursing evaluation form, nurse shift handover report and other types of documents. Users can fill in the above nursing documents according to the actual situation as the information basis for carrying out nursing work.

(2) Analysis of basic nursing management

Basic nursing management involves the basic management of hospital nursing. Users such as nursing department and head nurse can manage nursing documents and human resource information related to hospital nursing, control the amount of nursing and manage adverse events in the process of nursing.

On the basis of obtaining nursing management information, we can make statistical analysis of nursing and evaluate the performance of nurses; In daily nursing, we need to carry out necessary scientific research and education tasks, manage scientific research and education information, and form a complete head nurse work manual information; In addition, other nursing management businesses can be performed.

2.5 Non functional requirements

The business of hospital visual nursing system needs the combination of web and app, so it puts forward higher requirements for the non functionality of the system. In this section, it is proposed to analyze the non functional requirements of the system from the perspectives of adaptability and security.

(1) Adaptability. The mobile service component of the system is large, so it should be ensured that the system can adapt to the complex and changeable use environment; For example, in places with dense hospital personnel, the network communication environment is relatively poor, and the efficiency of business execution can be ensured by reducing the resource consumption in the process of business execution. Taking the performance statistics in the basic settings of app as an example, after the nurse user determines to count his workload within one week, the system should complete the response and return the statistical results within 3S.

(2) Security. Due to the irresistible factors such as slow network communication speed, mobile users will encounter poor or slow communication in the process of logging in to the app and accessing the page; In order to ensure the security of user access request, the system determines that the login is abnormal for users who are offline for many times in unit time. The number of offline times within 3min after the user logs in is ≥ 5 , and the system feeds back the abnormal prompt of account status. Here, the user needs to log out and log in again to access the system normally.

(3) Ease of use. Hospital nursing work has a large number of object-oriented and complex types, and presents the characteristics of strong tediousness and heavy task as a whole. Therefore, the system should be able to provide a personalized setting system; Nurses can flexibly set up work boxes and data entry methods according to their own operating habits, so as to lay a foundation for their daily work. In addition, users do basic processing of hospital nursing information through the web. Taking the query of nursing document information as an example, the system can return the query results of various nursing documents within 3S.

III. SYSTEM DESIGN

3.1 High-Level System Design

The overall architecture of hospital visual nursing system is reflected through app and web.

In the app end of the hospital visual nursing system, modules such as comparison management, record management, query management and basic setting are designed, and modules such as nursing document management and nursing basic management are designed in the web end.

In the comparison management part of the app end, the functions of liquid preparation management, infusion management, specimen management and doctor's order management are designed. In the liquid preparation management, the functions of liquid preparation task viewing and liquid preparation task processing are designed. In the infusion management, the functions of liquid preparation task viewing and liquid preparation task processing are designed; The functions of specimen query and specimen collection are designed in specimen management; In the part of medical order management, the functions of medical order execution and query are designed.

In the record management module, the functions of nursing sign management, nursing document management and nursing measure management are designed. In the nursing sign management, the functions of collecting and recording nursing signs are designed. In the nursing document management, the functions of generating, viewing and processing nursing documents are designed. In the nursing measure management, the functions of querying and viewing nursing measures are designed.

In the query management module, the functions of patient information management, diagnosis and treatment cost management, medical order information management, inspection management and special patient management are designed. In the patient information management module, the functions of patient information query and viewing are designed. In the special patient management, the functions of viewing patients with fever and patients in the whole hospital are designed.

In the basic setting module, the functions of performance statistics, information push, nursing link monitoring and application setting are designed. In the basic setting, the functions of rapid input setting and automatic reminder setting are designed. In the nursing link monitoring, the functions of nursing link selection and link monitoring are designed.

3.2 Detailed design of the system APP side

In the detailed design stage of the comparison management function, the comparison data and comparison commands in the interface are transmitted to the form class of comparison management. The comparison management form class needs to call the business class of comparison management. The business class can perform the logical processing of comparison business management. After the logical

processing, the data of comparison management is displayed, and the data is encapsulated in the entity class of comparison management. The comparison management class diagram is shown in Figure 1.

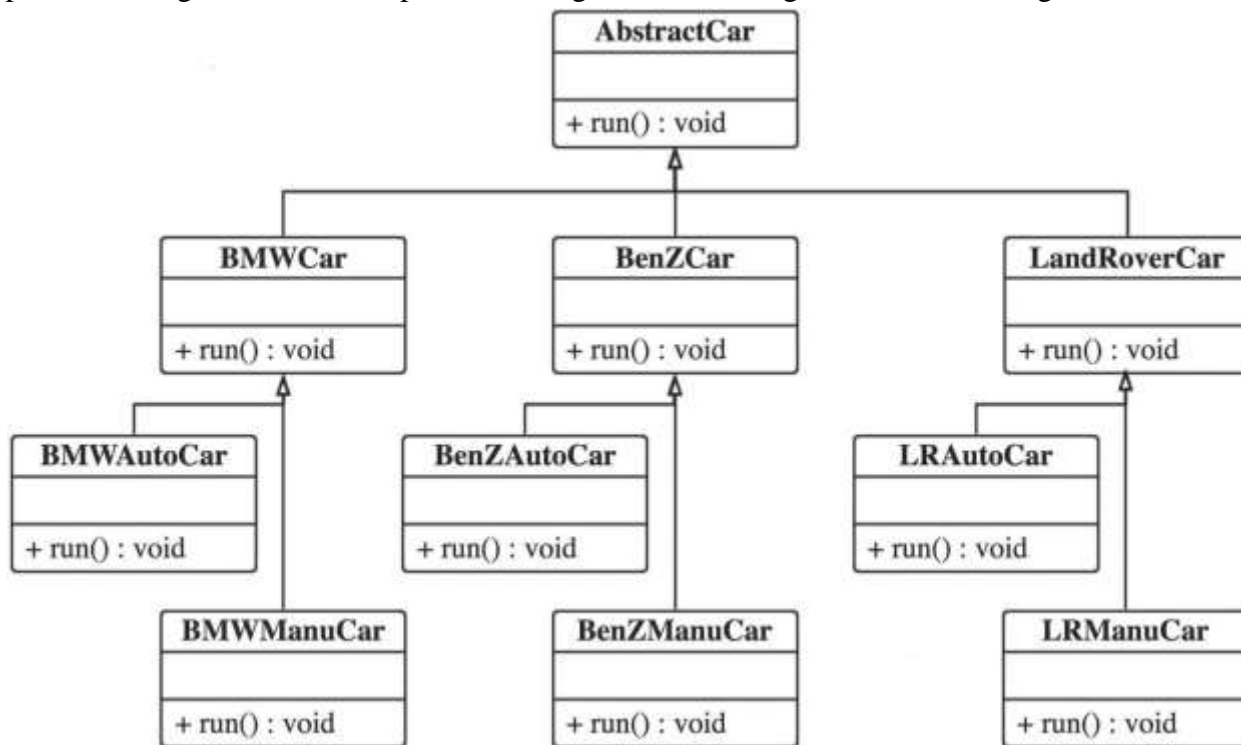


Fig 1: Comparison management class diagram

The functional classes of the record management module include record management form class recordactivity, record management business class recordmanage, nursing sign management business class nursingsignmanage, nursing document management business class nursingdocumentsmanage, patrol management business class inspectionmanage, and nursing measure management business class nursingmeasuresmanage. It also includes nursingsignbeans, nursing sign entity class, patrol record entity class, patrolrecordbeans, nursingdocumentbeans, nursing document entity class, nursing measure entity class, nursingmeasurebeans, etc. In the detailed design stage of record management function, the record data and record commands in the interface are transmitted to the form class of record management. The record management form class needs to call the business class of record management. The business class can perform the logical processing of record business management. After the logical processing, the data of record management is displayed, and the data is encapsulated in the entity class of record management. The record management class diagram is shown in Figure 2.

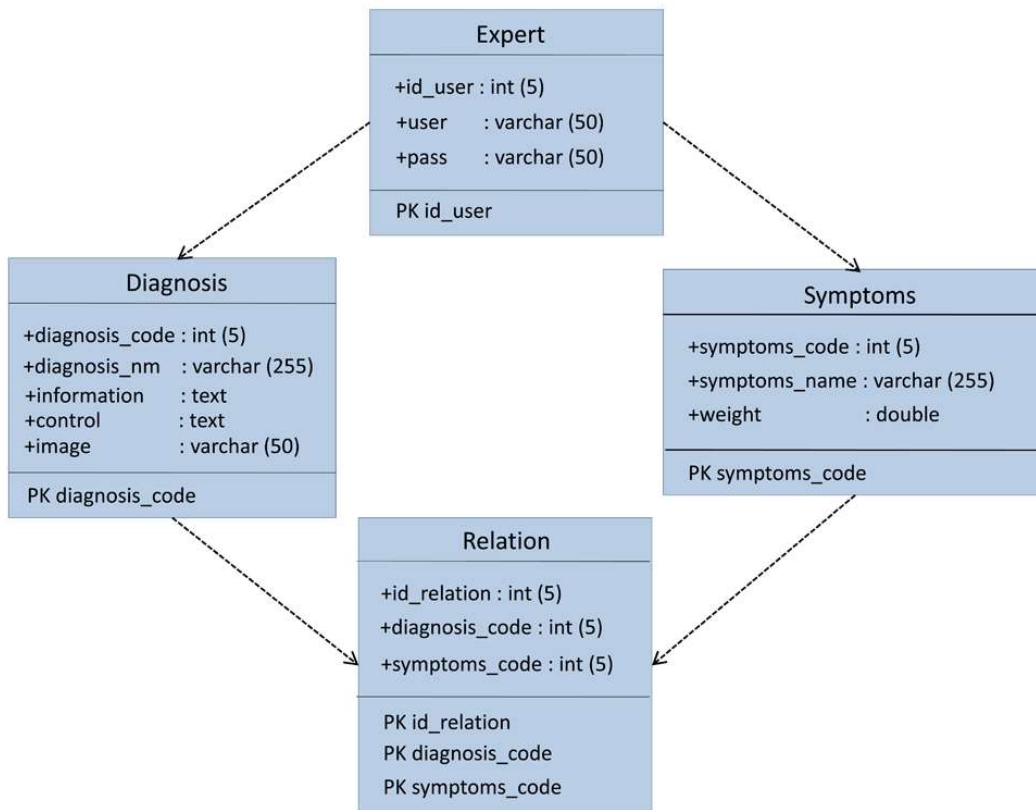


Fig 2: Record management class diagram

3.3 Database design

The database structure of the hospital visual nursing system includes data tables such as patient information table, nursing record sheet and early warning score table. Based on the patient information table, it can correspond to data tables such as nursing record sheet, doctor's order information table, basic nursing evaluation table and adverse event table. The basic nursing evaluation table corresponds to the nursing evaluation nutrition table. In addition, oracle11g database technology is selected to manage hospital nursing data.

IV. CONCLUSION

The application of the system solves the problems of manual proofreading and low accuracy of document writing in the traditional nursing work of the Affiliated Hospital of Shandong Academy of Medical Sciences. It is convenient for medical staff to report the nursing work in time, and ensures the quality of hospital nursing management while improving work efficiency. The deficiency of the system lies in the lack of business flexibility. Workflow and other forms can be used in the follow-up work, which is convenient for users to provide self-defined business processes.

ACKNOWLEDGEMENTS

This research was supported by Henan Educational Science Planning Project: Research on the mixed teaching mode of "online + offline and school-enterprise cooperation" of higher vocational college midwifery majors under the influence of COVID-19. (Grant No. 2020YB0503).

REFERENCES

- [1] Lemyre, B., Ly, L., Chau, V., Chacko, A., Barrowman, N., Whyte, H., (2017). "Initiation of passive cooling at referring centre is most predictive of achieving early therapeutic hypothermia in asphyxiated newborns", *Paediatrics & Child Health*, 22(5), pp.264-268.
- [2] Nikiphorou, E., Carpenter, L., Norton, S., Morris, S., Macgregor, A., Dixey, J. (2017) "Can rheumatologists predict eventual need for orthopaedic intervention in patients with rheumatoid arthritis? results of a systematic review and analysis of two UK inception cohorts", *Current Rheumatology Reports*, 19(3), pp.12-19.
- [3] Zhang, W., Ma, J., Danzeng, Q., Tang, Y., Kang, Y. (2017) "Safety of moderate hypothermia for perinatal hypoxic ischemic encephalopathy: a meta-analysis", *Pediatric Neurology*, 74, 51-64.
- [4] Ehsanur, R.A., Afrin, I., Emdadul, H.D.M., Md., M., Bin, Z.S., Sadeq-Ur, R.Q. (2017) "Managing neonatal and early childhood syndromic sepsis in sub-district hospitals in resource poor settings: improvement in quality of care through introduction of a package of interventions in rural bangladesh". *PLOS ONE*, 12(1), pp.17-26.
- [5] Jiang, M.Q., Ying Zhao, Cao, W., Wei, Z.Z., Yu, S.P. (2016) "Long-term survival and regeneration of neuronal and vasculature cells inside the core region after ischemic stroke in adult mice", *Brain Pathology*, 27(4), pp.480-498.
- [6] Winkel, P., Bath, P.M., Gluud, C., Lindschou, J., Bart, V.D.W.H., Macleod, M.R. (2017) "Statistical analysis plan for the eurohyp-1 trial: european multicentre, randomised, phase iii clinical trial of the therapeutic hypothermia plus best medical treatment versus best medical treatment alone for acute ischaemic stroke", *Trials*, 18(1), pp.573-588.
- [7] Tohme, S., Simmons, R.L., & Tsung, A. (2017) "Surgery for cancer: a trigger for metastases", *Cancer Research*, 77(7), pp.1548-1552.
- [8] Yang, G.S., Zhou, X.Y., An, X.F., Liu, X.J., Zhang, Y.J., Yu, D. (2017) "Synergistic effect of mild hypothermia and the notch inhibitor dapt against post stroke seizures", *Biomedicine & Pharmacotherapy*, 96, pp.675-684.
- [9] Slack, D.F., Corwin, D.S., Shah, N.G., Shanholtz, C.B., & Hasday, J.D..(2017).Pilot feasibility study of therapeutic hypothermia for moderate to severe acute respiratory distress syndrome.*Critical care medicine*, 45(7), pp.1152-1159.
- [10] Cies, J.J., Fugarolas, K.N., Moore, W.S., Mason, R.W., Menkiti, O.R. (2017) "Population pharmacokinetics and pharmacodynamic target attainment of ampicillin in neonates with hypoxemic-ischemic encephalopathy in the setting of controlled hypothermia", *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy*, 37(4), pp.456-463.