Information Horizons: AMERICAN Journal of Library And Information Science Innovation
Volume 3, Issue 4, 2025 ISSN (E): 2993-2777

Main Directions of Image Processing. Creation of Digital Images

Abdullaeva Sanobar Berdievna
Assistant of Samarkand State Medical University
Aralova Malika Ramazanovna, Toshtemirova Khosiyat Charikulovna,
Yusupova Makhliyo Orzikulovna
Student of Samarkand State Medical University

Abstract. *The rapid development of modern medicine requires close interaction with related fields: mathematics, physics, chemistry. One of these interactions is the processing and analysis of medical images. Images of the anatomical, histological structure and functions of the human body are the basis of medical science. Diagnosis, treatment and management of diseases are based on information obtained through medical imaging. In the process of digital image processing, the process of evaluating and filtering image quality indicators is of great importance. This article discusses the very important role of medical images in medicine, and in addition, their use as an auxiliary indicator for doctors in making an accurate diagnosis of patients.*

Keywords: *Medical imaging, information, education, student, diagnosis, medicine.*

INTRODUCTION: A person receives information about the environment mainly through his eyes, therefore any information presented in visual form is more convenient and understandable for us. Therefore, in many cases, in order to facilitate human assimilation, information is interpreted using graphs, maps, drawings, black-and-white and color photographs, inscriptions and other images. It is clear that the role of information in the form of various images in human life is very large and there is no way to replace it with something else that more fully conveys the essence of information. Images can be obtained in the visible frequency range of electromagnetic waves, in the frequency range of acoustic, infrared, ultraviolet, ultrasound, X-ray waves, and gamma rays. The means of their production and storage are very diverse. The increase in the pace of scientific research, the development and use of new methods of production and storage of information in the form of images, as well as the discovery and application of modern means of information increase the volume of such information, as it is known that images are not only the result of research in various fields of science, technology and the national economy, but also the object of processing, analysis and interpretation. Until recently, a person performed these tasks using his own capabilities, either directly or mainly semi-automatically. The large difference between the speed of obtaining image information and its processing and analysis has made the automation of image processing and analysis one of the most pressing issues of our time. In developed countries, ongoing research is being conducted to develop devices and methods for automating image processing and analysis**.**

Optical-mechanical, optical-electronic, television, analog, digital-analog computing devices and systems were invented and began to be used. In the process of processing images, computers with the necessary hardware and memory, including devices for recording and displaying the results of their recording, occupy a special place. Computers are used to process and analyze information in images. A new wide area of their application has been opened. The use of computers for image processing and analysis is a convenient method of analysis and processing in a short time with less effort than building test models, that is, it allows you to see the model in its perfect state, even in cases where modern technology does not allow. The accuracy, reliability and almost complete reproducibility of

the results, the ability to control any step of the processing process, and the ability to adapt to the type and characteristics of the problem being solved. That is why most automated systems for image processing and analysis are based on universal computers. It is difficult to imagine solving any problem related to image processing and analysis without the use of computers. Digital image processing and analysis (DIA) is used in all areas of human activity related to images and where computers can be used. According to many experts and scientists, the development of the theory of DIA methods and computational tools has led to the emergence of a new field of science and technology with a bright future. In subsequent years, the scope of application of GIS has expanded significantly, which was greatly influenced by the decrease in the size and cost of computers, the increase in their speed, and the development of industrial versions of devices for inputting, outputting, and displaying images. GIS methods have already taken an important place in scientific research, information systems, medicine, biology, histology, military work, geodesy, mapping, etc. Examples of the application of these methods include digital transmission of information from spacecraft, videotelephony via telephone wires, increasing the clarity of images obtained from electron microscopes, improving the quality of images obtained from space, creating and improving the quality of medical images of the Earth's surface based on photographs taken from artificial satellites (radiograms, thermograms, encephalograms, radioisotope diagnostic images, etc.), creating maps using automated methods based on ready-made images, detecting defects in industrial equipment using X-ray methods, and others. That is why TSIBTE has already become a profession for many. There is no doubt that in time TSIBTE will take an even wider place in various fields of science, technology and the national economy, in short, in almost all aspects of human activity. A person encounters a variety of images in his activity. The problem of automating the processing of these images, preserving the source and results requires the classification of the most widespread storage media, means and methods of recording images into classes.

DISCUSSION: In medicine, doctors mainly use medical images to accurately diagnose and treat patients. Medical images are structural and functional images of human organs intended for the diagnosis of diseases and the study of the anatomical and physiological picture of the body. They are also called diagnostic images. Medical image acquisition methods include radiation diagnostic methods: - X-ray, magnetic resonance, radionuclide and ultrasound. Digital image processing techniques can be divided into two main application areas. This allows you to improve the quality of images to improve human visual perception and process images for their storage, transmission and presentation in machine vision systems. Medical images can be divided into two groups: digital and analog. Analog images are images that contain continuous information. Like all analog images, medical images also have shortcomings. Analog medical images are more accurate than digital images. Doctors want to ensure greater accuracy and clarity of medical images. This will increase the degree of accuracy of doctors in making diagnoses. Analog images include images that contain continuous data. These images are presented to the doctor to diagnose diseases. All analog images, including medical images, have disadvantages. In particular, they are difficult to store, process for diagnostics, and transfer from computer to computer. In analog form, images contain a lot of unnecessary signals or noise that degrades their quality. All these disadvantages are not found in digital images. They are based on a cellular structure (matrix) that originates from signals from diagnostic devices and contains information about body parts (in digital form). Using computer devices, images of body parts are created using complex algorithms from the signals stored in the matrix. Digital images are characterized by high quality, clarity and clarity of the image, the absence of any errors in the transmission of signals. Images are easy to store on various magnetic, optical and magneto-optical digital media, easy to process on a computer and send over long distances through telecommunication networks, without any changes in the quality and appearance of the image. The main advantages of digital images when transferred to a matrix system are the clarity and high quality of the images. At the same time, these images can be easily stored on computer devices where they are to be stored and other processes can be performed on the images.

LITERATURE REVIEW AND METHODOLOGY: No matter how many generations of medical scanners there are today, their function is to digitize analog images. Today, the recommendation given to doctors is to use technologies that produce images with the highest resolution. Medical

images are divided into three types: vector, raster and matrix. Vector images consist of elementary lines. Image data has vector characteristics and can be changed without losing quality if necessary. Digital images are created from a series of such dots of different colors. The main difference between a vector and a raster image is that a raster image creates a much closer look to a real image than a vector image. A raster image is made up of very small elements called pixels. Raster graphics work with hundreds and thousands of pixels that form an image. The advantages of raster graphics are: If the pixel size is small, the image is close to photographic quality. The computer can easily control external devices that use dots to represent individual pixels. Therefore, raster images are easily printed on printers.

SUMMARY: Medical image processing is the application of computer algorithms and techniques to analyze and process medical images. It is aimed at extracting important diagnostic information from large images while minimizing network load and storage requirements. Various medical images, regardless of the form in which they are captured, such as x-ray, ultrasound, radionuclide, or magnetic resonance imaging, can be divided into two main groups: analog and digital. Images are first created in analog quality, and then digitized during transmission from the detector to the display.

Analog images: • traditional film radiography, including computed tomography; • traditional fluoroscopy; • sonography (a diagnostic medical examination that uses ultrasound waves to bounce off structures in the body and create an image). This examination is often simply called ultrasound or sonography.

Analog-digital imaging: • digital radiography (bi-dimensional digitization of radiography), digital fluoroscopy, • digital subtraction angiography, • sonography, • scintigraphy (the use of internal radionuclides to create two-dimensional images)

Digital imaging: • primary digital methods of radiography; • computed tomography, • magnetic resonance imaging, • emission tomography (one- and two-photon), • Doppler mapping. The appearance of diagnostic images on the monitor can be of two types.

Vector images consist of a set of elementary lines and curves, depicted by mathematical formulas in the form of mathematical objects, called vector images. The second is graphical and can be changed without compromising image quality according to the programs selected by the doctor.

Medical radiology (MR) is a branch of medicine that studies the use of ionizing radiation for the diagnosis and treatment of various diseases. One of the main areas of radiology that needs to be updated is image processing and diagnostics. The development of new, modernized and adapted methods of image processing and existing ones will lead to an increase in the efficiency of diagnosis by the diagnostician. Adaptation and development of existing methods of image processing in medical radiology is an urgent scientific and technical problem.

CONCLUSION: The development of science and technology allows for the development of new effective methods of image processing, decision support systems for medical radiology, which allow to increase the accuracy and speed of diagnosis in prognosis. In addition, patients can become disabled or die due to the error of doctors all over the world. The accuracy of images and high quality of images in diagnosis lead to the fact that the attending physician does not make mistakes. The first step in solving this problem is that all medical devices are modern and all medical specialists are highly qualified, so that they are confident that there will be no errors in diagnosing patients. Through the clarity of the image, we can clearly see the location of the lesion, for example, in a computed tomography scan of a tumor located in the patient's brain, its size, diameter, and depth of location must be expressed in centimeters. In traumatology, when making an accurate diagnosis of a patient with a broken arm or shoulder, the doctor must not make mistakes in the quality, clarity, and clarity of the images, which is considered the right decision in choosing the right method for treating the disease. In conclusion, it is worth noting that if any images related to medicine are clear, clear, and of high quality, doctors will not encounter difficulties in diagnosing patients and they will be able to make the right decision on the issue at hand.

References:

1. Abdullayeva S., Maxmudova Z., Xujakulov S. TIBBIY TA'LIMDA VR TEXNOLOGIYA //Eurasian Journal of Academic Research. – 2022. – Т. 2. – №. 11. – С. 1140-1144.
2. Berdiyevna, A. S., & Olimjonovna, T. F. (2022). INNOVATIVE APPROACHES IN THE EDUCATION SYSTEM TO INCREASE YOUTH PARTICIPATION. Web of Scientist: International Scientific Research Journal, 3(3), 674-677.
3. Toxirova, F. O., Malikov, M. R., Abdullayeva, S. B., Ne'matov, N. I., & Rustamov, A. A. (2021). Reflective Approach In Organization Of Pedagogical Processes. European Journal of Molecular & Clinical Medicine, 7(03), 2020.
4. Berdiyevna, A. S., Fazliddinovich, S. R., & Uralovich, R. N. (2022). Use of Information Technology in Improving the Quality of Education. Eurasian Research Bulletin, 14, 134-138.Abdullayeva, S. B., & Dosmurodova, S. S. (2022). THE ROLE OF THE FAMILY IN THE FORMATION OF VALUE DIRECTIONS IN YOUTH. Procedia of Theoretical and Applied Sciences, 1(1), 93-95.
5. Berdiyevna, A. S., & Shokirovich, X. S. (2023). Prospective Directions of Implementation of Modern Information Technologies in Education. Eurasian Journal of Research, Development and Innovation, 17, 7-11.
6. Berdiyevna, A. S., Akramovna, M. M., & Olmasovna, R. P. (2023). Research in the Process of Education of Medical Students Shaping Their Abilities. Eurasian Journal of Learning and Academic Teaching, 17, 95-99.
7. Berdiyevna, A. S., Ilhomovna, M. Z., & Ogli, K. S. S. (2023). Modern methods of information exchange in polyclinic conditions. Genius Repository, 25, 16-20.
8. Abdullayeva, S., Maxmudova, Z., & Xo'jaqulov, S. (2023). MODERN METHODS OF INFORMATION EXCHANGE IN POLYCLINIC CONDITIONS. Modern Science and Research, 2(10), 304-310.
9. Berdiyevna, A. S. (2024). AXBOROT KOMMUNIKATSIYA TEXNOLOGIYALARI VA VOSITALARIDAN TA'LIM JARAYONIDA FOYDALANISHNING ISTIQBOLLI YONALISHLARI VA KELAJAGI. BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI, 4(2), 152-157.
10. Абдуллаева, С., & Раупова, Р. (2024). ТАЪЛИМ ВА ТАРБИЯ МЕТОДЛАРИ ВА ВАЗИФАЛАРИНИ ЎРГАНИШ-БЎЛАЖАК ПЕДАГОГЛАР ФАОЛИЯТИНИНГ АСОСИЙ ОМИЛИДИР. Modern Science and Research, 3(1), 91-97.
11. Ilhomovna, M. Z., Berdiyevna, A. S., Shaxboz o'g'li, Y. T., & Mirkobilovna, S. R. (2023). The Importance of IT Technologies in Ultrasound Examinations. Journal of Intellectual Property and Human Rights, 2(12), 121-125.
12. Berdievna, A. S., Sobirovich, S. O., & Ibrahimovna, N. N. (2023). Distinctive Features of the Distance Learning System in Medical Education: the Opportunity to Learn at a Convenient Time, Place and Environment. Journal of Intellectual Property and Human Rights, 2(12), 33-38.
13. Абдуллаева, С. Б. (2023). ТИББИЁТДА ТАЛАБАЛАРГА АХБОРОТ ТЕХНОЛОГИЯЛАРИ ВА ЖАРАЁНЛАРНИ МАТЕМАТИК МОДЕЛЛАШТИРИШ ФАН МОДУЛИНИ ЎРГАТИШДА МОТИВАЦИЯЛАРНИНГ АҲАМИЯТИ. BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI, 3(12), 27-30.
14. Berdiyevna, A. S., Eshmamatovna, D. N., & Shukhratovna, D. S. (2023). THE ROLE OF ARTIFICIAL INTELLIGENCE IN MEDICAL DISEASE PREDICTION. EUROPEAN JOURNAL OF MODERN MEDICINE AND PRACTICE, 3(3), 5-9.
15. Berdievna, A. S., & Shokirovich, K. S. (2024). The Role of it in the Field of Medicine, Use Of Computer Technology In Modern Diagnostic Methods. Miasto Przyszłości, 51, 162-166.
16. Nabiyeva, S. S., Rustamov, A. A., Malikov, M. R., & Ne'matov, N. I. (2020). Concept of medical information. European Journal of Molecular and Clinical Medicine, 7(7), 602-609.

17. Malikov, M. R., Rustamov, A. A., & Ne'matov, N. I. (2020). STRATEGIES FOR DEVELOPMENT OF MEDICAL INFORMATION SYSTEMS. Theoretical & Applied Science, (9), 388-392.
18. Berdiyevna, A. S., & Olimjonovna, T. F. (2022). INNOVATIVE APPROACHES IN THE EDUCATION SYSTEM TO INCREASE YOUTH PARTICIPATION. Web of Scientist: International Scientific Research Journal, 3(3), 674-677.
19. Esirgapovich, K. A. (2022). THE EASIEST RECOMMENDATIONS FOR CREATING A WEBSITE. Galaxy International Interdisciplinary Research Journal, 10(2), 758-761.
20. Toxirova, F. O., Malikov, M. R., Abdullayeva, S. B., Ne'matov, N. I., & Rustamov, A. A. (2021). Reflective Approach In Organization Of Pedagogical Processes. European Journal of Molecular & Clinical Medicine, 7(03), 2020.
21. Ne'matov, N., & Rustamov, T. (2022). SANATORIYLAR ISHINI AVTOMATLASHTIRISH: BRON XIZMATI VA UNING STRUKTURASI. Eurasian Journal of Academic Research, 2(11), 763-766.
22. Ne'matov, N., & Ne'matova, N. (2022). OLIY TA'LIM TIZIMI TALABALARIGA O'ZBEK TILINI O'QITISHDA AXBOROT TEXNOLOGIYALARINING O'RNI. Академические исследования в современной науке, 1(19), 37-38.
23. OB Akhmedov, AS Djalilov, NI Nematov, AA Rustamov // Directions Of Standardization In Medical Informatics // Emergent: Journal of Educational Discoveries and Lifelong Learning (EJEDL), 2(2), 1-4 p. 2021
24. Ne'matov, N., & Isroilov, J. (2022). TIBBIY VEB SAYTLAR YARATISH YUTUQ VA KAMCHILIKLARI. Zamonaviy dunyoda innovatsion tadqiqotlar: Nazariya va amaliyot, 1(25), 162-164.
25. Ne'matov, NI. (2022). TIBBIY VEB SAYTLAR YARATISH SAMARADORLIGI. Academic Research in Educational Sciences (ARES) 3 (2), 118-124
26. Ismatullayevich, N. N. (2023). The role of educational websites in the development of student's higher education systems. Eurasian Journal of Research, Development and Innovation, 17, 17-20.
27. Ismatullayevich N. N., Ilxomovna M. Z. Automation of Sanatorium Work: Reservation Service and its Structure //Miasto Przyszłości. – 2022. – T. 29. – C. 65-67.
28. Ne'matov, N., & Sobirova, K. (2024). THE ROLE OF WEBSITES IN IMPROVING THE WORK OF MEDICAL INSTITUTIONS. Modern Science and Research, 3(2), 530-532.
29. Ismatullayevich, N. N. (2024). Medical Higher Education Institutions in Medicine and Science Lessons from the Use of Information Technology in the Organization of the Laboratory of Multimedia Tools. *American Journal of Biomedicine and Pharmacy*, *1*(6), 16-20.
30. Ne'matov, N., & Yarmahammadov, U. (2023). USE OF MULTIMEDIA IN ORGANIZING PRACTICAL LESSONS IN INFORMATION TECHNOLOGY IN INSTITUTIONS OF HIGHER EDUCATION. *Modern Science and Research*, *2*(4), 693-697.
31. MALIKOV, M. R., & NE'MATOV, N. I. (2022). Visual structure of health websites: the need to develop a comprehensive design guide. *THEORETICAL & APPLIED SCIENCE Учредители: Теоретическая и прикладная наука,(3)*, 805-810.