# Review Of Pathological Image Analysis

●Abstract

Pathological image analysis system is also called micro medical image workstation. Microimaging software; Pathological graph analysis system; Pathology graphic reporting system; Pathological medical imaging workstation; Pathological graphic workstation; Pathological workstation; Pathological imaging workstation; Pathological graphics workstation software, etc. It uses advanced image processing technology and high precision hardware configuration, from the system signal acquisition, measurement, processing to print out all realize color, automation, intelligent, has the advantages of simple operation, strong image processing function, intelligent image analysis, high image definition, graphic report printing fast, powerful database management. It provides advanced tools of epoch-making significance for clinicopathology, pharmacopathology and all the scientists who use microscopes.In this article, we review that development of the deep learning medical record image analysis system based on a variety of search methods from a survey of 40 reference articles in the last four year. In-depth study of its data, and analysis of the future in the field of medical records image analysis may encounter problems and research direction

●Introduction

The innovation of scientific theory and the progress of technological methods are often twin sisters. In terms of the formation and development of pathology, autopsy laid the foundation of organ pathology, the appearance of optical microscope established the cytopathology system, and the invention of electron microscope led to the revolution of microstructure pathology. The progress of immunocytochemistry technology makes immunopathology rise suddenly. The rapid development of molecular biology technology is leading to the formation of molecular and genetic pathology.  
As one of the important breakthrough points of science and technology in the 20th century, the application and development of computer and its network technology has penetrated into all aspects of social practice and personal life, and has widely penetrated into various disciplines with its astonishing speed, bringing the development and innovation of multiple disciplines, which is the fundamental change inevitably caused by the high-tech content of computer and its network technology itself. However, there are inherent rules and characteristics between different branches of natural science. The birth of computer image processing system is a special product formed by combining computer technology and morphological image.

1. Methods:

In this review, we conducted a comprehensive analysis of the current state-of-the-art methods used in pathology image analysis. We utilized a systematic approach to identify relevant studies through searching various databases, including PubMed, Scopus, and Web of Science, with specific keywords related to pathology image analysis. We also searched for additional studies through references cited in relevant articles.

After identifying relevant studies, we performed a thorough analysis of the methods used in each study, including image preprocessing, segmentation, feature extraction, and classification. We also evaluated the performance of each method based on various metrics such as sensitivity, specificity, and accuracy.

We classified the methods into different categories based on the type of pathology image analysis task, such as tumor detection, classification, and segmentation. We also discussed the advantages and limitations of each method, and identified potential areas for improvement and future research.

Overall, this review provides a comprehensive overview of the current state-of-the-art methods in pathology image analysis, and serves as a useful resource for researchers and practitioners in the field.

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| 参考文献 | 时间 | 种类 |
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| Analysis of cytology of germ cell tumors with histopathological and serum tumor marker correlation : a tertiary care centre experience | 2019 | 研究论文 |
| Evaluation of adnexal tumours in the International Ovarian Tumor Analysis system in reference to histopathological resules | 2019 | 研究论文 |
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| Uterine tumor resembling ovarian sex cord tumor : a clinicopathological and immunohistochemical analysis of two cases and a literature review | 2019 | 研究论文 |
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1. **数据及开源码**

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| **参考文献** | **数据库** |
| **Deep Learning Models for Histopathological Classifcation of Gastric andColonicEpithelial**  **Tumours** | **<https://www.nature.com/articles/s41598-020-58467-9>**  www.nature.com/scientificreports |
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| A deep learning model for molecular label transfer that enables cancer cell identifification from histopathology images | https://doi.org/10.1038/s41698-022-00252-0 |
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**5.Challenge questions and possible research directions**

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| **Challenge questions and possible research directions** | |
| **Assurance of image quality** | Pathology section images need to undergo the process of specimen fixation, harvesting, paraffin embedding, sectioning to staining and so on to do strict quality control, and the quality, fidelity, magnification, file format, and scanning time vary between countries and countries, resulting in the difficulty of image quality for subsequent computer processing. |
| **The acquisition of large accurate feature data sets** | At present, much human effort is still required for image annotation, and the samples are mostly from the same medical institution, the quantity cannot be ensured while the quality is guaranteed, resulting in low model accuracy and high false-positive rate. As the sample size accumulates, the resulting algorithm model based on a large sample, multi center training set might be expected to be clinically useful. |
| **Incomplete conclusions drawn from AI model analysis** | The dichotomous "" benign "" to "" malignant "" distinction cannot cover complex practical situations and should be considered in addition to the most severe and predominant lesions.  For example, some inflammatory lesions or precancerous lesions that were not annotated for learning and descriptive discourse. |
| **Ethical and legal challenges** | To address this issue, our country is actively refining the AI ethical and legal framework system with respect to issues such as data protection, privacy security, and medical responsibility.  During development, pathologists still take the dominant position, which is also consistent with the 'human centered' concept of AI development advocated by the European Union. |

**6.conclusion**

In conclusion, the progress of technology and scientific theory has played a vital role in the development of pathology. From the foundation laid by autopsy to the advent of the electron microscope and immunocytochemistry, each technological advance has opened up new avenues for understanding and characterizing different pathologies. The application of computer and network technologies has brought about a fundamental change in pathology image analysis, enabling new levels of accuracy, efficiency, and reproducibility. With ongoing advancements in computer image processing and analysis, we anticipate that these technologies will continue to be a driving force in the field of pathology, leading to even more innovative approaches to diagnosing and treating diseases.