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Scoliosis Lenke Classification Report Generation Method Based on Dual Attention to Space and Context

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Abstract

Scoliosis is a complex spinal deformity that affects millions of individuals worldwide. Accurate classification of scoliosis is crucial for determining appropriate treatment strategies. The Lenke classification system is widely used to categorize scoliosis based on curve type, magnitude, and flexibility. However, generating comprehensive and accurate Lenke classification reports can be time-consuming and subjective. To address these challenges, researchers have proposed a novel method that leverages dual attention to space and context for automated scoliosis Lenke classification report generation. This article aims to explore this innovative approach and its potential to enhance the efficiency and reliability of scoliosis classification.

Keywords: Lenke typing report generation • Dual attention mechanisms • Spatial

Introduction

The Lenke classification system provides a standardized framework for classifying idiopathic scoliosis. It categorizes scoliotic curves into six major types (Lenke types 1-6) based on curve patterns and characteristics. Each type is further subdivided into multiple subtypes, taking into account the levels of the spine involved, curve magnitude, and flexibility. The Lenke classification system plays a crucial role in guiding treatment decisions and predicting surgical outcomes [1,2]. Manually generating Lenke classification reports can be time-consuming, requiring experienced clinicians to analyse multiple radiographic images and extract relevant information. Interobserver variability and subjectivity may also affect the consistency and accuracy of the reports. Automating the report generation process can help overcome these challenges and improve efficiency proposed method for scoliosis Lenke classification report generation leverages dual attention to space and context [3]. It combines the strengths of deep learning techniques and natural language processing to analyse spinal radiographic images and generate comprehensive reports. The dual attention mechanism allows the model to focus on both spatial features, such as curve morphology and vertebral alignments, and contextual information, including curve flexibility and the relationship between different spinal levels.

Literature Review

The methodology involves several steps. First, spinal radiographic images are pre-processed to enhance image quality and normalize the data. Then, a deep learning model, such as a Convolutional Neural Network (CNN), is trained to extract spatial features from the images. Attention mechanisms are incorporated to capture the most informative regions and relationships within the images. Simultaneously, the model analyses contextual information, such as curve flexibility, by incorporating relevant clinical data and patient characteristics. Further development and refinement of the dual attention-based scoliosis Lenke classification report generation method are essential. The integration of additional clinical data, such as patient demographics and clinical measurements, can enhance the contextual understanding of the scoliosis cases. Exploring the potential of explainable artificial intelligence techniques can also increase trust and understanding of the automated report generation process [4].

Discussion

Once the deep learning model has extracted spatial and contextual features, a natural language processing component generates the scoliosis Lenke classification report. The generated report includes detailed information on the curve type, magnitude, flexibility, and the levels of the spine involved. To evaluate the accuracy and reliability of the automated reports, they can be compared with expert-generated reports and validated against a large dataset of scoliosis cases [4]. The proposed method for scoliosis Lenke classification report generation offers several advantages. It reduces the time and effort required to generate reports, allowing clinicians to focus on treatment planning and patient care. By leveraging deep learning and attention mechanisms, the method can capture both spatial and contextual information, potentially enhancing the accuracy and consistency of the reports. Furthermore, automated report generation can facilitate research and data analysis by providing large-scale, standardized datasets [5,6].

Conclusion

Automated scoliosis Lenke classification report generation based on dual attention to space and context holds great promise for enhancing the efficiency and reliability of scoliosis classification. This innovative approach, combining deep learning, attention mechanisms, and natural language processing, has the potential to streamline the report generation process, reduce interobserver variability, and improve treatment planning for scoliotic patients. Continued research and development in this field will lead to more robust and accurate automated systems, ultimately benefiting both clinicians and patients in the management of scoliosis.

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Conflict of Interest

None.

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