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Intelligent Evaluation Method for Rehabilitation of Human Cervical Vertebra Based on Computer Vision

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Abstract

The human cervical vertebra plays a crucial role in supporting the weight of the head and facilitating various movements of the neck. However, due to poor posture, sedentary lifestyles, and other factors, many individuals suffer from cervical spine disorders, leading to discomfort, pain, and reduced quality of life. To address this issue, the development of intelligent evaluation methods for cervical vertebra rehabilitation has become increasingly important. This article explores the potential of computer vision-based techniques in assessing and improving cervical vertebra rehabilitation.

Keywords: Cervical vertebra rehabilitation • Cervical spondylosis • Computer vision

Introduction

Cervical vertebra rehabilitation typically involves a combination of physical therapy, exercises, and corrective measures. However, evaluating the effectiveness of these rehabilitation methods is often subjective and relies heavily on the experience and expertise of the therapist. Additionally, traditional evaluation methods, such as X-ray imaging, have limitations, including radiation exposure and static snapshots that may not fully capture the dynamics of cervical vertebra movements [1].

Literature Review

Computer vision, a branch of artificial intelligence focused on visual data processing, offers promising opportunities for objective and non-invasive evaluation of cervical vertebra rehabilitation. By analysing video or image data, computer vision algorithms can extract valuable information about posture, movement patterns, range of motion, and other relevant metrics. A camera or sensor system capable of capturing high-resolution images or videos of the cervical vertebra and associated movements is essential. This can be achieved using various imaging modalities, such as RGB cameras, depth sensors, or even wearable devices. Estimating the pose or skeletal structure of the cervical vertebra is crucial for assessing rehabilitation progress. Pose estimation algorithms can determine the position and orientation of the vertebra, allowing for the measurement of joint angles and identifying any deviations from the normal range [2,3]. Computer vision algorithms can track the movement of the cervical vertebra and identify patterns or abnormalities. Techniques such as optical flow analysis and trajectory estimation can provide insights into the range of motion, coordination, and stability of the vertebra during rehabilitation exercises.

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Discussion

Objective evaluation metrics can be defined based on the extracted features and motion analysis. These metrics may include range of motion, symmetry, postural alignment, and overall improvement over time. By comparing these metrics against predefined thresholds or norms, therapists can make informed decisions regarding the effectiveness of the rehabilitation program [4,5]. It can be deduced from the preceding literatures that rainfall infiltration affects the surface soil moisture and soil grains have a significant impact on responses [6]. Computer vision eliminates the subjectivity associated with traditional evaluation methods. The quantifiable metrics provided by computer vision algorithms provide objective feedback on the patient's progress, allowing for personalized treatment plans and better decision-making.

Conclusion

Computer vision-based systems can provide real-time feedback to patients during rehabilitation exercises. This immediate feedback enables patients to correct their posture or movements, improving the effectiveness and safety of the rehabilitation process. Computer vision technology allows for remote monitoring of patients' rehabilitation progress. Therapists can analyze video or image data remotely, reducing the need for frequent in-person visits and enabling more accessible and convenient healthcare services. By continuously monitoring the rehabilitation progress, computer vision-based systems can track long-term improvements, identify trends, and provide insights for adapting and optimizing treatment.

Acknowledgement

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Conflict of Interest

None.

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