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以影像處理為基礎的髕骨滑行機制診斷系統之研究

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摘要

由於生活及飲食習慣的變遷，近年來罹患膝關節疼痛的人口與日俱增，膝關節疼痛雖不是致命的疾病，卻嚴重影響病人的生活起居，而且可能導致患者不良於行。膝關節髕骨的滑行機制不正常，是臨床上造成膝關節疼痛最常見的病因。髕骨滑行機制不正常，愈早治療效果愈好，而且治癒所需時間愈短，因此就臨床治療而言，最迫切的需要在於如何提高膝關節疼痛之初期病患的正確診斷率。目前的相關研究大多藉由磁振造影進行診斷，然而，其藉以診斷的依據-膝關節相關生理參數，都是以人工量測方式來取得，不但誤差大而且費時，因此，無法有效提高正確診斷率。本研究計劃擬藉由數位影像處理技術，為醫師提供較精確的膝關節生理參數，進而獲得有意義的統計分佈，讓膝關節疼痛病患能得到更早期的診斷，以提高療效並縮短治療時間，降低病患的生理與財務負擔以及減少國家醫療資源的消耗；另一方面，協助醫師於最短時間內做診斷，減少患者等待的時間，提昇整體的醫療品質。由於國內目前尚未有以電腦化方式進行膝關節髕骨滑行機制自動診斷的研究，因此，本研究所蒐集到的膝關節相關生理參數之分佈

資料，將可成為其他醫療研究機構從事相關研究的參考依據。

關鍵字：膝關節；髕骨滑行機制；磁振造影；影像強化；影像分割；

侵蝕；形態學；可變形模式；小波轉換

A Study of Diagnosis System of Patellar Tracking Mechanism Using Image Processing

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Abstract

Because of the change of living type and eating habit, the number of patients with knee pain grows with each passing date. Although the knee pain is not a fatal disease, it seriously affects the patients' life and even causes walking handicap. The abnormality of patellar tracking mechanism is the major reason of the knee pain. For this type of abnormality, the earlier the treatment is performed the sooner and the better the disease is cured. For clinical treatment, the most urgent problem is how to promote the successful diagnosis of early patients with the knee pain. The clinical diagnosis is almost through the MR imaging. However, their diagnosis bases, i.e. the patellar physical parameters, are measured from MRI artificially. This makes their diagnosis tend to error and to waste a lot of time. Hence, the correct diagnosis rate cannot be improved effectively. The research purpose of this project is to extract the patellar physical parameters more accurately from the MRI images for doctors by using the digital image processing technology, and to further acquire meaning statistical results. The research results can aid doctors to early diagnose the patients with knee pain such that the patient can obtain immediate and correct treatment. For patients, this will lighten their physical and financial burden. The overall treatment quality can also be promoted. And, the health resources consumption of country will be decreased. In addition, because of the absence of the related research in Taiwan, i.e. the computerized diagnosis of the patellar tracking mechanism, the extracted patellar physical parameters in this project will become the bases for the domestic research about this topic.

Key words: Knee;Patellar tracking mechanism;MRI;
Image enhancement;Image segmentation;Erosion;
Morphology; Deformable model;Wavelet transforms