

摘要

本論文研究目的，是藉由現今語音訊號的分類與辨識技術的成長，設計與實現肺音量測之人機介面系統此系統先依據特徵值所定義的特性分類出正常肺音與異常肺音，進而辨識出肺部之病症，做為醫師診斷之參考，也提供臨床應用和教學交流之用。在本論文中，對於特徵值擷取、硬體架構、演算法推導以及類神經網路都有完整介紹。

在本研究中針對肺部所發出之哮鳴異常聲音做偵測及判別。哮鳴音是一種偶發性且呈現連續高音調的肺部聲音，當呼吸道收縮產生氣流時，氣流經狹窄氣管發生振動而產生聲音，此聲音中夾雜著咻咻的聲音特徵，所以經常被拿來當作某些肺部疾病的重要特徵之一。

所設計的肺音感測人機介面系統，共包含硬體與軟體兩大部分，硬體架構部份，包含壓電麥克風及資料擷取卡，用來擷取肺部聲音訊號並將類比訊號轉換成數位訊號至電腦端做處理。軟體架構部份，使用 MATLAB 及 LabVIEW 程式，先利用 MATLAB 模擬類神經整體架構之可行性及內部參數，再利用 LabVIEW 設計訊號前處理及特徵值轉換架構，並進一步整合建構成入機介面用來分析紀錄與顯示判斷其哮鳴音的特徵量測結果。

最後，經由訓練後之類神經網路架構分類，對於肺音訊號是否具有哮鳴異常肺音之判別，其正確率可達 92%，並可由所設計之人機介面顯示其肺音波形、特徵值及頻譜分析圖，可供醫生作為診斷肺部疾病病患之輔助用。

關鍵詞：肺音、類神經網路、小波轉換

Abstract

The purpose of this paper is presented the way of the speech signal classification and the development of identify technology to establish the Human-Machine interaction system of pulmonary sounds recording process. First, we have to classify the normal pulmonary and the abnormal pulmonary sounds, we can recognize the pulmonary disease. All these researches can help doctors to diagnose and also to provide clinical application and education. This paper will introduce the retrieve of eigenvalue, hardware, derivation of algorithm and the artificial neural network completely.

This paper, is aimed at the research of wheezes. It is a characteristic of the pulmonary disease, like asthma. Wheezes are a kind of pulmonary sounds that is adventitious and continuous, which is probably cause of the vibration on narrow airways when airflow passing through, which is mixed with the sound heard like “shoo”, so we often treat the wheeze as one of the most important characteristic of the pulmonary disease.

The Human-Machine lung sound sensing system which is designed by this research, including two major parts of hardware and software altogether. The hardware architecture including the piezoelectric microphone, materials pick and fetch card, to record lung sounds signal and analogy signal and change them to digital signal for computer to process. The software architecture including the Matlab and LabVIEW programs. This research is used MATLAB to simulate the artificial neural network to recognize the characteristic and learn how to determine the characteristic of the wheeze. And using the LabVIEW to establish the human-machine to analyze the record, and display the result of lung sound recording process.

By the research results of this paper, the neural network structure classification via training, the correct rate is up to 92%, and show its lungs sound wave, characteristic value and spectral analysis chart by the human-machine interface design.

Keywords: Lung Sound, Artificial Neural Network, Wavelet Transform