

基於 KINECT-V2 之動態手勢辨識系統

Dynamic Hand Gesture Recognition System based on KINECT-V2

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摘要

近年來手勢辨識相當受到歡迎，不僅能跨越語言不通的問題，成為溝通與互動的橋樑，在生活上也帶來了無數的便利。本論文以 MATLAB 和 KINECT-V2 的深度鏡頭進行研究，並對拍攝到的樣本照片做前置處理，像是斑點分析、線性方程轉換、直方圖等化法等理論使照片中的手部影像更為清楚，再利用自組織映射圖(Self-organizing map, SOM)以電腦視覺的方式去進行分類，並利用 MATLAB 提供的卷積式類神經網路(Convolutional Neural Networks, CNN)模型架構來實現手部的影像辨識基礎，在卷積式神經網路擷取手勢特徵後訓練支援向量機 (support vector machine, SVM) 建立手勢分類器，並建立隱藏式馬爾可夫模型(Hidden Markov Model, HMM)來辨識動態手勢。研究的最後我們是以影音的播放來實現我們辨識系統的即時性以及準確率。

關鍵字：KINECT 感測器、自組織映射圖(SOM)、卷積式類神經網路(Convolutional Neural Networks, CNN)、隱藏式馬爾可夫模型(Hidden Markov Model, HMM)、手勢辨識。

Abstract

In recent years, hand gesture recognition has received so much attention and became very popular. It not only solves the problem of language barriers, but serves as a bridge for communication and interaction between human and computers. It has also brought countless conveniences in our life. We use MATLAB and depth lens of KINECT-V2 to build a dynamic hand gesture recognition system. Captured sample photos are pre-processed through speckle analysis, linear equation conversion, histogram and other techniques to make the hand in the image clearer. Hand images are classified by the self-organizing map (SOM), and their features are extracted by the Convolutional Neural Networks (CNN) model. Finally these features are used to train a support vector machine (SVM). The output sequences of the SVM are recognized by a hidden Markov model (HMM). At the end of the paper, we display the immediacy and accuracy of our recognition system on an audio and video

playing system.

Keyword : KINECT Sensor 、 Self-organizing map 、 Convolutional Neural Networks 、 Hidden Markov
Model 、 identification of gestures