Kinect Interfacing for VPI Player Through Hand Gesture

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Abstract: *Today gesture recognition is amazing way for human computer interaction and helps to eliminate the use of mechanical devices. From the beginning gesture was used for sign language detection that was help for disable people .By the time the as requirement of human beings are increases with HCI so gesture recognition progresses itself in various application like medical ,home science, gaming ,real life application and so on. This paper mainly focuses the different approaches available in present days for hand gesture with their limitation to avoid all hindrances for capturing image we introduce kinect interfacing with its great impact on digital form of percussion instrument.*

Keywords: Kinect Sensor, Hand Gesture, HCI, VPI

1. Introduction

Hand gesture recognition is easiest way of human computer interaction that has proved itself to work without mechanical devices .In modern days there are various application available based on hand gesture modality. Hand gesture has great command over various areas like real life applications, gaming sectors despite of the sign language detection and so on .There are two types of hand gesture static and dynamic; static can be the particular pose e.g. start or stop pose, dynamic gesture can be the series of poses e.g. waving hands(say bye).Basically hand gesture recognition is a way of identifying a hand movements and interpreting its meaning to perform particular task by the provided input data.

For digitizing the hand motions in multiparametric data, Data –Glove based and vision based methods require which uses sensors and camera respectively. Here the problem with the former method is it requires extra sensors to collect hand movement which t ends to costly expenses and uses have to suffer from technical problems. Opposite to it the later method uses the camera, although it does not require extra devices but suffer from the accuracy with respective x –axis. To overcome the all problems [7] we introducing the kinect interfacing for hand gesture.

2. Percussion Instrument and Kinect Vocabulary Design

A. Kinect Sensor:
Kinect sensor was introduced in 2010 basically for Xbox [6].This 3D technology patented by prime sense . Mostly used for gaming purpose and also its use is found in many application like studying crowd interaction ,facial recognition and so on. The kinect sensor added with depth sensing system, RGB camera, motor, and accelerometer and microphones .due to the use of RGB and depth cameras kinect terms as RGBD Sensors helpful in depth plus visual image combination research.

The depth sensing system has infrared (IR) emitter and IR camera which can creates a depth map for hand gesture. The sensor has an angular field of view of 58 degree horizontally and 43 degree vertically .In the default mode sensor has ability to detect the person by his distance range from 0.8 meters (2.6 feet) to 4.0 meters (13.1 feet) .if person is near to sensor at that mode the range varies from 0.4 meters (1.3 feet)and 3.0meters (9.8 feet) from the kinect sensor .in practice we found the range from 1.2 and 3.5 meters from the sensor. Nowadays Kinect usage increases beyond the gaming as in computer industry due to the low cost, accuracy which comparable with VICON camera, high sampling rate.

B. VPI Player
Percussion instrument is musical instruments played by striking with the hand or with a stick or beater, as well as by shaking e.g. drums, cymbals, xylophones, gongs, bells, and rattles. Up till now the percussion instruments are played by the power of human hands it will tend to wastage of energy. This paper propose a system that able to deliver the sound of these percussion instrument in digital form without the use of the of this instruments .The whole process is done by the use of the hand gesture.

3. Related Work

There are many methods proposed for hand gesture recognition. Noor Adan Ibrahim, Rafiqulzaman Khan reviewed the different technology and techniques in which data gloved have complex background, skin color object ,variation of light[8] .Although data gloved based methods give exact coordinates of palm and fingers but user need to be connected with computer physically. Vision based approaches requires only camera to capture the image. Hand gesture recognition system for physically impaired person consider only the static gesture and study of different methods i.e. Subtraction ,gradient, principal component analysis, rotation invariant[1].chen-cheing, Hsieh and dung-Hua Liou ,David lee proposes the system in which group of gesture are trained which is suitable for controlling home

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appliances[5].The static hand gesture recognition algorithm is completely emphasize on feature extraction on feature extraction algorithm is based on finger angle characteristics. Feature extraction is done by ycbcr space to classify collected images [3].Some hand gesture recognition system useful for communicating with deaf and dumb person but suffers from the noisy background, working on limited gestures [4] recognition approach is ANN. Due to the webcam image can be captured in 2D form which gives less accuracy this problem can be removed by kinect sensor which having RGB ,Depth camera and motorized base[6].Vasile, BOgdan, Dilier, Patrik proposes a dynamic gesture recognition through hand skeleton for which little training is required [10].None of any voice delivering facility is available with them. Ing-Jr Ding, he-Wei and Chang-Jyun He develops the kinect based gesture command control method to drive the humanoid robot to learn human action [2].

4. Methodology

The kinect camera capture the hand gesture it will be input for the VPI player .The all hand movement are according to selected percussion instrument will output the sound according to the characteristic of that instrument. Basically we are not implemented any feature extraction algorithm for this system since kinect sensor is capable of performing this task internally itself. The working of the VPI player shown as in fig.1.The skeletal tracking is perform after the capturing the image. In coordinate mapping scaling, translation, and normalization done for the image. The gestures are compared with the data available with us in database. Finally the gesture recognizes and music is played according to selected instrument. The cosine algorithm is used for distance calculation between the obtain gesture coordinates to the kinect.
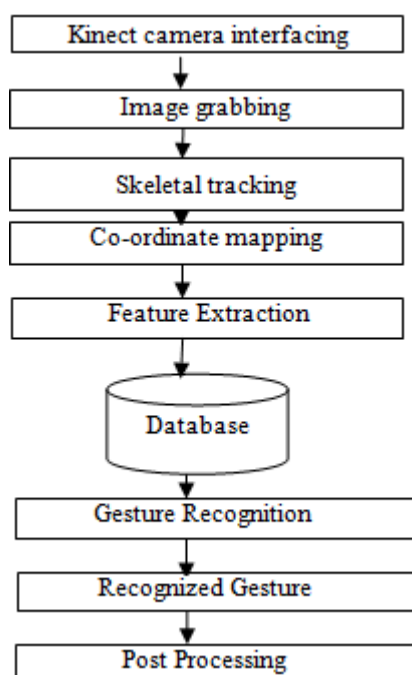

Figure 1: VPI player work flow

5. Conclusion

In this paper we proposed set of algorithm that can be used with the Microsoft kinect to identify the characteristics of the percussion instrument and able to possible to play the virtual percussion instruments. Our proposed system steps ahead in a way of 3D world of human computer interaction that eliminates the need of actual instrument to have with you. This system can able to deliver the sound of different percussion instrument digitally reduces the transportation cost as well as manpower. In future we try to work on tempo control and to increase the efficiency.

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