An Exquisite movement definition & recognition through the Motion-Matrix

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ABSTRACT

The gesture input, which is a means for interacting with the computer and human beings, is gradually developing. However, efforts to achieve accurate gesture recognition on existing platforms are reaching their limits. We are introducing the motion matrix, a new gesture measurement standard. This technology is the result of research to change the existing motion recognition sensors, algorithms and concepts.

Even if the same operation is performed, the approach to improve the human area, that is, the difference that the specialist sees when he / she sees them, is improved by summarizing the data from the simple sensor value and the procedural method instead of the prediction algorithm. 본 논문에서 우리는 기존의 측정 방법들과의 비교를 통한 제스처 인식의 차이점을 알아보고 Motion Matrix 가 적용된…. …

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Authors' choice; of terms; separated; by semicolons; commas, within terms only; this section is required.

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INTRODUCTION

Research related to the perception of human civilization is a field that is widely progressed along with the development of technology. Particularly, due to the development of computers, there is an increasing demand of users for input devices based on motion recognition.

A system for evaluating the accuracy of human motion is currently representative of 3D motion capture, using Depth cameras, an in-depth analysis of qualified athletic specialists, and finally subjective evaluation of oneself.

In the case of 3D motion capture, it is expensive for a capture system that uses accurate measurement, and in the case of using a skin-mounted marker, normal motion measurement such as other data other than measurement data is interfered. In addition, it requires a lot of time and labor to generate and analyze data for a professional workforce. Therefore, these systems have limitations such as the necessity of measurement in the laboratory.

As an alternative, a capture method using a depth camera (representative: Kinect, lip motion, etc.) has appeared. It is a system that is often used for research and commercial purposes with low cost and ease of use. However, the accuracy of this system is insufficient when compared with the method using the sensor. For example, inappropriate lighting or clothing can interfere with camera measurements. In addition, when the range of the camera is set to about 2 m square, it is reported that errors such as recognizing the exercise equipment or object similar to the person are operated in addition to the measurement of the range.

There are two types of measurement that can be directly measured by a person, such as an expert or a person. In both cases, it can be inaccurate because subjective judgment is involved. And even in the case of experts, it is doubtful that accuracy is required if many people need to observe and measure. If you yourself are a non-expert, the criteria for measurement are less accurate. In particular, if you are a non-expert, In the case of motion, it is very difficult to do exactly with given criteria.

Recently, in order to overcome the problems of various measurement methods, motion measurement methods using sensors such as IMU (Inertial Measurement Units) have been developed in various ways and are being researched. IMU uses inertial motion and three-way (3d) data acquisition and measurement using relatively low-cost sensors such as accelerometers and gyroscopes. Therefore, many researchers are currently conducting motion measurement research using IMU. It is a tendency to focus on solving the problem of how to process the data and how to measure the operation accurately and quickly when measuring the operation using the IMU sensor which is being developed recently.

In this paper, we develop a protocol for more accurate and stable data processing in this measurement process, and design a method to define and transmit the movements in each operation. It aims to provide accurate feedback on exercise techniques (or postures) even in a supervisor-free environment.

RELATED WORKS

There are not many studies to divide and classify the actions one by one. In this paper, we propose a new class of Motion Capture and Motion Quality for Knee Osteoarthritis Using Accelerometers, which is one of the most popular motion capture researches conducted by Martin O'Raily in the past 10 years. Data were measured. The subjects were provided with text and picture instructions and proceeded as they understood. The exercise proceeded in three types: the standing hamstring curl (SHC), reverse hip abduction (RHA), and lying straight leg raise (SLR).

Figure 1 Example of SHC, RHA and, SLR

Experimental results show some problems. It is impossible to distinguish other motions except three motions. In particular, the fact that a specialist group is indispensable for discrimination is a major difficulty in terms of cost. Basically, in the case of experiments using non-experts, the discrimination was unclear and the results were not good. And all the steps seem to be automated, but there is also a drawback that people have to do it all the way to actually iterating data.

Another study, The initial results shows that the WBASN foot pressure measuring system can be used as a quantifiable measure for detecting player injuries. The overhead squat operation is measured through the wireless body area sensor network (WBASN). The purpose of this study is not in motion sensing. In the case of motion sensing, the data is verified by the coaches in charge. In the end, it is a study to classify and divide judge's judgment to determine the degree of injury or weakness of the athlete.

The Motion Matrix is a study that uses the sensor-based data to define the procedures and determine the accuracy of the motion classification tasks that must be done by the experts themselves.

Max Matthews' Radio Baton is the oldest musical motion perception study with the goal of practicing human orchestra conduct. Although the operation in this study is very different from the existing command, it has been attracting attention as the best research which is still quoted in the present. This is because it is a study that focuses more on the perfection and coordination of music than on textbooks. This problem has also been pointed out in other articles such as Smartphone-based Music Conducting, Pinocchio: Conducting a virtual symphony orchestra, and Virtual Maestro: An Interactive Conducting System. It is a study of motion recognition method pursuing the completion of art with human feeling rather than perfection of motion.

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In the case of Everybody Dance Now, which is a representative study of motion recognition through artificial intelligence, it is aimed that the public can produce the image which is seen as an expert of dance through the learned model. However, in the present study, it is found that the image is a false image due to the trembling occurring between the frame and the frame. Especially, according to experts, the results of this study are similar to the actual dance movements, but they are not precisely matched for unknown reasons and the shape is very flat. Motion Matrix focuses on this 'unknown reason' and conducts research. In other words, when a professional or a non-expert defines a movement and completes a procedure, it aims at being able to distinguish what kind of action we are already doing just by comparing the data with the data we have.

SYSTEM DESIGN AND IMPLEMENTATION

On each page your material should fit within a rectangle of 7 x 9.25 in (18 x 23.5 cm), centered on a US letter page (8.5x11 in), beginning 0.75 in (1.9 cm) from the top of the page, with a 0.33 in (0.85 cm) space between two 3.3 in (8.4 cm) columns. Right margins should be justified, not ragged. Please be sure your document and PDF are US letter and not A4.

INTERACTION DESIGN AND DATA MAPPING

The styles contained in this document have been modified from the default styles to reflect ACM formatting conventions. For example, content paragraphs like this one are formatted using the `Normal` style.

CONCLUSION

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REFERENCES FORMAT

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