SP3005/PH3025 ADVANCED BIOMECHANICS
Laboratory 4
Quantitative kinematic analysis of Human movement

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1 Introduction

The HU-M-AN software package is a tool to analyse human movements. It uses videos taken from acting subjects to acquire the needed data. For a proper analyse some Administrative task like calibration and digitising must be done by the user through an easy to handle user interface. Then all all joint movements, angular acceleration and so on will be calculated and displayed by the software program.

2 Aims

1. To serve as an introduction to digitizing human movement

2. To digitize and analyze a video clip of a person performing a vertical jump.

3 Equipment

- Computer

- software package HU-M-AN

4 Procedure

Two section, Just starting and Vertical jump analysis of the HU-M-N software package are supplied. Using the computer supplied with the software preloaded work through these two sections

5   Results and Discussion

Qestion: Does this jumper exhibit sequencing of the contributing joints when evaluation initiation of motion ?

Answer: Yes the jumper does sequencing of the contributing joints. As it can be seen in figure 1 he initiates the extension of the hip and knee and the plantar flexion of the ankle at different times. One after another. He does not initiate all extensions at the same moment therefore it is a sequence.

Task: Using the tangent method calculate the maximum angular velocity.

Solution:

$$t_1 = frame15 = 0.500\,sec \qquad \theta_{shoulder1} = 258°$$

$$t_2 = frame23 = 0.767\,sec \qquad \theta_{shoulder2} = 15°$$

$$\omega = \frac{\dot{\theta}}{t} = \frac{\triangle\theta}{\triangle t} \tag{1}$$

$$\triangle\theta = \theta_{shoulder2} - \theta_{shoulder1} = -243°$$

$$\triangle t = t_2 - t_1 = 0.267\,sec$$

$$\omega = \frac{-243°}{0.267\,sec} = 910.1\,°sec^{-1} = \underline{15.88\,rad\,sec^{-1}}$$

6   Conclusion

The kinetic analyse is quite easy to do with such an software tool but the need to pick all points where a joint will be assumed by hand causes a great source of errors. A better way to digitise this like special markers for example should be used to get more precise results.