

A SURVEY OF COMPUTER VISION –BASED HUMAN MOTION CAPTURE

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ABSTRACT:

A Comprehensive survey on **COMPUTER VISION BASED HUMAN MOTION CAPTURE** focuses mainly on the basis of Taxonomy/classification of the functionalities which can be divided into the processes: tracking, initialization, estimation & finally recognition each process is divided into several sub processes. The “IDEA” with this report is to present previous work in a structural manner with the help of taxonomies.

The study of human movement within sports biomechanics and rehabilitations have a high progress in recent years. It deals with developing a motion Analysis system that collects all the raw info and data.

KEYWORDS: Human Motion Analysis, Taxonomy, Human Motion Recognition, Tracking.

INTRODUCTION:

The human action based on computer includes more and more support. The main task is the “motion” called “human motion capture”, it also includes moving head, arms and legs. Human motion is defined as capturing the body movement at some resolution. It enables the fields as biomechanics, machine vision, AI, image processing. AI has been design machines which work still more intelligently or natural human-like-understanding. In **kinesiology**, the model of human body explains how it functions mechanically and an increment in movement efficiency. In **CHOREOGRAPHY** there was long term interest in high level description of human movement notation of ballet, theatre and dance.

SURVEYS AND TAXONOMIES:

The fields of human action based on computer vision have grown up significantly. A taxonomy includes individual “papers, their purpose, algorithms” to define or arrange them into different categories having similar characteristics. The focus is on a general overview based on a taxonomy of system functionalities, broken down into four processes: initialization, tracking, pose estimation, and recognition. Cedras and Shah give an overview of methods within motion extraction prior to 1995, which are all classified as belonging to optical flow or motion correspondence. The human motion capture problem is described as action recognition, recognition of the individual body parts, and body configuration estimation.

CATEGORIES OF TAXONOMY:

- Tracking versus recognition
- 2D versus 3D
- Model based versus non-model
- Post estimation versus recognition
- Mobile versus sensors

- Person multiple versus person

The category depends on the purpose of the survey and also the survey that used different taxonomies.

PREVIOUS SURVEYS:

It gives an overview of methods used in 1995 [Articulated and elastic non grid motion]. Agarwal in which various types of motion with/without models are described, it is further more categorized into with shape model and without shape model. Each and every processes are discussed and divided into sub-processes and/or categories of methods to provide a reference to describe and compare more than 130 publications covered by the survey. Every survey provides a new view or description about Computer Vision –Based Human Motive Capture to explore it to the most of the innovation. A number of general assumptions used in this research field are identified and the character of these assumptions indicates that the research field is still in an early stage of development. To evaluate the state of the art, the major application areas are identified and performances are analyzed in light of the methods presented in the survey.

APPLICATION:

i) MECHANICAL MAN:

Human motion analysis includes mechanical man such as robotics for humanoid control to copy the motions of human beings. The robotics being used in the technology gives a new height to the human motive based captures

ii) BIOMETRY:

Human motion analysis in the fields of biometry has become eminent because of the gait (i.e.) patterns of movement of limbs, locomotion. The biometry is a highly secured encrypted activity which gives prevention to the invention.

iii) MEDICAL:

Human motion analysis is used in medical fields such as fitness, posture, neuro, orthopedics.etc... Thus, the ailments are reduced and almost being extinguished by the computer vision based human motive capture.

iv) GESTICULATE POSE:

It is the interface of the computerized system with human gesture, posture recognition. It is applicable in Gaming, sign language, device control etc.... The gaming activities are providing a huge contribution in the world of imagination where people will to live .

v) RELAXATION

It is useful for Art and entertainment purpose that includes learning, arts like dance movements. It improves the effectiveness of scene & impact of acting.

Human Motion Estimation & Recognition:

The Taxonomy is a basis of both motion estimation and recognition which are divided into subclasses:

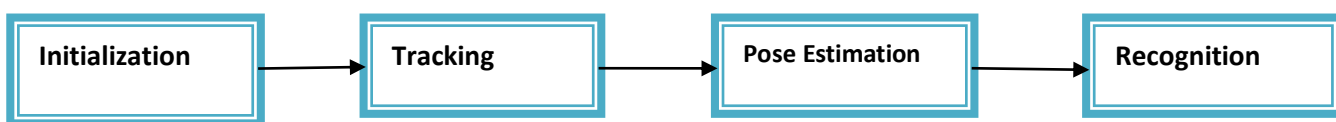
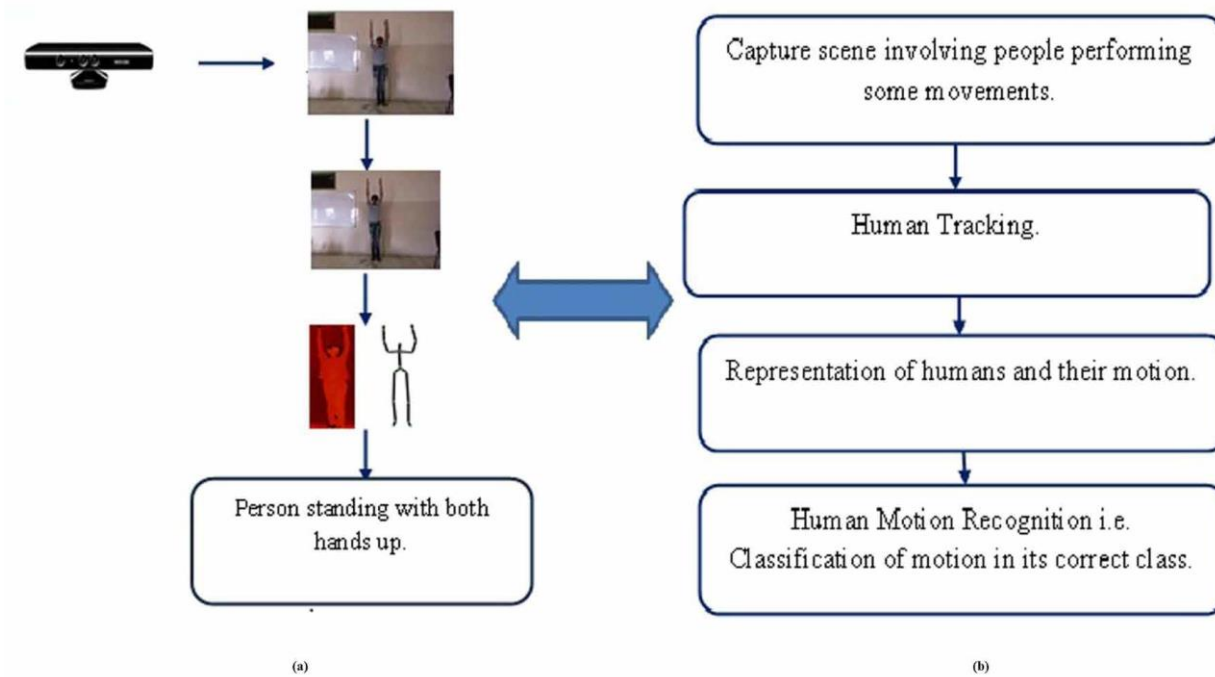


FIG. A general structure for systems analyzing human body motion.

Figure 1. General framework for human motion recognition and its pictorial representation



Skeleton based Approach:

Skeleton Based Approach can be demonstrated that a large set of action can be managed from the position of the joints. The main reason is the natural correspondence of the Skeletons, Meanwhile. It is difficult to establish for general data. The main objectives of the skeleton:

- Monocular or Multitier color images
- Active motion capture
- Single view depth maps

They are usually adapted for color images providing Stability. Skeleton Based Sequential Approach represents human action as curves in low dimensional phase via 3D joint trajectories. **SKELETON BASED SPACE TIME VOLUME APPROACHES** generally extract global features from the joints sometimes combined with point cloud data. This line of research is relatively new and only few methods are available.

Recent Development in Human Motion Analysis:

It has been investigated under huge research project. For Example: **DARPA** (Defense Advanced Research Projects Agency) whose aim was to develop an automatic video understanding technology which enables a human operator to peer activities over complex areas. Example: Battle Field. The recent trends in human motion analysis are Globalization, Strategic HRD and talent management, Electronic, mobile and social learning, Management and leadership development, Performance consulting, Career and performance management, Proactive learning needs identification, Learning design, Evaluation of training, Employment equity and diversity training and Learning organization.

Tracking:

Tracking is key issue in Human Motion Analysis since it serves as a source of data for, post estimation & recognition of data, considered to be equivalent for coherent relation of the feature of the image and its Position, Velocity, Shapes, Colors, Texture etc., The tracking of Human Motion Capture consists of various basis in tracking such as Characteristics, Active Profile and Domain or Region.

Characteristic based Tracking:

This Tracking method uses features such as classified points or lines on the object to review the tracking. The benefit is the presence of partial occlusions, some of the features are visible. It includes feature matching & feature extraction. It is also an issue for successful **MULTICAMERA** tracking system.

Active profile based Tracking:

Active profile based Tracking is adopted the differential equivalent to describe complex motion and combine those approach with template, statistical frame work which observed inter frame difference density function using mixture model. Active profile based Tracking is also called as Active contour or snakes aim of extracting the shape of the subject.

Domain or Region Based Tracking:

Domain or Region Based Tracking is widely used to identify the connected region linked with the moving object in an image and track it over time with the help of cross correlation measure. Meanwhile both the background scene and human body were modeled with distribution. The solution may require tracking using multiple cameras.

DISADVANTAGE:

- When there is problem, it is easier to retry the scene rather than manipulating the data, only few systems allow real-time view of the data to decide the need of radio.
- The results are limited to the performance within the capture volume without any manipulation.
- A movement that does not follow the laws of physics cannot be represented.
- The real life performance may not translate on to the computer models as per expectation.
- The cost of software equipment, personal can be prohibitive for small productions.

CONCLUSION:

The Human Motion Analysis is a prominent area of Research. The Paper is classified according to the complexity of the action. Field like Machine Learning, Artificial Intelligence needs to be applied for Human Motion Capture. The success is by commercial systems that estimate full body poses for computer games, hand poses for gesture interfaces. Expected that more approaches will make the transition from the lab to a business.

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