An Analysis Model of Sports Human Body Based on Computer Vision Tracking Technology

Mingzhu Yuan

Abstract.

This paper proposes the analysis model of sports human body based on computer vision tracking technology. Visual target tracking is an important research field of the computer vision, motion trajectory and it can provide not only the goal, to provide the initial data movement analysis, scene understanding, behavior or the event detection in intelligent surveillance, human-computer interaction, robot visual navigation and motion recognition based on field has a broad application prospect. For this reason, it is possible to consider the use of a large number of unlabeled samples to assist the training classifier to improve its performance. This type of machine learning method using both labeled and that unlabeled samples is called the semi-supervised learning. This paper proposes the novel idea of the related research topics to propose the new perspective of the model that will be later give us the novel idea of making it efficient for further development of sport science.

Keywords: Human Body, Analysis Model, Computer Vision, Tracking Technology

Introduction

Visual target tracking is an important research field of the computer vision, motion trajectory and it can provide not only the goal, to provide the initial data movement analysis, scene understanding, behavior or the event detection in intelligent surveillance, human-computer interaction, robot visual navigation and motion recognition based on field has a broad application prospect. The Mean-Shift target tracking algorithm the color or the texture took the target characteristic that uses the nuclear function construction goal template the nuclear density to estimate, estimated in the goal candidate region establishment candidate goal nuclear density that determines the next time goal through the Bhattacharyya coefficient maximization the position. In the goal template region, the demarcation rectangle inscribes in the ellipse the picture element spot to be able to participate in the nuclear density estimate in the computation, in the goal candidate region, usually is in the center of circle circular region calculates in an above center of the target treats matches the region the nuclear density estimate. In the figure one, we show the sample dataset.

1Public Physical Education Teaching Department, Fuzhou University of International Studies and Trade
In the classification-based target tracking, as in order to cope with changes in the target and the complex background, a large number of labeled samples are required, and the cost of manually marking the samples is huge and sometimes unrealistic. For this reason, it is possible to consider the use of a large number of unlabeled samples to assist the training classifier to improve its performance. This type of machine learning method using both labeled and that unlabeled samples is called the semi-supervised learning. In target tracking, the artificial markers are often only a few frames for initial tracking algorithms must continually learn from tracking results the change of the target and the background information, therefore the target tracking based on classification can be regarded as one and a half to supervise learning problems. Based on this in the later sections, we will discuss in detail of the model of sports human body based on computer vision tracking technology.

The Proposed Research

Computer Vision Tracking Technology Theoretical Review. The discriminant track method is carries on under the sorter frame, in the track process, divides into the goal a kind to be called the sample, the background divides into another kind to be called the negative sample. Withdraws the positive and negative sample from each, uses sample which these withdraw, sorter iteration renewal goal apparent model and as a result of their highly effective track result, therefore this kind of online enlargement mode sorter obtained the widespread use as the follows.

\[
\begin{align*}
x_{i+1|T} &= x_{i|T} + J_x(x_{i+1|T} - x_{i+1|T}) \\
V_{i+1|T} &= V_{i|T} + J_x(V_{i+1|T} - V_{i+1|T})J_x' \\
V_{i-1,0|T} &= J_{i-1}V_{i|T}
\end{align*}
\] (1)
According to the mechanism of motion significance detection, a new tracking method is proposed, which combines the spatial features of the target object to realize the tracking task based on the region. The region-based tracking model is that each frame updates the characteristics of each target object to produce an adaptive template. If the matching error is less, the area of interest in the motion graph is marked as the target object which can re-write the formula one into the formula two.

\[
P(X_t = x_t | X_{t-1} = x_{t-1}, S_t^x = i) = N(x_t; A_t x_{t-1}, Q_t)
\]

\[
P(Y_t^1 = y^1 | X_t = x, S_t^y = j) = N(y^1; C_t x, R_t^1)
\]

\[
P(Y_t^2 = y^2 | X_t = x, S_t^y = j) = N(y^2; C_t x, R_t^2)
\]

\[
P(S_t^x = j | S_{t-1}^x = i) = A^x(i, j)
\]

\[
P(S_t^y = j | S_{t-1}^y = i) = A^y(i, j)
\]

(2)

Object description color, texture and appearance model is use in the links on the material, the object appearance model and geometric model to each point of the position of the basic object and appearance, mathematical approach is used to describe the camera image model, object dynamic model is through the state space to describe the presumption of movement as the follows.

\[
W = \begin{pmatrix}
1 & 0 & Q_0^x & 0 & 0 & Q_0^y \\
0 & 1 & 0 & Q_0^y & Q_0^x & 0
\end{pmatrix}
\]

(3)

Due to the indirect method of many disadvantages it generally applied in specific situations, the direct method has the advantage of (1) the tracking target choose a larger flexibility can be replaced at any time (2) the same moving object tracking specific goals even if there are multiple can also choose to track the target The downside is when an object moves speed is larger operation more difficult.

Figure 2. The Vision Tracking Feature Extraction.

The Human Body Characteristics Identification. In the general full consideration different characteristic expression good and bad points and in the applicable scope foundation,
proposed one kind new flows the overall situation shape description static characteristic and the partial light the description the dynamic characteristic organic synthesis mix characteristic. First determined using the background abatement law movement approximate region, obtains the human body sketch, and using sketch outline vector representation human body outward appearance overall information; Then withdraws the light class in the movement region, and flows the information using the minute region partial light to express the core human body movement partial characteristic as sharpens the anti-chirp ability by this which the light flows, finally flows the overall situation sketch characteristic and the partial light the characteristic union to take the mix characteristic.

Different features reflect the characteristics of basic human motion from different perspectives. Choosing a feature not only takes into account its separability but also takes into account the ease of its extraction, how to choose one or more of the features the primary task of motion recognition. And therefore, we consider the following features as the sample. (1) Only depend on the characteristics and selection of the stance change rate, could not judge the human body is walking movements, or standing. These two actions, people's attitude changes from satation gesture gesture, movement of position information can solve this problem. (2) The body's normal action in daily attitude always changes steadily, but the sudden abnormal (fall) when the attitude rate will be very severe. This paper introduced motion feature detection of attitude change rate fell down and down. The two movements, the key process of the attitude change similar attitude change rate is different. (3) The model-based attitude acquisition can describe the complex attitude, but the model is difficult to initialize, the calculation is large, it is easy to produce local minimum, it is difficult to find the global optimal and robust parameters. Therefore, this paper chooses the target size, degeneration, perspective of the human body is not wide, high than the description of the human body posture characteristics.

**Human Movement and Sports.** In this paper, the use of hierarchical human body model, as the body movement by the skeleton movement to express. The structure of the joint is a tree structure, the joints as a node, the joints between the bones as a chain, we can follow the movement of the joints will link up. During the course of the movement, the local coordinate system of each node will change, but the length of bone marrow and its position in the local coordinate system is constant. The process of bone marrow movement is actually the process of changing the local coordinate system of each node. The root node is the core of the local coordinate system, and the other skeletal nodes are directly or indirectly affected by the local coordinate system of the basic root node. In the human body's three-dimensional reconstruction of the results known, and we can first calculate the root node of the translation and rotation vector, and then calculate the rotation vector of each joint, so that you can find the movement of each frame in the human model the rotation vector of the joint.

And with the assistance of the proposed system, we can propose the suggestions for the modern sports training as the follows. (1) The index system mainly reflects the common characteristics of the sunshine sports in colleges and universities, but it has the unique contents and methods of the colleges and universities in the sun sports work created by the good experience, the good way as well as in the physical education and extracurricular sports
activities that can also be better reflected. (2) Index system should be correctly reflected sunshine sports development status and development direction, the influence on sunshine sports work, the more important factors in the evaluation standard of larger tilt; At the same time to make the indicators of the scale of the various universities to self-check the sunlight sports work, clear school to carry out the problems existing in the process of sunshine sports and weak links, motivate schools continue to strengthen the school sports work, improve the students' physical health level. (3) From the viewpoint of system, the sun sports need to run the appropriate organization and management system of colleges and universities, to provide security through the allocation of some resources, physical education, extracurricular sports activities and publicity and education, to enable students to master the knowledge and skills of the physical exercise, physical exercise habits and establish the correct concept of health.

Conclusion

This paper proposes the analysis model of sports human body based on computer vision tracking technology. When human body movement, the skeletal muscle anxious and the relaxation always has one to start, the high tide and the conclusion natural process, this process is the order cannot skip. Therefore human body some behavior may use a posture sequence to indicate, the current posture is decided merely by its preceding posture and this is conforming to the Markov nature. Based on this feature, we integrate the CV model to present the novel analysis model of sports human body and furtherly we propose the suggestions for the sports activities.

Reference


