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HUMAN POSE ESTIMATION USING MACHINE LEARNING

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Abstract: Computer vision is becoming increasingly important in video surveillance, video retrieval and analysis, and human-computer interaction because of the ubiquitous nature of video data. Due to rising demand for automated analysis of human actions by computers, this project is being undertaken. This paper presents a human pose estimation system based on global feature extractions that can operate in real time. In the proposed method, video sequences are used to compute features of images. A real-time human pose estimation system is the goal. UT Actions such as hugging, handshakes, kicking, pushing and punching are included in the dataset. Real-time detection of various human activities is made possible through the use of an SVM classifier. The dataset which we have been used is to find similar videos based on the actions in the input videos.

Keywords: Support Vector Machine (SVM)

I. INTRODUCTION

Intelligent health care, video surveillance, human-computer interaction, and visual content retrieval systems all benefit from action recognition in videos. People's appearance, lighting changes, and the amount of data generated make video-based real-time human activity recognition a difficult task.

There are three main steps in a real-time human pose estimation system: detection, tracking, and identification. As the number of people are being more used to of using digital video cameras in their daily lives rises, so therefore the amount of video being created, uploaded, and stored online and in large video data sets.

There are numerous applications for human pose recognition including visual surveillance, content-based video retrieval, human-computer interaction, and sports action. Visual surveillance systems in large public areas, for example, can automatically extract high-level semantic information from surveillance video if human action recognition is successful.

The tracks of a person's body parts were used as input features in early human action recognition attempts. As a result, most recent research shifts from skeletons to low-level features, such as local features, because of which full body tracking from videos is still a difficult problem to solve Recently, the rapid development of depth sensors (such as the Microsoft Kinect) has resulted in sufficient accuracy and low cost for real-time full-body tracking. As a result, we can once again test the viability of activity recognition based on skeleton features. To classify videos of simple periodic actions performed by a single person (For example, "walking" and "kicking"), algorithms have been proposed in the past. For example, 'pushing' and 'handshakes' are two examples of actions and activities that take place frequently in the real world and are often performed by multiple people (e.g., Complex non-periodic activities, such as interactions between multiple people, will be required for a variety of applications (For example, automatic detection of violent activities in smart surveillance systems).

II.MOTIVATION

Action recognition in videos has applications in intelligent health care, video surveillance, human computer interaction and visual content retrieval systems. Video based real time human pose or action recognition is a complex and challenging task due to variation in people’s appearance, illumination changes and the amount of data generated. The main step of real time human pose estimation system involves person detection, tracking and recognition

III. REVIEW OF LITERATURE

A real time human activity or pose recognition system based on Radon transform (RT), Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA) are presented. Artificial Neural Nets (ANN) is used to recognize different human activities [1].

The data extracted using optical flow is converted to binary image. Then Histogram of Oriented Gradient (HOG) descriptor is used to extract feature vector from the binary images. These feature vectors are given as training features to Support Vector Machine (SVM) classifier to prepare a trained model [2].

In this paper, video based pose recognition is performed on KTH dataset using four combinations of two feature descriptors and two classifiers. The feature descriptors used are Histogram of Oriented Gradient Descriptor (HOG) and 3-dimensional Scale Invariant Feature Transform (3D SIFT) and classifiers used are Support Vector Machine (SVM) and K Nearest Neighbour (KNN). Features are extracted from frames of training videos using descriptor and clustered to form Bag-of-words model. [3].

This approach predicts human actions using temporal images and convolutional neural networks (CNN). CNN is a type of deep learning model that can automatically learn features from training videos. Although the state-of-the-art techniques have shown high exactness, they consume a ton of computational assets. Another issue is that numerous strategies accept that accurate information on human positions [4].

The focal thought of Principal Component Analysis (PCA) is to reduce the dimensionality of an informational data set comprising of an enormous number of interrelated factors, while holding however much as could be expected of the variety present in the informational index. This is achieved by transforming to a new set of variables, the principal components (PCs), which are uncorrelated, and which are ordered so that the first few retain most of the variation present in all of the original variables [5].

Human Activity Recognition Using an Ensemble of Support Vector Machines is employed to improve the classification performance by fusing diverse features from different perspectives.

The Dempster-Shafer fusion and product rule from the algebraic combiners have been utilized to combine the outputs of single classifiers [6].

Human motion capture continues to be an increasingly active research area in computer vision with over 350 publications over this period. A number of significant research advances are identified together with novel methodologies for automatic initialization, tracking, pose estimation, and movement recognition. Recent research has addressed reliable tracking and poses estimation in natural scenes. Progress has also been made towards automatic understanding of human actions and behavior [7].

IV. PROPOSED SYSTEM

The proposed work is a two-person interaction-based, video-based system for identifying human activity. This paper presents a human pose estimation system based on global feature extractions that can operate in real time. In the proposed method, video sequences are used to compute features of images. Actions like hugging and shaking hands are included in this dataset as well as kicking, punching, and pushing. Using this, all features used for classifying two-person interactions are represented by a body-pose feature in the context of identifying interaction activities via Support Vector Machine (SVM). User is the only module in the system. The system responds to a user's request.

PROPOSED SYSTEM ARCHITECTURE

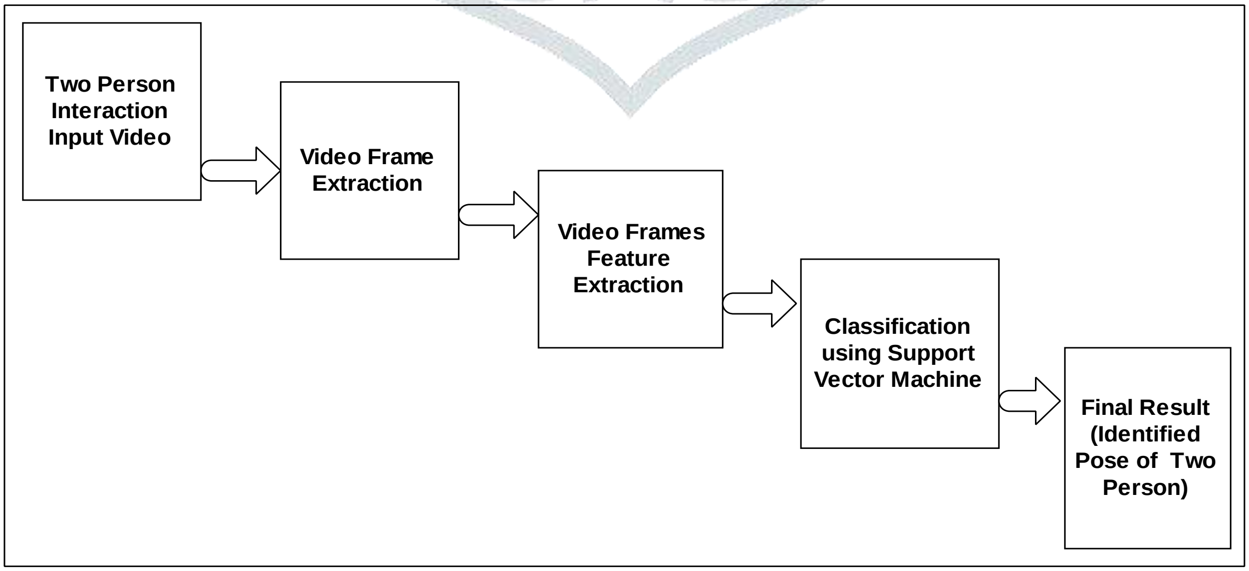

Two Person Interaction Input Video
Video Frame Extraction
Video Frames Feature Extraction
Classification using Support Vector Machine
Final Result (Identified Pose of Two Person)

Fig. Proposed System Architecture

Algorithm: Shape Invariant Texture Index (Global Features)

1. Color Features

a. Color Moment

- Mean

-Standard Deviation

-Variance

2. Edge Detection

-Canny Edge Detector for Shape Features

3. Texture Extraction

-Input: Edge Detection Features

-Output: Co-occurrence Matrix converted into array as features

V. RESULT AND DISCUSSION

- A dataset contains 20 video files of human actions.
- A search was conducted on those files and 20 records were retrieved.

Of those 4 records retrieved, 4 files consider as a test files and remaining 16 files consider as a train files.

In our system, firstly we take a video file for processing. After that we extract the frames of input video file.

So, if we consider the 100 frames of each video. So out of 100, 95 records were retrieved. Then out of 95 frames 90 frames are relevant which is retrieved.

Calculate the precision and recall scores for the search.

Solution:

Using the designations above:

- A = the number of frames retrieved,

- B = the number of relevant frames not retrieved,

And

- C = the number of irrelevant frames retrieved.

In this example

A = 90,

B = 10 (100-90)

And

C = 5 (95-90).

Recall = (90 / (90 + 10)) * 100% => 90/100 * 100% = 90%

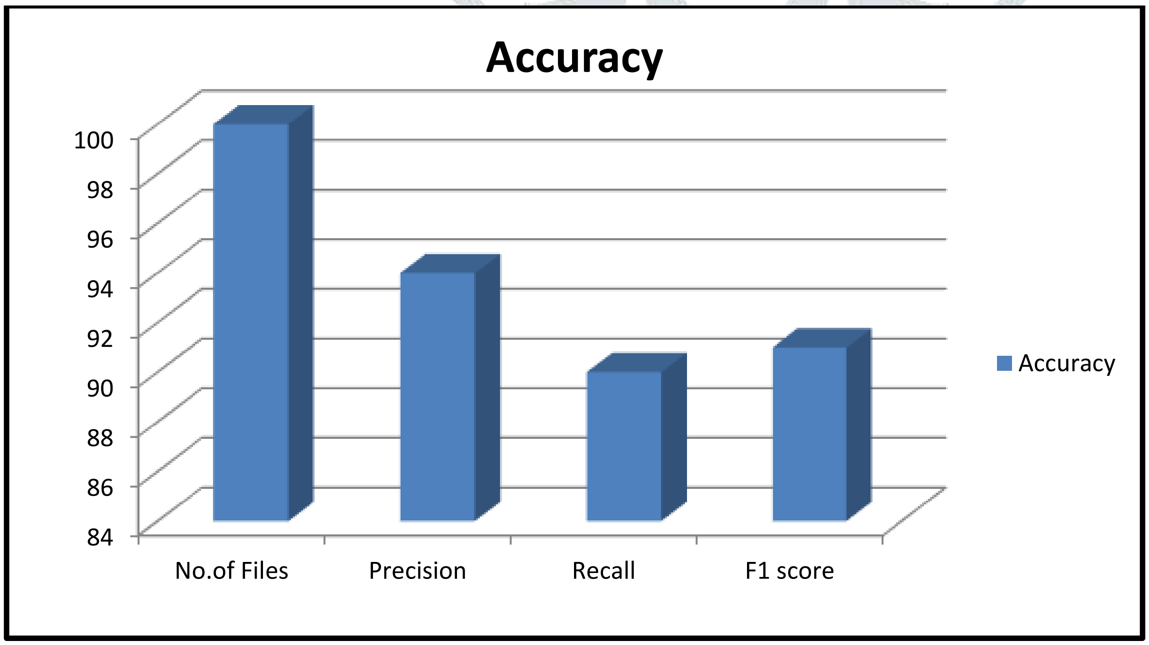
Precision = (90 / (90 + 5)) * 100% => 90/95 * 100% = 94%

F1 Score = 2 * (Precision * Recall) / (Precision + Recall)

= 2 * (90 * 94) / (90 + 94)

= 91.95%

Chart



VI.APPLICATIONS

This project makes the activity recognition techniques more valuable and widely used in diversified applications of our daily lives. In this section, we focus on four dominant applications, including

- Surveillance environments
- Entertainment environments
- Healthcare systems
- In sports

VII. CONCLUSION

In this project, a feature representation and activity recognition system for video retrieval system human activity recognition is proposed. The selection of key frames to represent a sequence of activity significantly reduced the computational complexity. To determine a person's activity, the feature extraction algorithm is implemented in java. As a result, our human activity recognition system operates more effectively. Classifier support vector machine is used to perform recognition (SVM). For detecting human activity, the SVM classifier achieves the best recognition results. The database is searched for videos that are similar to the input video.

VII. FUTURE SCOPE

To enhance this work in future by using capturing the using real time video to recognize the common activities like simple actions the interactions between persons such as hand shaking, hugging; or the interactions between humans and objects, such as pushing, kicking, approaching**.**

IX.ACKNOWLEDGEMENT

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