



Survey for Classification of Indian Classical Dance

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Abstract --- Production of the multi-media data is increasing with the time. Searching of desirable data from this big data is a very time consuming and complex task. This survey deals with one of the application of video classification and gives an approach for Classification of Indian Classical Dance. There are certain applications like improving indexing of videos, automatic choreographic tools, etc needs video classification. This paper concentrates on video classification of Indian Classical Dance. To classify this we need to apply feature extraction on dance videos. Till now some features are used and experiments are made using different classifiers. This paper reviews different features and techniques to classify Indian Classical Dance.

Keywords: Video Processing, Feature Extraction, Video Classification, Spectral Features, Human Pose Descriptor, Gesture Recognition.

I. INTRODUCTION

Classification of any dance videos comes under Human Activity Analysis, which is an emerging research field for techno-dance person. There are various applications of it like Automatic Choreographic tools, Dance form Separation, Dance Recommender System and Dance Classification. For analyzing and classifying the dance form we required video processing. The Indian Classical dance form can be of three types: 1. Solo Dance, 2. Duet Dance and 3. Group Dance. Solo dance performance is done through a single dancer, Duet is done when two dancers are there and group dance comprises of more than two dancers. There are some features and techniques which can be used to distinguish one dance form from other, like Human Pose Descriptor, Gesture Recognition, Motion Detection, Space Time Interest point Detection etc. In this paper Section II gives details about dance forms and its category, which helps to understand dance classification. Section III gives idea about steps involved in video classification. Section IV contains literature survey for Dance recognition features over the last decade.

II. DANCE CATEGORY

2.1 Bharatnatyam[3]

Bharatnatyam is one of the most ancient of all the Indian Classical dance styles. This dance is known for its grace, purity, tenderness and sculptural poses. There are two authentic books which gives techniques and rules for this dance form 1. Natyashastra, 2. Abhinayadarpan. There are two major aspects to this form of dance: Nritya (rhythmic dance movements) and Nritya (representational dance). Nritya is divided into Chari - walking movement; Karna - balanced composition of hand and leg movements; Angahara - different combination of Karna; Mandala - postures with hand gestures. The body limbs are classified as: Anga (main body parts); Pratyanga (minor limbs); and Upanga (features of the face). Pratyanga and Upanga are supposed to move in unison with Anga.

2.2 Kathak

Kathak originated in Uttar Pradesh, India. The name Kathak is derived again from the Sanskrit word katha (story): kathaka means 'he who tells a story, or has to do with stories'. This dance form traces its origins to the nomadic bards of ancient northern India, known as kathakas (storytellers). Rapid leg movements are the main aspect of this dance form.

2.3 Manipuri

Manipuri dance is one of the main styles of Indian classical dances that originated in the beautiful north-eastern state of Manipur. It is associated with rituals and traditional festivals; there are legendary references to the dances of Siva and Parvati and other gods and goddesses who created the universe. The dance was performed earlier by maibas and maibis (priests and priestesses) who re-enact the theme of the creation of the world.

2.4 Kathakali

Kathakali is a classical dance form which originated in Kerala. Katha in Sanskrit means story and kali in Malayalam means play. So Kathakali is a play based on a story. Kathakali, a stylised art form, is a blend of dance, music and acting and dramatizes stories mostly adapted from the Indian epics. All the four aspects of Abhinaya — angika, vacika, aharya, sattvika — and the three components of the dance — natya, nritya and nritya — are unified flawlessly in this form.

III. VIDEO CLASSIFICATION PROCESS

The whole process of video classification comprises of the following steps:

- Image Capture
- Video Preprocessing
- Feature Extraction
- Classification



3.1 Image Capture

In this phase the video is converted into frames. Frames are the 2D image which when combined forms a video. The image is captured from the video in this phase and then it is processed for the next phase. The capturing is mostly done with the camera capturing the frontal view. As per the feature used for classification of dance the angle of camera is chosen. In gesture based classification mostly the frontal view of camera is taken. If Human pose is taken as the feature then more cameras at different angles are needed to capture the whole body pose.

3.2 Video Preprocessing

The image obtained from the image capture phase cannot be directly used as an input due to various factors such as: Lightning condition, angle of camera, geometric transformation, Noise removal, Image resampling etc. The basic aim of this phase is to optimally prepare the image obtained from the previous phase in order to extract the features in the next phase. Preprocessing phase enhance the area or region of interest from the paper.

3.3 Feature Extraction

The aim of this phase is to extract feature or set of features that can be used to classify one dance form from other. The features that can be used to classify Indian Classical Dance can be Human Pose Descriptor, Gesture Recognition, Motion Detection, Space time Interest point calculation etc. Ideally such a feature, or a set of such features, should uniquely describe the gesture in order to achieve a reliable recognition.

3.4 Classification

In this phase a feature or a set of feature is assigned to some predefined class or label for classification. In general, a class is defined as a set of reference features that were obtained during the training phase of the system or by manual feature extraction, using a set of training images. Therefore, the classification mainly consists of finding the best matching reference features for the features extracted in the previous phase.

IV. Literature Survey of Dance Recognition Features

Soumitra Samanta et. al [1] has represented each video using pose descriptor. A dictionary is made and learned which consist of some sequence of Human pose and its description. Through comparing the input video to this dictionary they have created a sparse descriptor for each video which explain the pose in the particular frame. The pose descriptor is built here using motion and gradient information. Optical flow and gradient value of each frame is calculated and by combining this two vector field the motion matrix is been built. SVM classifier is used to classify the dance forms.

Soumitra Samanta et. al [2] had first detects space-time interest points from video data. Then each detected point is described by local gradient and motion information. A vocabulary is learned by clustering the description of the interest points and subsequently each action sequence is represented by the learned vocabulary. Finally, some classifier is used to recognize the action. Here they propose an efficient STIP detection method using differential geometry. The contribution in this paper is in three folds. First, they propose a new space-time-interest point detector based on differential geometry formulation. Second, they propose a new descriptor by using spatial and temporal derivatives of different orders. Finally, they build a new ICD dataset.

Sangeeta Jadhav et. al [3] had identified and classified the main angalakshanas. An angalakshanas can be described as different movements of the body like head, eyes, neck, hands and legs. By using different existing dance repository a machine learning technique is build to identify different angalakshanas. A computational model is build to identify the dancers body movement at a particular interval of time and then to categorize it in one of the angalakshanas.

Shweta Mozarkar et. al [4] had tried to recognize the hand gesture which convey some specific meaning and which convey information. The dance mudras are identified using pattern recognition and image processing techniques. Here, a novel approach of computer aided recognition of Bharatnatyam Mudras is proposed using the saliency technique which uses the hypercomplex representation (i.e., quaternion Fourier Transform) of the image, to highlight the object from background and in order to get the salient features of the static double hand mudra image. K Nearest Neighbor algorithm is used for classification.

Table 1. Survey Content

Year	Feature	Classifier/ Technique
2010	Hand Gesture, Leg Movement	Neural Network
2012	Human Pose Descriptor	SVM
2013	Space Time Interest Point Detection	SVM
2013	Hand Gesture	Quaternion Fourier Transform
2014	Human Pose	Attributed relational graph, skeletonization

V. CONCLUSION

Video Classification and Human Activity Analysis are both emerging field. Till now most of the work is on concentrating categorization of western dance forms. Indian Classical Dance forms are still need to be focused to get better result. As per the survey different features are used with different classifiers but most of the research work includes single feature extraction with limited no. of dance forms. Thus, by combining more no. of features and increasing the no. of dance classes and the dataset will always get attention of dance and technology seeking researchers.

VI. REFERENCES

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