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Classical Dance Hand Gesture Recognition using Image Processing and Deep Learning Irnal

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ABSTRACT

Recognition of Dance posture & hand gesture in dance is most important. To get the exact names of these mudras some expertise should be there. So without expertise our proposed system recognizes the dance posture and hand geture. Indian classical dance traditionally performed as an expressive show dance type of strict execution workmanship, connected with Vedic writing. It's likewise a method of articulation of inward sentiments, assisting with creating self-conviction and fearlessness. Significance of old style dance is the activity of the whole self. Due to picture names, picture quality, uneven dataset and pixels values the accuracy is not good. So our proposed system implies the CNN and Deep Learning algorithm to recognizes the Dance posture and Hand gesture. Our system is used for all users who are interested in dance. Without a teacher can get the dance posture details. Introduced here Kathakali and Bharatnatyam Hand Mudras. Referred Kaggale site for dataset and also we added our own dataset. Each image recognizes the proper name and gives in the form sound also of Hand Mudra. Gaussian algorithm is used for more accuracy purpose.

KEYWORDS:-Gesture, Posture, Bharatnatyam, Kathakali, CNN, Deep Learning

1. INTRODUCTION

Gestures are powerful and natural methods of non-verbal correspondences in which apparent body activities are utilized to convey significant messages. Signal acknowledgment implies the distinguishing proof of significant articulation of human activities. To concentrate motion acknowledgment, on understanding the applications, definitions and nature of the gestures is fundamental. Signal acknowledgment implies a course of perceiving a kind of motion. Hand

Gesture implies cycle of perceiving a sort of hand picture articulation which convey significance during normal discussions. Culture explicit hand signals, hand motions can convey various implications in various culture. Dance signal acknowledgment implies the acknowledgment of significant articulation from various dance presents. It communicates the significance of dance show and assist with establishing all inclusive correspondence climate.

The term Indian old style dance includes all the artistic expressions of the natyashastra, it presents traditional status to eight Indian maneuvers, of which Bharatanatyam is perhaps of the most settled. We have used two Indian dated dance structure pictures i.e, Bharatanatyam and Kathakali.

The various deep learning methods use data to train neural network algorithms to do a variety of machine learning tasks, such as the classification of different classes of objects. Convolutional neural networks are deep learning algorithms that are very powerful for the analysis of images. Deep learning has various applications like image processing, natural language processing, etc. It is also used in media& entertainment, autonomous cars, etc. We have taken images from kaggle website for training and testing the images. In our study we are performing more than 10 images for this basic model. Hence we use the CNN algorithm for more image accuracy.

The author K Wolek refers in this study proposes atechnique for identifying facial locales by joining a Gabor channel and a convolutional brain organization. The primary stage utilizes the Gabor channel which removes natural facial highlights. Because of this change we get four sub pictures[1]. The author U.Rafi refers in the paper, we hence propose an effective profound organization design that can be proficiently prepared on mid-range GPUs without the need of any pre-preparing. Regardless of the low computational necessities of our organization, it is comparable to significantly more intricate models on famous benchmarks for human posture assessment[2].

In our study we applied the Gaussian filter at the first level used to blur the image or to reduce noise. The Gaussian filter alone will blur edges and reduce contrast. At the second level different dance gestures is extracted. We use the CNN algorithm for image preprocessing and classification, to predict the accurate dance pose name according to the input image. We have taken the dataset in kaggle website.

The rest of the paper is organized as follows. Section II describes the related work, in section III describes proposed methodology. The implementation and experimental results are provided in detail in section IV.

2. RELATED WORK

In this work we're using CNN algorithm for image classification and prediction. And also we have taken two Indian classical dance hand gestures for identifying the mudras name. It's a sample, to identify the mudras with their corresponding dance form. It's very useful for child artist and beginner dancers of an Indian classical dance.

The serious issue to be settled is with the quality and sizes of the photos. The inconsistent proportions of low and phenomenal pictures in the dataset lead to the unbalanced request. Isolating and seeing complex human improvements from unconstrained separated video and terrible quality pictures gathering is a troublesome endeavor in PC vision. Executing the gathering of Indian outdated dance exercises using a tough man-made intellectual prowess gadget: Convolutional mind associations (CNN).In this work, human activity acknowledgment on Indian old style dance pictures, recordings is performed on accounts from disconnected information. We have taken two Indian old style dance structures like as Bharatanatyam and Kathakali. In Existing strategy the picture quality is poor and size of the picture is to short, thus we proposed by stepping through 3D pictures for examination cases by utilizing the CNN calculation and CNN modules.

Human pose estimation is one of the issues that have gained many benefits from using state-of-the-art deep learning-based models. Human pose, hand and mesh estimation is a significant problem that has attracted the attention of the computer vision community for the past few decades[3]. A wide variety of solutions have been proposed to tackle the problem. Deep Learning-based approaches have been extensively studied in recent years and used to address several computer vision problems. However, it is sometimes hard to compare these methods due to their intrinsic difference. This paper extensively summarizes the current deep learning-based 2 D and 3 D human pose, hand and mesh estimation methods with a single or multi-person, single or double-stage methodology-based taxonomy. The authors aim to make every step in the deep learning-based human mesh estimation pose, hand and techniques interpretable by providing readers with a readily understandable explanation.

Human activity recognition is a classification task for recognizing the action performed by human. Pose estimation forms the base of action recognition. Recently, deep learning have been deployed for pose estimation and action classification. Here a new challenging dataset of a popular Bharathnatyam is taken. The dataset contains more than 10 different poses. We have captured images and try to

classify

them using deep convolutional neural

network[4]. This comprehensive dataset was collected using an established taxonomy of over 800 human activities [1]. The collected images cover a wider variety of human activities than previous datasets including various recreational, occupational and householding activities, and capture people from a wider range of viewpoints. We present a novel method for real-time continuous pose recovery of markerless complex articulable objects from a single depth image Our method consists of the following a convolutional network for feature extraction[5].

Images from the dataset are first transformed to HSV images for use in image pre-processing to locate exudates. Color space conversion is the process of converting an image from one color space to another, with the purpose of making the translated image as close as possible to the original in terms of appearance[6]. Machine learning techniques are used to provide predictive modelling for innumerable applications and requirements. Machine learning approaches can be categorised as 'general purpose' and 'universal' according on the specific task at hand. According to the needs, facts and focus of the problem several solutions will be appropriate[7].

3. PROPOSED METHEDOLOGY

There are several issues with current practices for distinguishing the picture names, picture quality, uneven dataset and pixels values. The assortment of picture information will be broke down, coordinated and assembled in light of various requirements utilizing the most ideal calculation. To anticipate Indian traditional dance structures names and recognizes the separate hand stances mudras names by utilizing CNN and Deep CNN.

And furthermore we involved Gaussian channel for diminishing commotion and obscuring locales of a pictures and multi-class grouping issue that can be displayed by a convolutional brain organization. The CNN takes as info picture of size 200 X 200 pixels and result a vector numbers addressing the probabilities of every one of the action names relating to the 10 classes of pictures. After this we get a 93% precision pace of profound CNN order. This assessment will be useful to recognizing the picture names with their separate dance structures. The dataset contains more pictures of Indian old style moves, we have taken two traditional dance structure pictures like as Bharatanatyam and Kathakali. What's more, we are taking the informational index from kaggle site.

CNN is a powerful algorithm for image processing. The image contain data of RGB combination. Matplotlib can be used to import an image into memory from a file. The computer doesn't seen an image, all it sees is an array of numbers. Color images are stored in 3-diemensional arrays. The first two dimensions corresponds to the height and width of the image (the number of pixels). The last dimension corresponds to the red, green, and blue colors present in each pixel.



Figure 1: System architecture

System Perspective contains the system behavior and the environment of the system. It includes the relationship and the interactions among the system and the environments.

CNN algorithm: In our workwe use the CNN algorithm for image preprocessing and classify the images, according to the dance pose. We considered the more

than 10 images of Indian classical dance like as Bharatanatyam and Kathakali. This work is helpful for basic beginner dance learners. CNN algorithm has 3 important layers i.e convolutional layer, Pooling layer, fully connected layer.



Figure 2: Basic structure of CNN

Convolutional Layer: This layer is the first layer that is used to extract the various features from the input images The output is termed as the Feature map which gives us information about the image such as the corners and edges. Later, this feature map is fed to other layers to learn several other features of the input image. The convolution layer in CNN passes the result to the next layer once applying the convolution operation in the input. Convolutional layers in CNN benefit a lot as they ensure the spatial relationship between the pixels is intact.

In Max Pooling, the largest element is taken from feature map. Average Pooling calculates the average of the elements in a predefined sized Image section. The Pooling Layer usually serves as a bridge between the Convolutional Layer and the FC Layer. This CNN model generalises the features extracted by the convolution layer, and helps the networks to recognise the features independently. With the help of this, the computations are also reduced in a network.

In the last layer of CNN and MLPS it is comman to use softmax layer or units with sigmoid activation functions for multi-class classification. The softmax function is used as the activation function in the output layer of neural network models that predict a multinomial probability distribution. The softmax is used as the activation function for multi-class classification problems where class membership is required on more than two class labels.



Figure 3: Proposed System The proposed work consists of : It accepts theinput image, performs the preprocessing in which it converts the image in terms of gray and

removes the noise using Guassian filter then performs the segmentation and applies CNN model. Based on this the system gives the Dance posture and Mudra.

4. IMPLEMENTATION

The various tools and technologies used to design the application. The technologies used are briefly discussed below:

Backend design tools: Anaconda prompt and Navigator, spyder IDE, python, Django, data analytics, machine learning, various libraries like numpy, pandas, sklearn etc. deployed in the project, KNN algorithm Frontend design tools: html, CSS, w3css, bootstrap and JavaScript

Database: SQLite

Anaconda prompt and Navigator

Advanced Re-Recognition of Automobiles was built using the anaconda prompt and setup. This software provides a flexible platform to build and run the application in the desired way. Anaconda prompt is used to create new project and various applications related to the project using the below code:

Its is also used to execute the application using the command:

The screen of Anaconda with the commands to start and run the project and application

Python

Python is an over-all determination and high level programing language and easy to implement programming language. In Advanced Re-recognition of Automobile python is used as the main programming language to implement working in the application. Python has very easy format of syntax and is more secured language when compared to other programming language.



Dance P

Namskar



Figure 11: Recognizes the Image as Namaskar



Figure 12: read the Kathakali image.



Figure 13: recognizing the kathakali mudra name

In our discussion The main goal of this work is to correctly identify the dance pose from an image dataset. This paper introduces using the powerful CNN tool to classify dance poses. The proposed model of CNN is applied to the offline Indian classical dance database for classification.

CNN is a powerful artificial intelligence tool in pattern classification. In this paper, we proposed a CNN architecture for classifying Indian classical dance poses/mudras. The CNN architecture is designed with four convolutional layers with different filtering window sizes is considered which improves the speed in recognition.

5. CONCLUSION

In this work, the overview of hand and dance gesture recognition with special emphasis on hand movements and dance gestures are discussed. it also provides a complete study on vision based and image dance gesture recognition. Considered Indian classical dance forms images are used in image processing to predict the mudras names and image names with their respective dance form, by using convolutional neural network. We applied CNN modules and Gaussian filters For more image accuracy. And finally it predicts the dance pose name in the above of the image with voice form. This project is helpful for new learners who don't know other dance postures/forms.

FUTURE ENHANCEMENT

The proposed approach is yet to be tried in non-dance recordings. It will be a fundamental device to fragment the recordings of any Indian Classical Dance structure. Moreover, in the ML approach, we use tests each with 3,07,200 elements, which influences SVM and CNN's time intricacy. It might fundamentally lessen with the histogram of the given component, which should be tried. At last, the profundity data of Kinect might be utilized as a contribution to the way to deal with investigate the exhibition. Future work is taking internet based old style dance recordings and predicts the dance structure like as how the video plays around then correspondingly it predicts the dance present name.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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