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Gesture Identification Model In Traditional Indian Performing Arts By Employing Image Processing Techniques

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ABSTRACT

Classical dance forms are an integral part of the Indian culture and heritage. Kathakali is an Indian classical dance composed of complex hand gestures, body moments, facial expressions and background music. Kathakali mudras are difficult to understand common peoples. There are 24 classes of hand gestures. The images of hand mudras of kathakali dance are collected from the dataset. The proposed work explores the possibilities of recognizing classical dance mudras in kathakali dance forms in india. This system has achieved an accuracy of 84% with Convolutional Neural Network for classifying the mudras.

Keywords: Mudra, Kathakali, feature extraction, classification

I. INTRODUCTION

Human posture gauge is helpful in observing, improvement framework, human PC interface, action identification, picture arranging and recovery, and different fields. The human position is vital for perceiving activities. Understanding human appearance and related components is significant for modern applications since it permits us to look at people and their connections with their surroundings. For business, data like stance, motions, and viewpoint are basic. Human stance gauge is a test that includes deciding the positions and setup of human body joints. Bharathanatyam has been the mother of numerous other Indian old style dance classes. India's traditional dance culture is perhaps the most established on the planet. In the Indian territory of Tamil Nadu, it is a notable and advanced customary Indian dance structure. Bharathanatyam is a music-went with dance structure that comprises of 64 standards of composed hand, foot, face, and body movements. The dance steps are fixated on the artists' reasonable body weight circulation, strong lower appendage position, and wonderful hand developments that stream around their body. The positions are totally not the same as what we do consistently. CNNs are various leveled grouping PCs that join layered tasks with learnable channels and nonlinear enactment capabilities to get an order result. Contingent upon the goal capability, the info is planned into reduced structure and split into classes for arrangement. CNN removes convoluted and dynamic data by stacking and down testing various pieces of the information. The three sorts of layers utilized here are "Convolutional Layer, Pooling Layer, and Completely Associated Layer". The fundamental structure component is the convolutional layer, which utilizes parts to distinguish includes the whole way across the picture. Kathakali is an Indian old style dance show from the south Indian territory of Kerala began in seventeenth 100 years. The tale of Kathakali dance execution is imparted to crowd through hand motions, looks and moves alongside music support. Kathakali is customarily performed by male artists in courts and theaters of Hindu religions. Kathakali hand signals are considered as a total language without anyone else with essential linguistic components and language structures related with it. With the assistance of 24 hand gestures available, one can communicate any message to another completely using hand. Due to the intricate hand gestures and dance motions used in Kathakali dance theater, it is typically exceedingly challenging for the average person to grasp what is being said. It is trying to comprehend the message an entertainer passes on through the motion language except if you are know all about all of the hand signals and the words and sentences you can make utilizing these developments. So we center around how to effortlessly comprehend the hand signals to commoners and make informational index then, at that point, arrange the motions. Because of various mix of mudras in some

ways address different significance, some in any event, contingent on the specific situation, except if one is knowledgeable with these mudras, their blends and implications, it is challenging for one to comprehend and value this workmanship. We have endeavored to take care of this issue and this is the most vital move towards something very similar. In this proposed work, first we utilize a dataset of Kathakali hand gesturesIn a resulting step, we consider and plan information readiness techniques to be used on the dataset being referred to, and in the last stage, we research ML and DL strategies for grouping hand movements. The old presentation specialties of India have consistently included hand signals, called mudras. These developments are vital for depicting numerous parts of the presentation, like feelings and stories. In any case, hand motion location has turned into a fascinating expansion to old style Indian performing expressions in light of the fact that to mechanical enhancements and the expanded interest in combining state of the art strategies with old fine arts. Using PC vision calculations and AI draws near, hand signal acknowledgment innovation investigates and disentangles hand movements and areas. Explicit hand movements might be identified and perceived with this innovation, empowering for constant cooperation and execution reconciliation. By presenting hand motion acknowledgment in old style Indian performing expressions, a few advantages emerge. It, right off the bat, improves the visual effect of the presentation by giving an enrapturing and vivid experience for the crowd. The consistent synchronization of the entertainer's hand developments with computerized visuals or increased reality components adds another aspect to the narrating. Also, hand signal acknowledgment can support the protection and spread of traditional Indian performing expressions. . With the utilization of this innovation, appropriate transmission of these mind boggling motions to people in the future is made conceivable by the cautious documentation and investigation of mudras. By allowing distant exhibitions and web stages, it likewise makes these inventive forms more accessible to a larger audience. Additionally, hand gesture recognition opens up opportunities for creative collaborations between traditional artists and technologists. Digital components may be incorporated into performances in novel ways by artists, enabling cutting-edge and unique interpretations of traditional Indian arts. However, it is essential to strike a balance between technology and tradition, ensuring that hand gesture recognition does not overshadow the core essence and authenticity of classical Indian performing arts. The technology should complement and enhance the art form rather than overpower it.In conclusion, the introduction of hand gesture recognition in classical Indian performing arts brings forth a captivating fusion of tradition and technology. It adds a new layer of visual appeal, aids in preservation, and opens up possibilities for creative exploration. Classical Indian performing arts may continue to develop and enthrall audiences in the digital era by embracing this novel technique.

II. RELATED WORKS

[1] Basavaraj S. Anami et al. have proposed a 3 stage method which involves pre-processing of mudras by obtaining contours of images, extracting features by using Eigen qualities, Humoments and convergences lastly characterizing the mudras utilizing Counterfeit Brain Organization. The Baratanatyam dataset is made with 2800 pictures (100 pictures for every mudra). Mudras are separated into clashing and non-clashing mudras. The revealed exactness is 97.1%, 99.5% and 96.03% for entire hand mudras, clashing and nonconflicting hand mudras separately.

[2] P.V.V. Kishore et al. have proposed design for Profound Brain Organization for characterization of Indian old style dance activities. The dataset of recordings are gathered from both on the web (YouTube, live exhibitions) and disconnected (accounts) and. The general acknowledgment pace of 93.3% is gotten for the CNN.

[3] K.V.V. Kumar et al. have introduced a methodology for grouping kuchipudi dance mudras into instant messages (importance of mudra) by utilizing Histogram of situated Gradients(HOG) highlights as a component extraction calculation and Backing vector machine (SVM) is utilized as the classifier. The Graphical UI (GUI) is produced for working out Mudra Acknowledgment Recurrence (MRF). The SVM classifier has gained a MRF of 90%.

[4] P.V.V. Kishore et al. have proposed a Super pixel based Straight Iterative Bunching (SLIC) and Marker Controlled Watershed calculations to perform division out of which SLIC performs better compared to Watershed calculations. The outcome shows that a SLIC calculation performs better compared to Watershed calculation. The investigations are performed on dataset gathered with 120 kuchipudi pictures (both preparation and testing pictures). A normal of 52.55% of the all out pictures is sectioned accurately by watershed calculation though 74.25% of pictures are divided well by SLIC calculation.

[5] SoumitraSamantaetal.have made their own Indian Old style Dance dataset from the YouTube recordings. Each class contains of 30 recordings with various goals (greatest goal. 400x350). The proposed scanty portrayal based Word reference learning method includes addressing each casing of the video by a development descriptor in view of Foot (Histogram of Situated Optical Stream). A typical precision of 86.67% is

accomplished for characterizing the recordings outlines utilizing SVM.
[6] Mampi Devi et al. have ordered the asamyuktahastas of Sattriya dance structure by utilizing a two level characterization technique. In light of the underlying closeness the pictures from the gathered dataset of 1015 pictures are characterized into 29 classes and concentrates the Clinical Pivot change (MAT) to recognize the gatherings. The exactness procured by utilizing SVM with PBF portion is 97.24%.
[7] Ankita Bisht et al. have proposed a system for ordering the Indian Old style Dance structures from 626 recordings gathered from both disconnected and on the web. The recordings are of various dance structures like Sattriya, Bharatnatyam, Kuchipudi, Kathak, Odissi, Manipuri, Mohiniyattam. The structure had accomplished the exactness of 75.83% when feeded 211 recordings to a Profound Convolutional Brain Organization (DCNN). Nurfitri
[8] Anbarsanti et al. have recorded a few motion occasions of Aceh Conventional Dance by the XBOX Dynamic sensor. The total perceiving framework was proposed by utilizing the Simulink programming bundle by MatLab. The framework characterizes the info testing signals into one of six unique classes of predefined motions or a solitary class of vague motion. For a solitary motion the classifier framework has accomplished a precision of 94.87%.
[9] Y. Tongpaengetal.have carried out a device which orders the mix-ups and furthermore examinations the directions and gives a criticism to the artist for further developing the moving abilities. The framework analyzes the posture from Thai dance master and continuous artist posture to compute exactness.
[10] Dohyung Kim etal.have planned a productive Amended Straight Unit (ReLU) based Outrageous Learning Machine Classifier (ELMC) 800 dance development significant pieces of information of 200 sorts of moves. The proposed strategy plays out a preferable characterization over those of KNN and SVM.
[11] NeelakantaIyer, Ganesh et al. have proposed an informational collection with 659 pictures of Kathakali hand signals in 2019. There are 24 classes of pictures. This dataset has been produced without any preparation to apply profound learning standards for grouping Kathakali hand signals

III. PROPOSED METHODOLOGY

A 12-layer CNN model is developed to identify kathakali hand mudras using image processing techniques. Convolution layer,pooling layer, flattern layer, fully connected layer and applying activation function are stages that make up our CNN 12-layer model. Our model has four sublayers of convolution, a pooling layer between each layer of convolution, flattening the layer using the two-layer dense layer that we are utilizing here, and three activation functions to demonstrate our model's performance. The kaggle dataset from kaggle repository is used in this work.

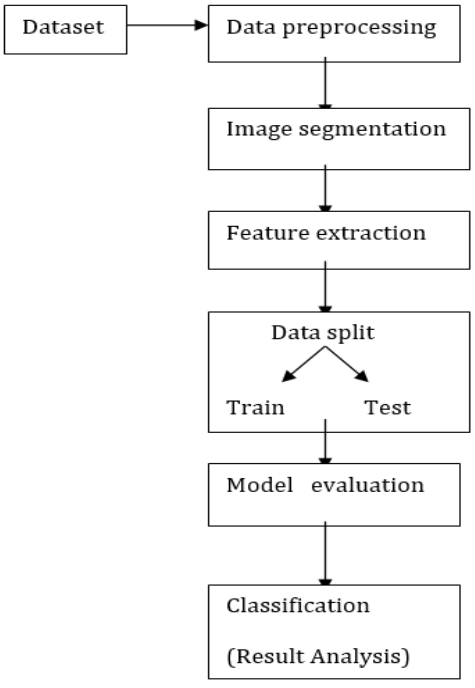

Figure 1: Proposed Methodology for Mudra classification

Preprocessing: The images will be the input to the model. Then the preprocessing steps are applied to the images which includes colour space conversion, edge zero padding, media filtering and adaptive histogram equalization. Colour space conversion is used to transform RGB images to HSV images during this yellow exudates are removed.
Edge Zero Padding:This steps used to enlarge an image, where the strips of zeros will be added to the outside the edge of image.
Median filtering: The typical preprocessing steps to remove the noise from an image and to improve the result at later stage. We use median filtering techniques. To adjust and to enhance the contrast of an image we have applied adaptive histogram equalization technique.
Image Segmentation: After preprocessing it is easy to segment the image. Green channel extraction is applied which makes images more clearly visible with high contrast as the mudras images are the low contrast images. Image compliment is used to reverse the black and white parts of the image. In order to create blured image and to remove the noise low pass filter kernel method is used. The first layer of CNN model is input layer where the image will be the input. Next, the initial layer in the image processing pipeline that extract features from an input image using a tiny square of input image or by lowering the picture size for each convolutional layer it passes through when the pixel is passes through the layer it is subjected to a succession of filters. For the first CNN layer 32 distinct filters are used for the images pixels with kernel size of 4*4 Zero-Padding is used when the filters does not fit perfectly the input image ReLU activation function is used, then we have max pooling layer in which the largest pixel in the respective window is allow to pass through in order to reduce the dimensions of the image still more the second CNN layer is used. This layer has window size of 4*4 and 16 filters are applied.

IV. RESULT

The proposed work is accurate in identification of the dance mudras from kathakali dataset. The dataset is split into 80:20 ration for train and test respectively. A 12-layer CNN model is constructed with input layer and output layer. The data is divided into mini batch size of 10 with epochs 35 and the learning rate $_{10}{}^{-4}$

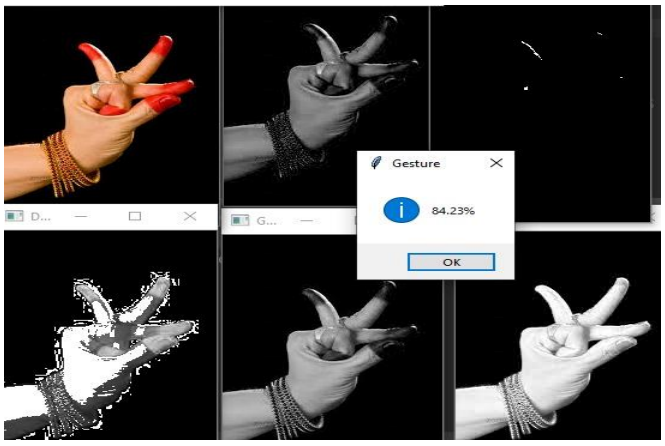

Figure2: mudras recognition

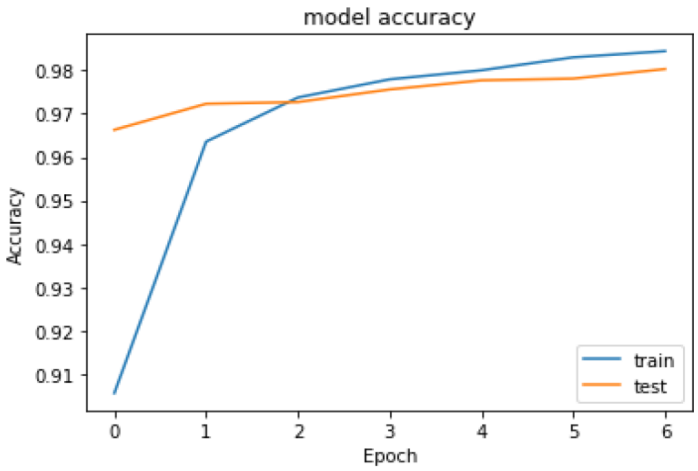

Figure3: Mudras recognition accuracy graph

V. CONCLUSION

The proposed model makes it easier to document and preserve digitally, guaranteeing that future generations may accurately learn and study the complex mudras. But it's essential to apply hand gesture detection technology in a way that preserves the authenticity and integrity of traditional Indian art forms. The proposed model Convolutional Neural Network we use 35 epochs with batch size of 10 images has achieved accuracy of 84%.

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