***Abstract*—'Bhavas Classification' is used to classify the different 'bhavas' of classical dance such as'Sringara'(Love), 'Hasya'(Comic), 'Karuna'(Compassion), 'Raudra'(Anger), 'Veera'(Valor),'Bhayankara'(Fear), 'Bhibhatsa'(Disgust), 'Adbhuta'(Wonder) and 'Shanta'(Tranquility). Thesenine 'bhavas' are something which conveys the meaning intended ,through facial expressions.Normally, these 'bhavas' in classical dance are difficult for the non-trained dancers to under-stand. This system tries to identify the 'bhavas' from facial expressions and classify them to the respective classes. There by all people can easily understand the meaning of each 'bhavas'and enjoy the dance in its full extent. This system uses technology of deep learning to classify the images of facial expressions. The project aims at facial expression detection and emotional classification using deep learning technique of Convolution Neural Network (CNN).The main goal of this project is to validate the usage of this methodology of facial expression detection and classification.**

***Index Terms*—Facial Expression; Recognition; Deep Learning; CNN Architecture ; Emotion Classification.**

I. Introduction

There are different ways for communication. Both verbal and non verbal communication plays an important role in communicating with each other in day to day life. Among the nonverbal communication, facial expressions are the most significant as it is universal. The facial expressions for happiness, sadness, anger, surprise, fear, and disgust are the same across cul-tures. It can display personal emotions and indicate an individual's intentions within a social situation. It is said that the emotional expression through face can convey 55% of information.Generally, facial expressions are classified into six types such as happiness, sadness, anger,surprise, fear, and disgust. But in classical dance, there are nine different types of facial ex-pressions such as 'Sringara'(Love), 'Hasya'(Comic), 'Karuna'(Compassion), 'Raudra'(Anger),'Veera'(Valor), 'Bhayankara'(Fear), 'Bhibhatsa'(Disgust),'Adbhuta'(Wonder) and 'Shanta'(Tranquility). It is difficult for a non trained dancer to identify the facial expression as some of the facial expressions look similar like raudra and veera.

This paper aims at identifying and classifying the facial expression of the given image to the 'bhava' that it denotes using deep learning technology. CNN algorithm is used for extracting features like eye, lip and cheeks and also for classification. As a first step, the input image is preprocessed. Then its features are extracted and it is classified to its 'bhava' using CNN. Due to the use of CNN algorithm, the process of complex artificial feature extraction in traditional facial expression recognition is avoided, and feature extraction and expression classification are performed simultaneously.

II. Literature Survey

Currently, there are many methods available for facial expression detection. Most of them differ in the number of convolutional layers, activaton functions and pretrained models being used. The main objective of [1] is to identify 6 basic facial expressions such as happy, sad, fear, anger, surprise and disgust. It has used JAFFE dataset for training and testing. Convolutional Neural Network is used for extracting features of eyebrow, eye, mouth, cheeks and nose and also for classification. The layers used are two convolutional layers, two pooling layers and two fully connected layers. ReLU activation function is used in all layers.

In [2], it classifies facial expressions into 7 expressions like angry, disgust, fear, happy, sad, surprise and neutral. FER-2013 dataset is used for training and testing. Three models are used which are a baseline model, a Resnet50 model and a five layer model. Of these, highest accuracy is obtained for Resnet50 model and five layer model. Five layer model consists of four stages of convolutional layer together with maxpooling layer, 1 fully connected layer and a softmax layer. Resnet50 consists of 50 layers. From that output layer is replaced with two fully connected layers and a softmax layer. To get the final emotion detection network called ED NET, five layer model and Resnet50 model are ensembled. ReLU activation function is used in all layers.

In [3], it mainly consists of two steps. In first step, the CNN architecture is fine tuned by VGG model to get the first model. In second step, inorder to improve classification the CNN architecture is fine tuned by first model and final model is obtained. It uses a combination of CK+, RaFD, MUG and KDEF datasets. The main objectives of this model is to to improve the accuracy in classifying emotions and to classify the facial expressions to angry, happy, fear, neutral, sad and surprise using CNN architecture. It uses four convolutional layers, three maxpooling layers, two fully connected layers and a softmax layer for classification of facial images and the regularization technique used is dropout.

The main objectives of [4] are to avoid the explicit feature extraction process and to classify facial expressions to worried, angry, disgust, surprise, anxious, happy, sad, neutral emotions. The dataset used is Chinese Linguistic Data Consortium(CLDC), which is composed of multimodal emotional audio and video data. In order to avoid the complexity of explicit feature extraction process and the low level data operation involved in traditional facial expression recognition, Faster R-CNN is proposed for facial expression recognition here. Firstly, the facial expression image is normalized and the features are extracted by using the trainable convolution kernel. Then, the maxpooling is used to reduce the dimensions of the extracted features. The Region Proposal Networks (RPNs) are used for predicting accurate region proposals. The proposed method uses just one convolutional neural network (CNN) for all purposes. Finally, softmax layer is used for classificaton of facial expression images and regressor layer for obtaining bounding box coordinates.

The main objective of [5] is to classify facial expression into seven facial expressions like angry, disgust, fear, happy, sad, surprise and neutral. FER-2013 dataset is used for training and testing. It uses six convolutional layers, three maxpooling layers, one fully connected layer, one dense layer and a softmax layer for classification. ReLU activation function is used in all layers and the regularization technique used is dropout.

In [6], it classifies facial expressions into happiness, surprise, sadness, anger, fear, disgust and neutral. Preprocessing is performed using normalization and augmentation. Features are extracted using trainable convolutional layers. It uses three convolutional layers, two maxpooling layers, one fullly connected layer and a softmax layer. ReLU activation function is used in all layers and dropout regularization is used to prevent overfitting.

III. Prepare Your Paper Before Styling

Before you begin to format your paper, first write and save the content as a separate text file. Complete all content and organizational editing before formatting. Please note sections III-A–III-E below for more information on proofreading, spelling and grammar.

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Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, ac, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

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- Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) English units may be used as secondary units (in parentheses). An exception would be the use of English units as identifiers in trade, such as "3.5-inch disk drive".
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Number equations consecutively. To make your equations more compact, you may use the solidus (/), the exp function, or appropriate exponents. Italicize Roman symbols for quantities and variables, but not Greek symbols. Use a long dash rather than a hyphen for a minus sign. Punctuate equations with commas or periods when they are part of a sentence, as in:

$$a + b = \gamma \tag{1}$$

Be sure that the symbols in your equation have been defined before or immediately following the equation. Use "(1)", not "Eq. (1)" or "equation (1)", except at the beginning of a sentence: "Equation (1) is . . ."

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E. Some Common Mistakes

- The word "data" is plural, not singular.
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- Be aware of the different meanings of the homophones "affect" and "effect", "complement" and "compliment", "discreet" and "discrete", "principal" and "principle".
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Figure Labels: Use 8 point Times New Roman for Figure labels. Use words rather than symbols or abbreviations when writing Figure axis labels to avoid confusing the reader. As an example, write the quantity "Magnetization", or "Magnetization, M", not just "M". If including units in the label, present them within parentheses. Do not label axes only with units. In the example, write "Magnetization (A/m)" or "Magnetization {A[m(1)]}", not just "A/m". Do not label axes with a ratio of quantities and units. For example, write "Temperature (K)", not "Temperature/K".

TABLE I
TABLE TYPE STYLES

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	Table column subhead	***Subhead***	***Subhead***
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[a]Sample of a Table footnote.

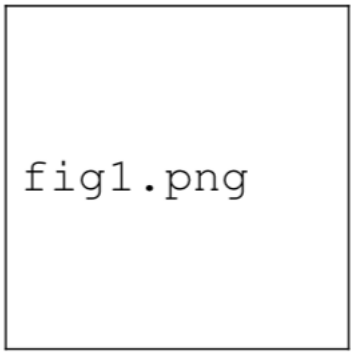

Fig. 1. Example of a figure caption.

ACKNOWLEDGMENT

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REFERENCES

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