

# A Review Paper on Determination of Parameters Like Age, Gender, Color and Pattern of A Person Using Cnn and Python

CSN Koushik, Shruti Bhargava Choubey, Abhishek Choubey, D.Naresh, N. Bhanu Prakash Reddy  
Dept of ECE, SNIST, Hyderabad, India

**Abstract**— Artificial Intelligence is the trending buzz word which is used to mimic or implement the task just like how a human brain performs in order to complete it. The outputs are predicted or generated when the task is done by the model. A neural network which is the sub category of the deep learning is used for the sake of the output generation along with the use of algorithms of Machine learning thereby ensuring the ease of use in an advantageous manner. They reduce the use of hardware components such that all the complexities can be solved or implemented. The model being developed is used to determine the person's age, gender and color and pattern of the dress type worn by the individual. For the model to be implemented, a Convolutional Neural Network (CNN) is developed along with the use of the Machine learning algorithms and the highly advanced python packages is done such that their determination can be done in an effective manner. The model is trained and validated wherein the coding is done in python language, using tensorflow, keras, scikit and openCV packages to implement the solution to the problem. These characteristics can be useful for understanding of the trend and even for the surveillance purposes.

**Keywords**— Artificial Intelligence, Machine Learning, Deep Learning, Neural Network, CNN, Python language.

## I. INTRODUCTION

Data is the characteristic value of a particular entity which determines the parameter for the sake of the description. Data in general can be of any format and must be handled with great care in order to prevent the creeping of the errors. Data can be either nominal or ordinal in nature or can even be categorized into unordered or ordered based on the arrangement of the data for the sake of the ease of handling of the data. The data is taken as input for the sake of the processing or for the sake of the processing. The data processing is done by the help of the neural network which works as similar to that of the human brain and is a subcategory of Artificial intelligence (AI). By the association with Machine Learning (ML), the efficiency of the deep learning model is increased. For it to pass the test, it must be trained to a large extent until the model reaches perfection to pass the test i.e. these models needs to be trained and they must be validated accordingly for the respective inputs being given. [1-5]

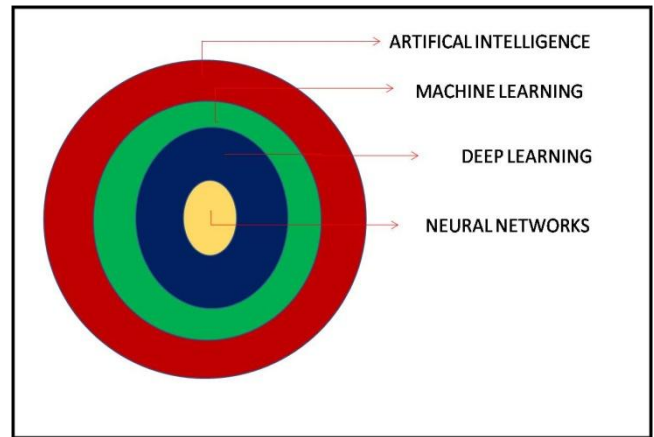


Fig. 1: AI v/s ML/ DL

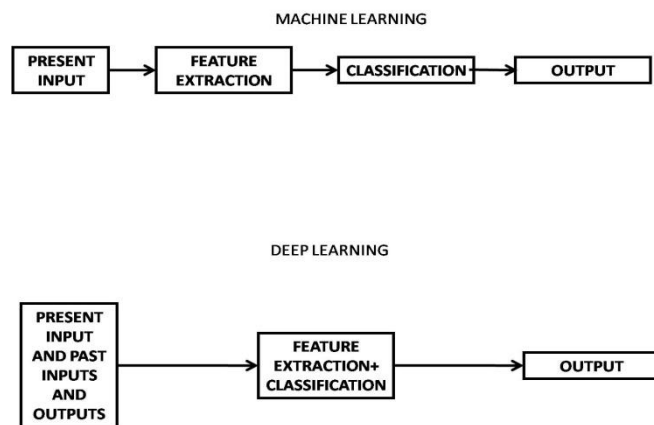


Fig. 2: ML v/s DL.

The neural network can be developed by the help of the python language easily and effectively by the use of the packages like the tensorflow and keras and other packages like the numpy, pandas, openCV, tkinter and PIL for the development of the model and its respective associated tasks. The neural networks can be of many types and based on the requirement, one must be able to select the desired network for the respective task. The determination of the age, gender of the person and the colour and the type of dress worn by the individual becomes a must for the sake of the trend analysis and the surveillance purposes. The data can be taken as input in the form of the input or a video bring streamed by the use of the camera. The camera must be of a good resolution such that the data being

captured must be of a good clarity and use it effectively for the sake of the output generation by the model developed. The model developed is a Convolutional Neural Network (CNN) which is a type of the neural network that operates on or processes on the image or the frames of the video which are being sent at a certain rate. The data taken for the sake of the processing is used for the sake of the output generation wherein the data is selected region wise as per the interest or the important data lies in the input. CNN is used for the sake of the feature extraction as and when the convolutions are being performed. These convolutions are done and the operations are done as per the matrix arithmetic. So, by the use of the models and the other packages or the models of the machine learning if used, the end model accuracy can be increased tremendously such that the determination can be done easily and effectively. This paper has been organized in manner that section 2 explains about the literature review for the determination of the age, gender and the colour and dress pattern of the individual being worn in a simple and understandable manner. The use of the high accuracy models makes it the best way to use them for the sake of the determination of the individual's parameters.[1-5]

II. LITERATURE SURVEY

The determination of the age, gender and the color and the dress pattern worn by the individual is found useful for the sake of the trend analysis and the surveillance purposes wherein they can be used for the sake of profit purposes via using them with effective strategies in business and for the sake of security aspect as well.

For the effective implementation of the model, the use of the neural networks needs to be done. The neural network consists of the neurons also being called as the perceptrons are used which form the nodes in the network. There are three main layers in the network namely the input layer, dense layer(s) and the output layer wherein the input and the output layers can be of only one in quantity whereas the dense layers can be of numerous in quantity, which operate at a certain value of the accuracy. Each node is associated with value of the weights, which are updated for every forward and the backward propagation being done at every instance of the computation due to which the cost or the loss function is updated and ensured to be of small value as much as possible. For the smallest values of the cost function, the accuracy of the model for the training and the validation increase tremendously and can be understood by the gradient of descent model. The speed of the computation depends on the density of the network. The use of the activation functions like the relu, softmax, and step function etc. is done for the input, dense and the output layers wherein they are used to activate the respective perceptron node in the network corresponding to the network.[5-10]

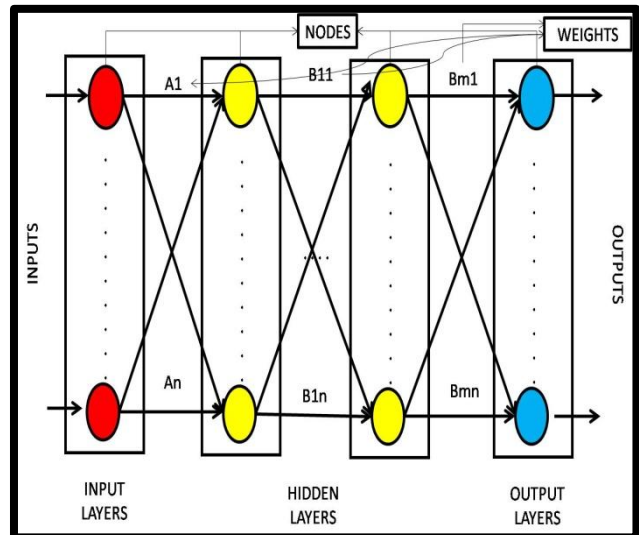


Fig. 3. Basic Neural Network

For the sake of the processing of the images, the Convolutional Neural Network is to be used wherein the processing of the image is done by the feature extraction for the particular region from the input by the use of the convolutions done successively implementing them in a matrix arithmetic. The basic equation of CNN is:

$$CNN_{out} = \sum_{k=0}^N (wgt_k)(P_{im}(K))(A_{fctn}) \quad (1)$$

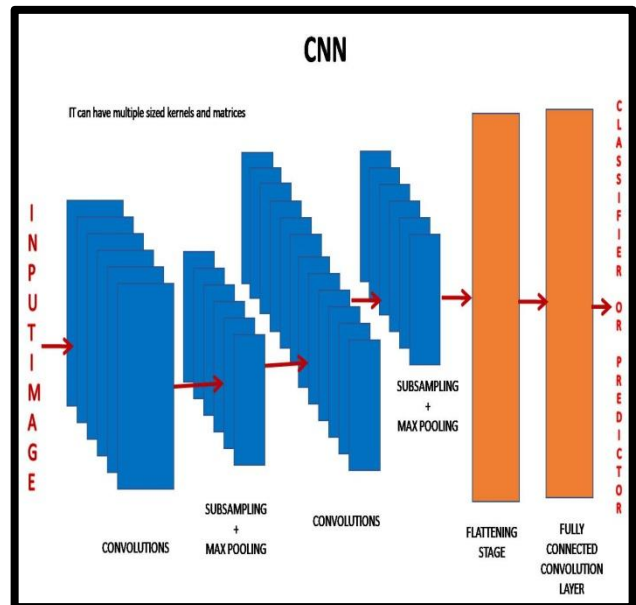


Fig. 4. CNN Network.

The convolutions are done for every element of the matrix successively. There are 4 main stages in the CNN namely the convolutional layer, pooling layer, flattening and the fully convolutional layer. There are intermediate sub sampling stages for the every task if done once. The sub sampling is used to padding the element and the respective stride quantity can be selected for effective computation depending on the input data dimensions. When the each intensity value is entered into the matrix for every respective pixel value, the computation is done for

the convolutions of the matrix with itself for every successive element hence from the selected region; all the maximum features can be extracted easily. After performing the convolutions, the values are pooled to select the highest intensity value which are later flattened and then given to the fully convolutional layer for more convolutions to be done. So, due to which more features can be extracted and this is essential for the determination of the parameters at a good value of the accuracy. The train set must be greater than the test set and the training can be done by the use of the GPU units for better image processing in terms of hardware.[10-15]

The age determination was done earlier by the use of the height of the person and the wrinkles on the face of the person but these were not quite effective as the data could be easily tampered and the determination could not be effective even though the accuracy of the model being developed so instead a CNN model could be developed and trained and evaluated by the datasets like the UTKFace dataset or the IMDB-WIKI Dataset but then again, the effective training could be done only if there is the use of the graphical processing units. The age could also be determined by the use of the facial features like from the eyes, mouth, chin etc. and it was quite effective when compared to that of the previous method. If this was associated with the trained model like the netcaffe model etc., the determination could be done effectively. Similarly even in the case of the determination of the gender. The determination was not quite effective in the case of the gender by using the parameter like the height and the wrinkles, hence effective trained models are to be used for the sake of the determination of the age and gender. The face detection could be done by the use of the haar cascading. [15-20]

The determination of the color and the pattern was done by the use of the openCV and by the use of the pretrained model namely the minivggnet model. The color was estimated based on the R, G, B values which are got by estimating them upon the comparison of the computed values with that of the predefined values. The pattern determination was done earlier by the use of the MNIST dataset which was not effective as the images in the dataset were of colored images which were later gray-scaled in the fashionMNIST dataset by Zolando. This dataset was used to easily determine the type of the dress worn by the person. The CNN could have many numbers of the dense layers starting from two but the problem will be the execution time, hence dense layer of 2 in quantity was selected for the sake of optimizing the computing time on normal processors. Hence the determination of these parameters was done by various methods and the determination could be possibly done by the use of the highly trained and accurate models for the estimation of the parameters.[20-24]

### III. CONCLUSION

The determination of the parameters like the gender, age and the pattern and the colour was done by the use of the effective pretrained models as the accuracy of these models was very high when compared to that of the previously used models. The data taken for the sake of the processing and analysis must be error free as the processing accuracy for the sake of evaluation can be increased immensely. The data is used for the validation of the trained model and such that the parameters can be predicted in an effective manner easily. The trained model could be trained for large number of epochs but it must be kept in mind that the training must neither be under fit nor over fit as this will have an impact over the determination of the parameters. The data taken can be either an image or a video being streamed from a camera wherein they can be used in real time applications of trend analysis and the surveillance purposes.

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