ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 8| Issue: 10| October 2022|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2022: 8.205 || ISI Value: 1.188

CLASSIFICATION OF GARMENTS FROM FASHION MNIST DATASET USING ALEXNET CNN ARCHITECTURE

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ABSTRACT

Clothing in many cultures mainly reflects very similar characteristics for human such as a social status, lifestyle and gender. Now a day's popular fashion images are considered as attraction for humans for buying new trending things of fashion products. Fashion is considered as self-expression of the human and it can context in many ways like footwear, lifestyle, makeup and hairstyle. For the classification of clothing different techniques are applied and one of the methods is CNN which is known as Convolutional Neural Network. So, CNN is type of artificial intelligence system. It is used in image recognition and processing by varying different layers. Alexnet CNN model has been used for predicting accuracy with the use of Fashion Mnist dataset. In this model, 10 classes have been used of T-shirt, Trouser, Pullover, Dress, Coat, sandal, Shirt, Sneaker, Bag, and Ankle Boot. 25 Epochs has been applied for better result in all models.

KEYWORDS: ***CNN Architecture, AlexNet, Fashion MNIST.***

I. INTRODUCTION

Clothing in many cultures mainly reflects a very similar characteristics for human a social status, lifestyle and gender. Clothes are one of the important things for identifying people, it has provides a great the role in human society, the "fashion classification" has many applications for classifying fashion-MNIST dataset by using different techniques. For example, predicting details of clothes in an unmarked photo can be easy discovery of very similar fashion items those are present in e-commerce database website [1]. Now a days popular fashion images are considered as attraction for humans for buying new trending of fashion products [2]. Fashion is considered as self-expression of the human and it can context in many ways like footwear, lifestyle, makeup and hairstyle. So in other words fashion has many kinds. Body posture of human also recognized as fashion. Now days with the gross of demand for commodities, fashion industry becomes a attraction for youth people. The clothes which has very low prices are contently increase in global market. So clothing is recognized as business around the world, Everyday millions of clothes are manufactured in a terms of designing and sew. Clothing may vary to geography to geography and climate to climate. So there are huge cultural addition in India for people who wear multiple additions of clothing during session and festivals. For the classification of clothing different techniques are applied and one of the methods is CNN which is known as Convolutional Neural Network. So CNN is type of artificial intelligence system. It is used in image recognition and processing by varying different layers. Fashion-MNIST dataset are openly available which can be used for classifying the images [3].

II. LITERATURE SURVEY

Many CNN architecture has been proposed for analysis of image classification such as Alex Net, Google Net, VGG Net and Resnet etc[4][5][6] So with the creation of conventional neural network the image enhancement becomes very popular various. Neural networks have been introduced nowadays for examination in various materials such as fashion-MNIST so there are continuous improvement of the neural network so that it can becomes more accurate for identifying the things with the help of different machine learning techniques. The researcher proposed many methods and architectures for identifying the fashion-MNIST source and CNN basically is not restricted for image classification whether it can be used in several experiments that can be used in object detection and making predictions. Dung at al. (2012) propose day had written problem for the recongnization of characters the author proposed neural networks for identifying search characters [7]. Kang at al. (2014) the author proposed CNN segmentation of the images. The author achieved 80 % of accuracy with the training [8]. Bharatnagat at al. (2017) proposed a three-dimensional CNS structure for classification of fashion MNIST. The proposed the accuracy of 19.2.5 percentage with the help of batch normalization and crosslinking technique [9]. Mohhamad at al. (2020) the author proposed the CNN model for identifying the fashion MNIST data. The author is used lenet-5 architecture for the examination of fashion MNIST data and achieved 98% of efficiency [10]. Shobit at al.proposed a classificatiojn model for the examination of fashion manist dataset and the result shown that proposed architecture enhance the accuracy of 2% to existing technique [11]. Shen et al. proposed a short term memory model for the examine of fashion mnist dataset. Author proposed the accuracy of 88% by using

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LSTM technique [12]. Agrap et al. proposed the SVM model in order to identify fashion mnist dataset and with the use of CNN-Soft Max technique author proposed the accuracy of 90% . Han et al. achieved the accuracy of more than 90% by creating a good benchmark dataset [13][14].

III. MATERIAL AND METHODS

a) Alexnet

Alexnet architecture is a model which is used to predict given input to output. it has a lot of application. This architecture has been used in different purpose according to requirement. This model can be used to predict hand written and machine printed character. Most of researcher ha used this model because of easy to implement and it has been considered has multilayer neural network. Alex net has 11 layers and those are used to predict values. The first layer is convolution layer which has a size of 55*55*96 with 4 strides and having a kernel size of 11*11 with activation function Relu, by adding the result the feature map of 96 is obtained. The final and last layer is a Fully connected layer having a size of 1000 with an activation function Softmax. Figure 1 shown Alexnet images.

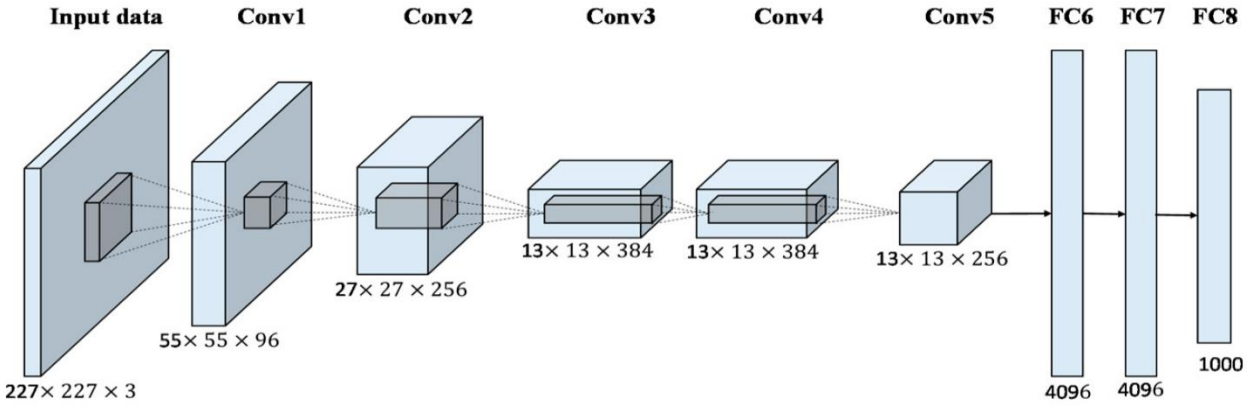

Figure 1: Alexnet Architecture Model

IV.PREPARATION OF DATASET

Samples for the CNN research was obtained from the Kaggle website. Google has launched and owns the Kaggle online group, which is open source. People can download datasets for use with CNN models and even upload their original data. The Fashion MNIST dataset is harder than the other MNIST datasets listed on the site, and it consisted of 60,000 testing data, 10,000 testing instances, and ten classes. There are 2828 single-channel monochrome photos.All Fashion MNIST images are 28*28 matrix samples, with 28 pixels in length. and 28 pixels wide are used. Total is 784 pixels in the matrix exists. Each pixel in the matrix has a given value and this value depends on the brightness or pixel darkness. All value is taken from the total data value with limits 0-255. Minimum value within the task assigned to you for example it will be simpler, compared to the maximum value from the set. Training data set, once the test data set will have approximately 785 columns. Figure 2 represents Overall images of fashion Mnist dataset.

Table 1: Name of Classification

Label	Classification
0	T shirt
1	Trouser
2	Pullover
3	Dress
4	Coat
5	Sandal
6	Shirt
7	Sneaker
8	Bag
9	Ankle Boots

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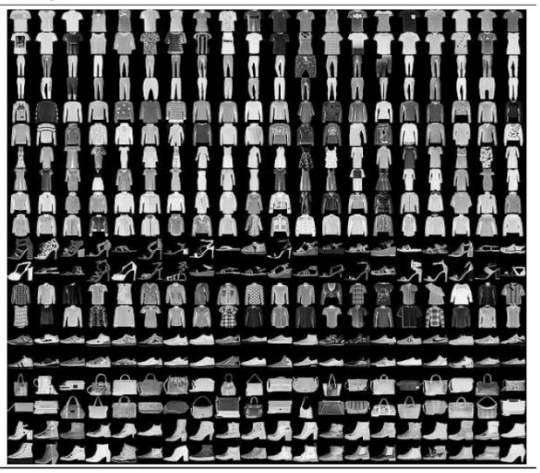
Label	Description	Examples
0	T-Shirt/Top	
1	Trouser	
2	Pullover	
3	Dress	
4	Coat	
5	Sandals	
6	Shirt	
7	Sneaker	
8	Bag	
9	Ankle boots	

Figure 2: Ovelall images of fashion Mnist dataset

Data Evaluation Parameters

Different models have been used to evaluate the result. The confusion matrix data has been used to display true values and false value. These values are based on different parameters. Theses parameters are Recall, Precision, Accuracy and F1-Score. All these parameters are discuses as below:

a) Precision: It is the ratio of truly predictive positive values to the total number of predicted positive observations. Precision can be calculating as follows:

$$\text{Precision} = \frac{TP}{TP+FP} \dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

b) Recall: It is the ratio of truly predictive positive values to the total number of observations taken from one class.

$$\text{Recall} = \frac{TP}{TP+FN} \dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

c) Accuracy: Accuracy is a ratio of true positive values to the true negative values in all matrix.

$$\text{Accuracy} = \frac{TP+TN}{TP+TN+FP=FN} \dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

d) F1-Score: It is a weighted combination of Recall and Precision.

$$\text{F1-Score} = 2 * \frac{Recall*Precision}{Recall+Precision} \dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

Analysis of results has been based on above parameters.

V.CLASSIFICATION OF FASHION MNIST WITH MODELS.

a) Classifying fashion Mnist dataset using vgg-16 Architecture

The green line indicates the value of accuracy based on 25 epochs while green line indicates the value of loss based on 25 epochs. Figure 3 represents overall report of fashion mnist generated with the help of vgg-16 architecture based on predicted response.

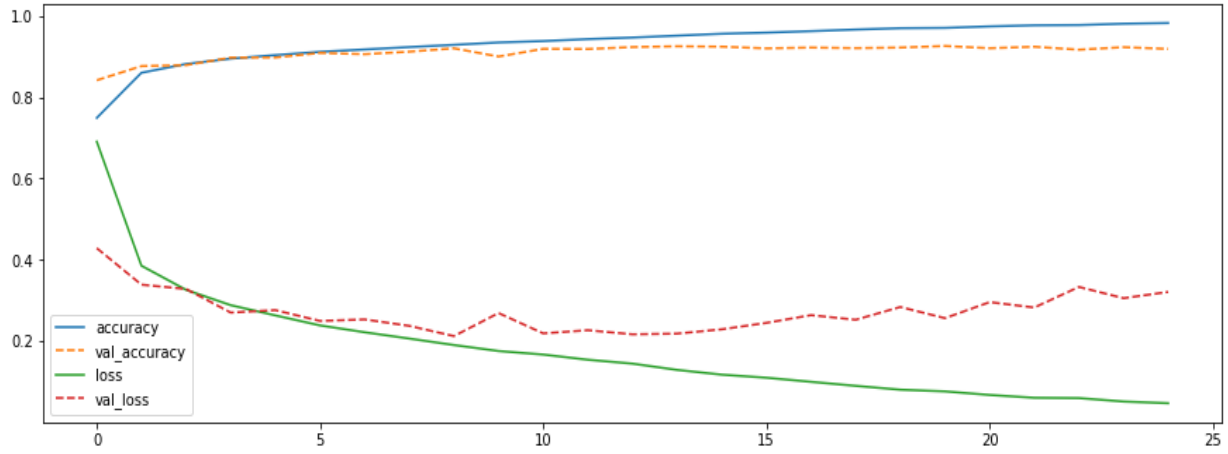


Figure 3: Overall performance of Accuracy and loss

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VI.CONCLUSION AND FUTURE SCOPE

Different types of data set of fashion Mnist has been chosen from Kaggle. The dataset consists of 10 classes of items such as T-shirt, Trouser, Pullover, Dress, Coat, sandal, Shirt, Sneaker, Bag, and Ankle Boot. These classes have been classified by using different CNN models. This data can be used for any machine learning algorithm. In a given research three model has been constructed to determine the accuracy status. Kaggle. Tensorflow version: 2.6.2 has been used for analysis. Fashion mist dataset has been taken from Kaggle which is open source. In this model the data set consisting of 60000 training samples and 10000 training samples have been used. In all models, 10 classes have been used of T-shirt, Trouser, Pullover, Dress, Coat, sandal, Shirt, Sneaker, Bag, and Ankle Boot. 25 Epochs has been applied for better result in all models. . In a model of Alexnet the best training and testing accuracy is obtained 91.21% and 91.78% respectively with total number of 25 epochs has been executed. More CNN architecture will be applying on the data set of real clothes and images are collected by our self for examination purposes. In future study comprehensive comparison has been applied into different CNN architecture.

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