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# **Image Classification Model**

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**Abstract:** Image Classification nowadays is used to narrow the gap between the computer vision and human vision so that the images can be recognized by machines in the same way as we humans do. It deals with assigning the appropriate class for the given image. We therefore propose a system named Image Classification using Deep Learning that classifies the given images using Classifiers like Neural Network. This system will be developed to measure the accuracy of classifying images on GPU (NVIDIA) and CPU. The system will be designed using Python as a Programming Language and Tensorflow for creating neural networks.

Keywords: Image Classification

### I. INTRODUCTION

- Image classification plays an important role in computer vision, it has avery important significance in our study, work and life.
- Image classification is process including image preprocessing, imagesegmentation, key feature extraction and matching identification.
- Image classification using convolution neural network (CNN) has revolutionized computer vision tasks by enabling automated and accuraterecognition of objects within images
- CNNs are basically combination of convolutions followed by feature maps, subsampling, image features, dense layer of neural network.
- We are using convolutions, subsampling, feature maps to extract image feature & dense layer of NN to categorize input image according to imagefeatures.
- Applications of CNN are image & video recognition, object recognition, natural language processing Operating

### **II. MOTIVATION**

A digital image is 2D grid image, since neural network expects a vector as input, oneidea to deal with images would be to flatten that image and feed the output of the flattening operation to the neural network and this would work to some extent.

### **III. LITERATURE REVIEW**

Neural Networks are essentially mathematical models to solve an optimization problem. They are made of neurons, the basic computation unit of neural networks. It also called Artificial Neural Network (ANN). There are different types of ANN – Depending upon the human brain neuron and network functions, an artificial neural network or ANN performs tasks in a similar manner. Most of the artificial neural networks will have some resemblance with more complex biological counterparts and are very effective at their intended tasks .Feedback ANN – In these type of ANN,the output goes back into the network to accomplish the best-evolved outcomes internally. The feedback network feeds information back into itself and is well appropriate to resolve optimization problems. Feed Forward ANN – A feedforward network is a simple neural network be made up of of an input layer, an output layer and one or more layers of neurons. Through assessment of its output by go through its input, the power of the network can be observed base on group behaviour of the connected neurons and the output is decided

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### **IV. METHODOLOGY**

Image classification using convolution neural network (Cnns) involves several key steps. First acomprehension dataset is collected, containing adiverse range of image representative of the classification task.

Data preprocessing follows, involving image normalization and augmentation to enhance model robustness. The CNN architecture is then designed, typically comprising convolutional layers for feature extraction and fully connected layers for classification.

The model is trained using the prepared dataset, and hyperparameters are fine-tuned to optimize performance. Transfer learning may be employed, leveraging pre-trained CNN models for task related to the classification objective.

The training process involves iterative epochs, with the model adjusting its weights to minimize the classification error. Validation sets are used to monitor overfitting and ensure generalization.

Post-training, the model undergoes rigorous testing on an independent test set to evaluate its accuracy and overall performance. Interpretabilitytechniques, such as attention mechanisms, may be incorporated to enhance understanding of the model's decision-making

The system scalability and efficiency are considered during development, with potential optimization techniques applied to ensure real-time processing.

### V. WORKING

**Step 1**: The first step is to choose a dataset for the image classification task. There are many publicly available datasets, that can be used for training and testing the CNN. For this tutorial, we will be using the dataset, which consists of  $60,000\ 32\times32$  color images across ten classes, with 30 images in each class.

**Step 2**: Next, we will load the dataset and prepare it for training. This involves splitting the dataset into training , test and validation sets, and then normalizing thepixel values of the images to the range of 0 to 1.

**Step 3**: We will use the training set of images and labels to train the CNN. We will use the flow\_from\_directory() method from the keras.preprocessing.image module to create a generator that will read the images from the directory and apply dataaugmentation.

**Step 4**: We will define the CNN architecture using the Keras library. The model will consist of several convolutional layers followed by max pooling layers, and a fully connected layer with a softmax activation function. We will then train the model using the fit() method.

**Step 5**: Finally, we will evaluate the trained model on the test set using theevaluate() method and calculate the accuracy of the model.

### VI. CONCLUSION

We used Convolution Neural Networks (CNN) for image classification using images form hand written MNIST data sets. this data sets used both and training and testing purpose using CNN. it provides the accuracy rate 98%. images used in the training purpose are small and grayscale images. the computational time for processing these images is very high as compare toother normal JPEG images.

Stacking the model with more layers and training the network with more image data using cluster of GPUs will provide more accurate results of classification of images. The future enhancement will focus on classifying the colored images of large size and large size and its very useful for image segmentation process

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