Image Classification Using Convolutional Neural Network

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Computer vision and neural networks are the emergency fields and most promising research areas for developing many applications. Image recognition is a subfield of computer vision, which is at the growing pace now. Even though researchers are active, still strive to find a good approach using advanced neural networks. The objective is to make computer automatically recognize objects perfectly, given millions of data. The use of deep convolutional neural networks best suits to classify image, when there is huge amount of data. In this work, a machine learning based algorithm is used with Canadian Institute for Advanced Research-10(CIFAR-10) classification algorithm to provide a generic solution for the correct recognition of the object by the computer.

1. INTRODUCTION:

Deep Convolutional neural network is highly capable of producing good results irrespective of the challenges in dataset. It relies on supervised learning method as discussed in [1] ,used to classify millions of high resolution images into thousand's of different classes. ImageNet is a dataset of millions of label high resolution images collected from web and manually labelled.

CIFAR-10 is another dataset for object recognition which is computer vision enabled. This dataset comprises of more than 60,000 color images and collected by [1] , [2] have used Artificial neural neutrons(ANN) for recognizing vechicle's license plate using CCD camera. This is done by capturing the vehicle image and finding the plate region, them segmenting the characters, feature are extracted and ANN used for recognizing vehicle's license plate using CCTV camera. This is done by capturing the screenshots from the footage and finding the license plate region, then segmenting the characters, features are extracted and ANN is used for recognition. [3] is used for deep learning in computer vision for security purpose.

It is evident that automatically identifying the object is difficult because of the near infinite number of permutations of objects, their positions, lightings, and so on. The proposed work adopts a machine learning algorithm to classify objects obtained from ImageNet and CIFAR-10 datasets.

2. Proposed work

One of the requirement to apply machine learning algorithm is large dataset. The data set can be structured or unstructured. The IMAGENET and CIFAR-10 are combined and very large data set are created. The dataset is fed to the object recognition system to learn more about the image. So our proposed idea is that we identify the stolen model and make using smart object identification without any human intervention.

The next step, would be using the screenshots from a CCD and identify a drowning child by the unusual patterns the stills exhibits, and thus sending an alert message or buzzer to indicate that the child is in danger.

2.1 Role of MNIST dataset

Fig.3. Big data for image processing

For the required analysis, we feed our training data about each image into our machine learning algorithm. The algorithm is trying to figure out what kind of math needs to be done to make the patterns work out.

2.2 Role of Deep Convolutional Neural Network

The proposed work uses a separate image Input layer and a 2D convolutional layer, a rectified linear unit, a max pooling 2D layer, software layer and classification layer is at the output.

The structure of convolutional neural network is conv pool[conv pool] stack2line ['nonlinear'] [] means optional, and can be replicated for many times.

- **Conv** implements convolution computing. To use 'conv' layer, you should specify the following parameters: **filterDimnumFiltersn linear type** the inputs has multimaps, then you may specify the connection table between the input maps and the output maps: **conn_matrix** If you don't specify the connection table, then each output map is connected to all input maps.
- '**maxpool**' and '**meanpool**' are both pooling layer. To use pooling layer, the following parameters should be specified:**poolDim pooltypes**
- **relu/tanh/sigmoid/softmax/softsign** these types of layers mainly do the non-linear function to the input. y = max(0,x) y = tanh(x) y = 1/exp(-x) y = softmax(x) y = x/(1+abs(x)) To use them, the following parameter should be specified: **size** Besides, the softmax layer is usually used as output layer.
- **stack2line** is used after convlution and pooling, the multi-dimention "outputs" usually are converted to a vector to be used as the inputs of the densely connected non-linear layers. And stack2line layer is to indicate this converting.

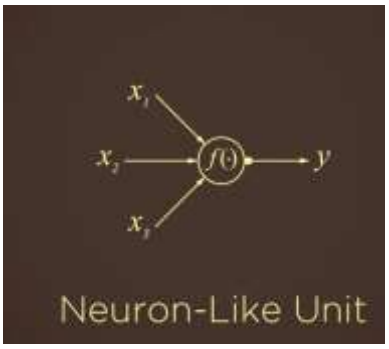


Fig2a.Neuron like unit

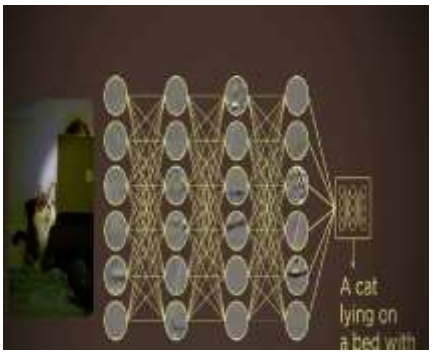


Fig2b: multilevel neural network

The necessary features are extracted from the images and fed as input to the networks.

3. Result

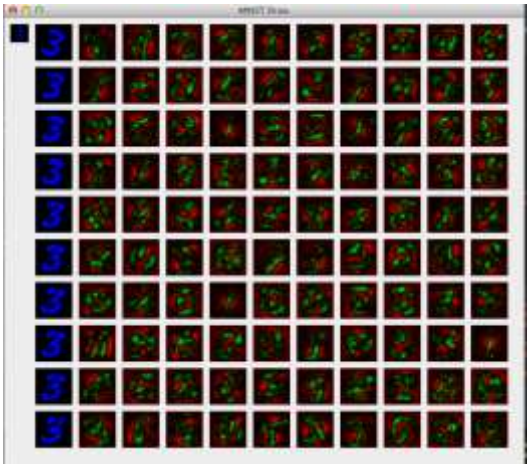
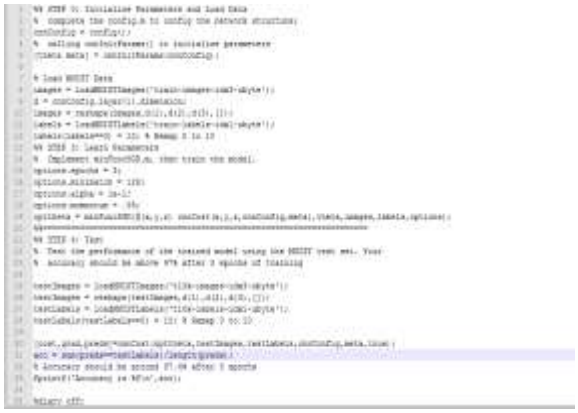


Fig 3a. MNSIT set of 3 as input



.Fig 3b. Code for training set

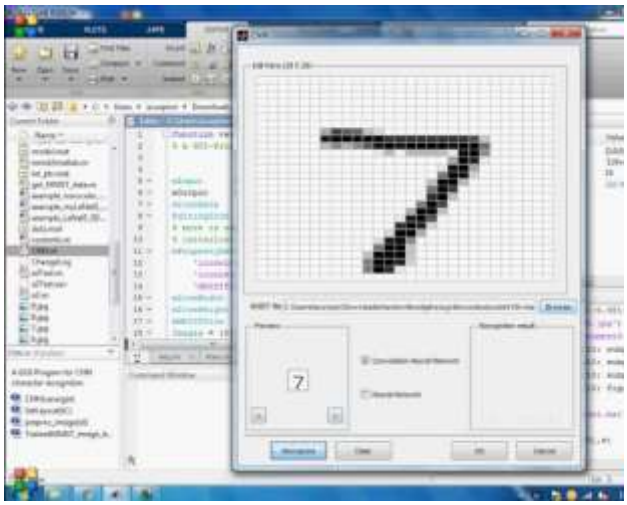
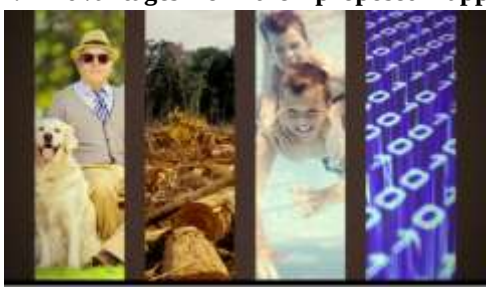


Fig 3c. Screenshot of number recognition system using CNN

Thus, we are training the system with our datasets.

4. Advantages of the proposed approach:



Even though we have matched the highest clarity and precision in retinal display , our computer are still blind.

Basically, this help a cctv camera to identify the stolen vehicle or any vehicle's .license plates. Making it fully automatic. The main advantage is their accuracy in image recognition problems.

5. Conclusion:

The presented approach is expected to yield significant improvement in correctly classifying the images. The implementation of deep convolutional neural network ensures that this is possible as a large set of data is analyzed with the help of machine learning approach.

6. References:

[1]] H. Erdinc Kocer and K. Kursat Cevik, "Artificial neural netwokrs based vehicle license plate recognition," *Procedia Computer Science*, vol. 3, pp. 1033-1037, 2011.

[2] Cynthia Lum, Julie Hibdon, Breanne Cave, Christopher S. Koper, and Linda Merola, "Deep learning in Computer Vision for security," *Journal of Experimel Criminology, Springer Netherlands*, , pp. 321-345, 2011.

[3] A Albiol, L Sanchis, and J.M Mossi, "Detection of Parked Vehicles Using Spatiotemporal Maps," *IEEE Transactions on Intelligent Transportation Systems*, vol. 12, no. 4, pp. 1277-1291, 2011.

[4]Y. LeCun, F.J. Huang, and L. Bottou. Learning methods for generic object recognition with invariance to pose and lighting. In Computer Vision and Pattern Recognition, 2004. CVPR 2004. Proceedings of the 2004 IEEE Computer Society Conference on, volume 2, pages II–97. IEEE, 2004.