Image Classification using Deep Learning

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ABSTRACT

Most of the existing image recognitions systems are based on physical parameters of the images whereas image processing methodologies relies on extraction of color, shape and edge features. Thus Transfer Learning is an efficient approach of solving classification problem with little amount of data. There are many deep learning algorithms but most tested one is AlexNet. It is well-known Convolution Neural Network (AlexNet-CNN) for recognition of images using deep learning. So for recognition and detection of the image we have proposed Deep Learning approach in this project which can analyse thousands of images which may take a lot for a human to do. Pretrained convolutional neural network i.e. AlexNet is trained by using the features such as textures, colors and shape. The model is trained on more than 1000 images and can classify images into categories which we have defined. The trained model is tested on various standard and own recorded datasets consist of rotational, translated and shifted images. Thus when a image is passed to the system it will apply AlexNet and return the results with a image category in which the image lies with high accuracy. Thus our project tends to reduce time and cost of image recognition systems using deep learning.

KEYWORDS: Image Recognition, CNN, Transfer Learning, Median Filter, Deep Learning and AlexNet

I. INTRODUCTION

Image Processing is a hot topic today. One of the most sought after topic in image processing is Convolution Neural Network (CNN) which has a great accuracy than other techniques. So this CNN technology can be used to create a very helpful applications which will save time and money that has to paid for doing the same work by a human with less accuracy. It can traverse through thousands of images and return accurate results.

Currently most sought after image processing is Deep Learning. Many Deep Learning algorithms are developed and used. But the most tested and used CNN is AlexNet-CNN which has high accuracy. This kind of CNN can be used to classify images which can be used in crime fighting and many more applications. In order to solve this problem, We are designing a project which will classify images in to categories from thousands of images accurately using AlexNet-CNN Deep and Transfer Learning technique.

The proposed system additionally will be able to help in -

- To improve current image recognition systems.
- Classify images in to similar categories.
- To analyse thousands of images at a go.
- To apply AlexNet-CNN.
- To implement and run the concept of Deep Learning.
- To maintain image database needed for AlexNet-CNN

II. Literature Survey

Image classification using deep learning is done by few researchers all over world. In[1] 2018 M. Shamim Hossain, Muneer Al-Hammadi and Ghulam Muhammad, explains Fruit classification is an important task for many industrial applications. A fruit classification system may be used to help a supermarket cashier identify the fruit species and prices. It may also be used to help people decide whether specific fruit species are meeting their dietary requirements. In this paper, we propose an efficient framework for fruit classification using deep learning. More specifically, the framework[7][8] is based on two different deep learning architectures. The first is a proposed light model of six convolutional neural network layers, while the second is a fine-tuned visual geometry group-16 pre-trained deep learning model. Two color-image datasets, one of which is publicly available, are used to evaluate the proposed framework.

In[2] 2018 Ali Abd Almisreb, Nursuriati Jamil and N. Mdin explains Transfer Learning is an efficient approach of solving classification problem with little amount of data. In this paper, we applied Transfer Learning to the well-known AlexNet Convolution Neural Network (AlexNet CNN) for human recognition based on ear images. We adopted and fine-tuned AlexNet CNN to suit our problem domain.

related equipment's. Most of the existing coin recognitions systems are based on physical parameters of the coins whereas image processing methodologies relies on extraction of color, shape and edge features. For recognition and detection of Indian coin we have proposed Deep Learning approach in this paper. Pre trained convolutional neural network i.e. AlexNet is trained by using the features such as textures, colors and shape.

In[4] 2019 N. A. J. Sufri, N. A. Rahmad, N. F. Ghazali, N. Shahar and M. A. Asari explains visually impaired people faced a problem in identifying and recognizing the different types of banknote due to some reasons. This problem draws researchers' attention to introduce an automated banknote recognition system that can be divided into a vision-based system and sensor-based system. The main aim of this study is to have deeper analysis on the effect of region and orientation on the performance of Machine Learning and Deep Learning respectively using Malaysian Ringgit banknotes (RM 1, RM 5, RM 10, RM 20, RM 50 and RM 100).

III. Working Methodology
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IV. Mathematical Modules
Set theory applied to the project
A. Pre-Process:-
Set (P)={P0,P1,P2,P3,P4,P5}
- P0 ∈ P = Download Images.
- P1 ∈ P = Label Images.
- P2 ∈ P = Apply Median Filter algorithm to remove noise.
- P3 ∈ P = Save and Label images after noise removal.
- P4 ∈ P = view results.
- P5 ∈ P = Categorize images in different folders for AlexNet-CNN.

B. AlexNet-CNN:-
Set (A) = {A0,A1,A2,A3,P4,A4,A5}
- A0 ∈ F = Initialize AlexNet-CNN.
- A2 ∈ F = Train ALexNet-CNN.
- A3 ∈ F = Get Results.
- P4 ∈ F = view results.
- A4 ∈ F = Show CNN result data.
- A5 ∈ F = View most matched category of Image.

C. Venn diagram of intersection of two sets:-

D. Probability of our Project Modules
1. In Pre-process Module:-
We have two possibilities of removing noise in images i.e whether median filter algorithm is properly applied or not.
P (present) = 1/2 P (not) = 1/2
Hence, P (Median-Filter) = P (present) + P (not)
=1/2 + 1/2
= 1

2. In AlexNet-CNN Module:-
We have two possibilities of a successful classification of image i.e. whether AlexNet-CNN is properly trained with image database or not.
P (present)=1/2 P (not) =1/2
Hence, P (AlexNet-CNN) = P (present) + P (not)
=1/2 + 1/2
= 1

3. Conditions:-
A. Success Conditions: The system will take a input image from user and classify the image in to the image category accurately.
B. Failure Conditions: For real-time information gathering internet is must.

V. Design

VI. Conclusion
In this project, we are developing a novel approach to provide Smart Image Classification Using Deep Learning system. The basic idea of the project is to classify the image into categories using Deep Learning approach AlexNet-CNN. We will first download images from internet and then categorize them with high accuracy. The proposed method is found to be better on many criteria as compared to existing studies as it does not predict a single image category but multiple categories of different types. Moreover, the proposed system is designed and tested using a sufficiently large image database downloaded from a standard and verified data centre. Thus our project will provide high accuracy and results.

References


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