International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume 4 Issue 4, June 2020 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

Image Classification using Deep Learning

Dr. Sachin K. Korde, Manoj J. Munda, Yogesh B. Chintamani, Yasir L. Pirjade, Akshay V. Gurme

Department of Computer Engineering, Pravara Rural Engineering College,
Loni, Pune University, Pune, Maharashtra, India

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*

How to cite this paper: Dr. Sachin K. Korde | Manoj J. Munda | Yogesh B. Chintamani | Yasir L. Pirjade | Akshay V. Gurme "Image Classification using Deep Learning" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-4 | Issue-4, June 2020, pp.1648-1650, URL: www.ijtsrd.com/papers/ijtsrd31653.pdf

IJTSRD31653

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 Alext-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.

In[3] 2018 A.U.Tajane, J.M.Patil, A.S.Shahane, P.A.Dhulekar, Dr. S.T.Gandhe and G.M.Phade explains automatic coin recognition and identification system plays vital role in vending machine, slot machine and in several banking

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

An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it.

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.
- A1 ∈ F = Pass Test Image.
- 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:-

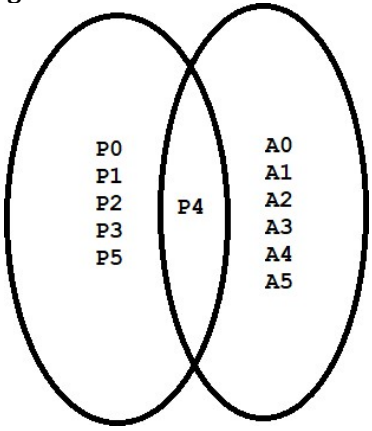

Fig 1: Venn diagram

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

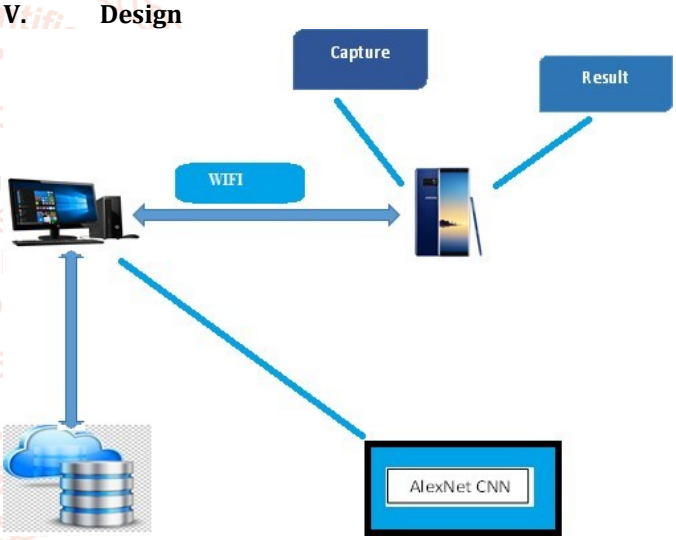

Fig 2: System Architecture

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

[1] M. Shamim Hossain, Muneer Al-Hammadi and Ghulam Muhammad, "Particle Swarm Optimized Fuzzy Model for the Classification of Banana Ripeness," IEEE Sensors Journal, vol. 17, no. 15, pp. 4903-4915, Aug. 2018.

[2] Ali Abd Almisreb, Nursuriati Jamil and N. Md Din, "Big Data-Driven Service Composition Using Parallel Clustered Particle Swarm Optimization in Mobile Environment," IEEE Transactions on Services Computing, vol. 9, no. 5, pp. 806-817, September/October 2018.

[3] A. U. Tajane, J. M. Patil, A. S. Shahane, P. A. Dhulekar, Dr. S. T. Gandhe and G. M. Phade, "Classification of fruits using computer vision and a multiclass support vector machine," Sensors, vol. 12, no. 9, pp. 12489- 12505, Sep. 2018.

[4] N. A. J. Sufri, N. A. Rahmad, N. F. Ghazali, N. Shahar and M. A. Asari, "Fruit classification using computer vision and feed forward neural network," Journal of Food Engineering, vol. 143, pp. 167-177, Dec. 2019.

[5] S. Lu, Z. Lu, P. Phillips, S. Wang, J. Wu, and Y. Zhang, "Fruit classification by HPA-SLFN," 8th IEEE International Conference on Wireless Communications & Signal Processing (WCSP), Yangzhou, China, Oct. 2016.

[6] A. Rocha, D. C. Hauagge, J. Wainer, S. Goldenstein, "Automatic fruit and vegetable classification from images," Computers and Electronics in Agriculture, vol. 70, no. 1, pp. 96-104, Jan. 2010.

[7] C. S. Nandi, T. Bipan and C. Koley. "A machine vision-based maturity prediction system for sorting of harvested mangoes," IEEE Transactions on Instrumentation and Measurement, vol. 63, no. 7, pp. 1722-1730, Jul. 2014.

[8] S. R. Dubey and A. S. Jalal, "Robust approach for fruit and vegetable classification," Procedia Engineering, vol. 38, pp. 3449-3453, 2012.

[9] G. Muhammad, "Date fruits classification using texture descriptors and shape- size features," Engineering Applications of Artificial Intelligence, vol. 37, pp. 361-367, 2015.

AUTHORS PROFILE

Dr. Sachine K. Korde Assistant Professor In Pravara Rural Engineering College, Loni.

Manoj J. Munda BE Computer (Student)

Yogesh B. Chintamani BE Computer (Student)

Yasir L. Pirjade BE Computer (Student)

Akshay V. Gurme BE Computer (Student)