



# IMAGE CLASSIFICATION WITH CIFAR-10

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# OUTLINE

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# Abstract

The image classification is a classical problem of image processing, computer vision and machine learning fields. In this paper we study the image classification using deep learning. We use AlexNet architecture with convolutional neural networks for this purpose. Four test images are selected from the ImageNet database for the classification purpose. We cropped the images for various portion areas and conducted experiments. Cifar-10 is a well-known dataset having a variety of images divided into specific classes for image classification using different models. Among all models of image classification, deep learning methods of image classification have achieved great popularity due to good results, ease of usage, and deep learning of features in shorter time.

# Problem Statement

Image Classification is a fundamental task in vision recognition that aims to understand and categorize an image as a whole under a specific label. Unlike object detection which involves classification and location of multiple objects within an image, image classification typically pertains to single-object images. When the classification becomes highly detailed or reaches instance-level, it is often referred to as image retrieval which also involves finding similar images in a large database.

# Aim and Objective

**Aim:**

Image Classification is a fundamental task in vision recognition that aims to understand and categorize an image as a whole under a specific label

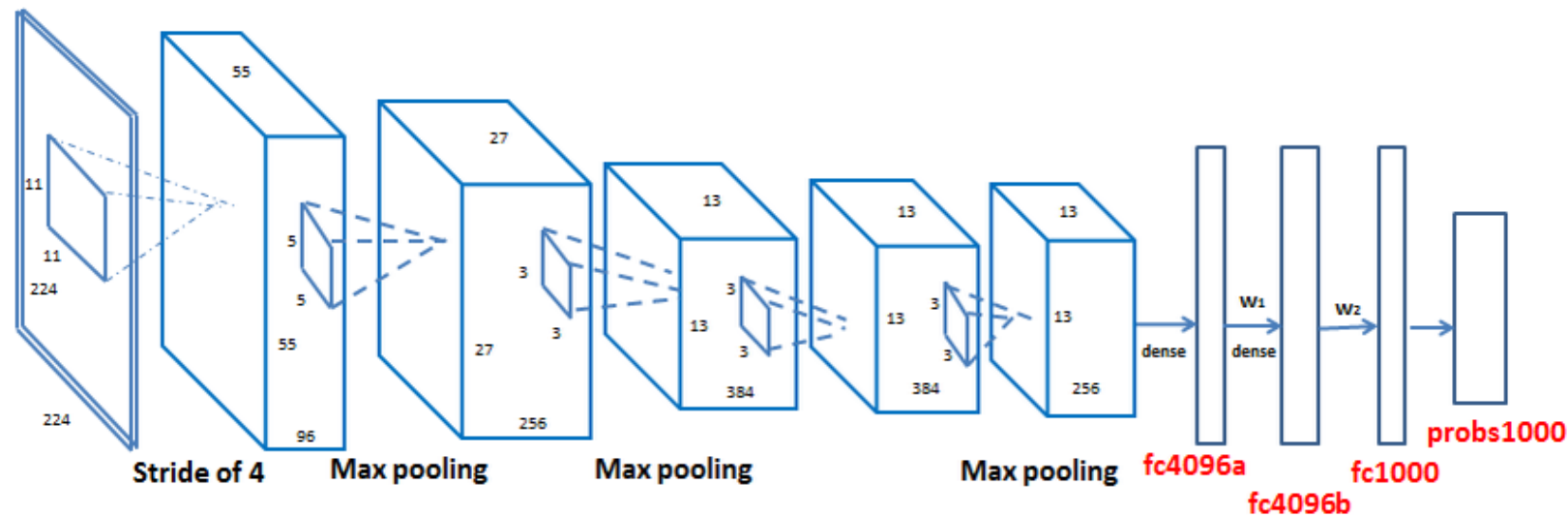
**Objective:**

- Due to its great feature learning ability, deep learning has become the first choice to solve image classification.
- The rapid development of deep learning in the past decade, image classification using deep learning has achieved tremendous progress.
- However most existing reviews focus on the methods based on CNN, while the summary of relevant research progress in recent years is not much.
- This is not friendly for scholars who want to have a more comprehensive understanding of image classification.

# Proposed Solution

Classification is a systematic arrangement in groups and categories based on its features. Image classification came into existence for decreasing the gap between the computer vision and human vision by training the computer with the data. The image classification is achieved by differentiating the image into the prescribed category based on the content of the vision.

# System Architecture



# System Deployment Approach

We selected four images Anemone, Barometer, Stethoscope and Radio Interferometer from the ImageNet database for experimentation purpose. The block diagram of the architecture shown in Fig and the corresponding implementation is illustrated. In the first layer, there are 96  $11 \times 11$  filters are used at stride 4. The output volume size is  $55 \times 55 \times 96$ . The AlexNet is trained on the GPU named GTX580 which is having a small amount of 3GB of memory. So, the CONV1 output will be halved and sent to two GPU's i.e.  $55 \times 55 \times 48$  is sent to each GPU. The 2nd, 4th, and 5th convolutional layers bits are related just to the part maps in the previous layer which dwell on the same GPU said in the figure. The kernels of the 3rd convolutional layer are associated with all kernel maps in the 2nd layer. The neurons in the fully connected layers are associated with all neurons in the past layer.



# Algorithm & Deployment

## **Artificial Neural Networks :**

A neural network is a combination of hardware bonded or separated by the software system which operates on the small part in the hu-man brain called as neuron. A multi layered neural network can be proposed as an alternative of the above case. The training image samples should be more than nine times the number of parameters essential for tuning the classical classification under very good resolution. We train the data in the networks by giving an input image and conveying the network about its output. Neural networks are expressed in terms of number of layers involved for producing the inputs and outputs and the depth of the neural network. Neural networks are involved in many principles like fuzzy logic, genetic algorithms and Bayesian methods.

# Conclusion

In conclusion, the implementation Deep learning is a powerful tool that has become a leading machine learning tool in computer vision and image analysis. A survey report is by IEEE provides a snapshot of this fast-growing field, image classification, specifically. The report briefly introduces several popular neural networks and summarizes their applications in image classification. It also discusses the challenges of deep learning in image classification.

# Future Scope

- A study on photo quality classification using deep learning shows that deep learning has shown great promise in solving complex tasks by using a black-box approach to the problem.
- Another survey on deep learning-based medical image classification presents various models like CNN, Transfer learning, Long short term memory, Generative adversarial networks, and Autoencoders and their automatic feature representations, which have high accuracy and precision.

## Reference

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Essentials

JSON View

Resource group (move) : beehrg

Status : Running

Location (move) : East US

Subscription (move) : Micro soft azure sponsorship

Subscription ID : 9605207f-d7dd-4101-a792-949e2ca2e234

Tags (edit) : Click here to add tags

Default domain : stdconnect.azurewebsites.net

App Service Plan : ASP-dbatuproject-9c98 (P1v2: 1)

Operating System : Linux

Health Check : Not Configured

Properties

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Logs

Capabilities

Notifications

Recommendations

Web app

Name : stdconnect

Publishing model : Code

Runtime Stack : Php - 8.1

**Thank you!**