



## Review Article on Machine Learning and its applications

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### Abstract

Image processing is one of the most prominent area in science and technology. Agriculture, biological image processing, face/iris/image recognition and many other fields. The goal of image processing is to enhance or compress image information whereas in machine learning, it is used to optimize differentiable parameters so that a certain loss or cost function is minimized. So, combination of these two has led to a better conception about recognition and processing of images. There are many fields and uses where, frameworks that analyze images could have much benefit. From high-tech uses to areas like agriculture, image recognition etc., frame works benefit the community and improve quality of life. Extraction and machine learning algorithms provide a viable approach to creating such a system. For e.g. Google Cloud Vision API enables developers to understand the content of an image by encapsulating powerful machine learning models in an easy way. In this paper, we have discussing about various researches carried on image processing using machine learning and its framework.

**Keywords:** Image processing, image recognition, encapsulating, machine learning, framework.

### 1. Introduction

In today's scenario, where information and technology is playing a dominant role with the graphical advancement, images play an important role in many aspects. With image processing plays a vital role in defining the minute aspects of images and thus providing the great flexibility to the human vision. Initiating with the image dataset, machine learning has received a great attention [1]. The strategy of combination of machine learning and image processing leads to a great combination and conception about the images. The potential of the image processing calculations and its joining with the learning parts expands the issues of image processing in numerous fields like medical, audio/ visual communication, military applications, etc. With the profusion of complex images, the image processing has to come up with its

adaptability. The machine learning provides intelligent vision programs with the required adaptation. An innovative integration of image learning and image processing gives a tremendous benefit to the field and its understanding. As the number of image processing algorithms which are incorporated with learning components increases, an adaptation is required. And an increase in adaptation is necessarily linked to the increase in its complexity.

With the increase in the amount of data images which are being able to process through the large quantities of data with its larger amount of high dimensions, an interaction with the image and image priors is necessary to drive the strategy of model selection.

## 2. Literature Survey

In Steve A. Chien et al. [2], examined an Artificial Intelligence framework, VICAR organizer which has utilised the information about image handling and their necessities to build the image that is executable and preparing in scripts to bolster state science demands that are abnormal. This article has portrayed an Artificial Intelligence with an arranging way for dealing with the computerization and utilization with a particular picture region prepared for the planetary science and applications including the radiometric correction with colour triplet. Martin Kiechle et al., [3] proposed a model for the relationship for two image modality along with the provision of analysis model in a joint setup with co-sparsity. The coupled analysis operators are also introduced by decreasing and minimizing the joint co-sparsity function, through a conjugate inclination strategy on a proper complex process. The identifying virtue of the introduced model is also examined in different applications.

Farshid Arman et al., [4] has introduced an encoded video sequences antecedent to the decoding. This approach has exploited the data contained in the DCT coefficients of MPEG or JPEG encoded video groupings. The framework has also been tried effectively on different video groupings, counting gatherings, presentations, individual meetings, and others. The algorithm has low problems and can be processed in real-time on simultaneous processors [5]. This algorithm presents the key features of machine vision system and the detection of salient objects which were also efficiently used for preparing the second key part of the framework, that is called as the machine learning-based object detection and recognition unit.

Huang et al., [6] has proposed a depth learning convolutional neural network based framework on (CNN) and Naive Bayes data fusion scheme (called NB-CNN), which can be used to analyse a single video frame for crack detection.

## 3. Machine Learning Approach

The machine learning approach is being introduced and implemented like as alternate towards many of the conventional engineering approaches which are being widely used for designing the solution of any problem. The domain starts from the acquisition of knowledge, along with problem of interest and capturing its mathematical model with its physics of setup. Depending upon the set up and its designed model, the optimized algorithm presents the guaranteed performance representing the accurate reality. Designing an algorithm could be a better example, that may be in the field of wireless networking that is designed by using the conventional approach and if it requires any development in the terms of channel which is connecting the transmitter with the receiver. The problem is solved by considering its optimization under the channel model including the Gaussian noise channels, code spreading issues and the faded channels. The machine learning approach implements the acquired knowledge along with the large number of examples of desired behaviour for the interest based designed algorithm. Then the training set is constituted which is implemented through the learning algorithm and is thus produced to the trained “machine” for carrying out the desired task.

The Machine Learning is made by the possible set of machines, also referred to as hypothesis class, which can be used for the purpose of selection while training.

Architecture of the Neural Network with synaptic weights can also be used as an example of the hypothesis. The method of Machine learning integrates domain knowledge for the purpose of model selection. The Learning algorithms, which are based on the optimization of the performance criterion measures the wellness of the selected “machine” and its matching with the available data. And for the designing of a channel decoder, machine learning approach operates even in the absence of an established channel model. However, after the basic assessment and formulation, machine learning tools also integrate the domain knowledge available in the learning process which allows the machine learning process to be successfully implemented in the numerous operations. Similarly in the field of processing of images, where the invariance among the visual features and its minute details can be solved by implementing the neural network, by selecting the specific hypothesis class for the process of training.[7]

#### **4. Applications of Machine Learning**

Artificial Intelligence and Machine Learning facilitates the development of software in the field of image processing. Some of the applications are found in the following industries:

##### **Healthcare industry**

Image analysis is a key application in the radiology domain of the healthcare industry. The deep learning algorithms like Computer vision has made the things more comfortable in the healthcare industry by making automated analysis, which delivers more accurate results at a faster rate. These technologies also help us to reduce manual analysis dependency even at microscopic levels with molecular imaging. The technique helps to reach the advanced level

and accurate measurements in the different diagnosis and its related procedures. Image processing has also found to be playing an important role in the diagnosis of Brain Tumours.

Application areas of artificial intelligence and machine learning are:

1. **Medical X-ray:** The radiologists study the X-ray reports in many hospitals. Thus, deep learning algorithms in combination with automated analysis can help the radiologists’ to a much greater extent and their task can also be reduced, with machine analysis to give more accurate and faster results. Such analysis can be more helpful to the radiologists in getting appropriate decisions.
2. **Patients:** Such automated analysis reports can also be helpful to the patients, and they will also be presented with the immediate diagnosis reports with greater accuracy.

##### **Defense**

It is a challenging task for the army personnel to access the different surrounding locations in 360 degrees. The image processing has given a revolutionized way to cope up with the situation in a more accurate way and more effectively. The Monitoring cameras and drones can be implemented for capturing the images of such critical areas and that may be processed through deep learning algorithms.

##### **Automobile Industry**

This industry has also been the greatest metamorphosis, the best example in the automobile industry is Self-Driving Cars. They are greatest of eternity in the industry. Self-driving cars do all the driving. The application of deep learning in the automobile industry for example, self-driving cars, with the application of machine intelligence also help to reduce the number of collisions. The principle of object

detection which is involved in image distribution helps in the presenting and implementing the intelligent cars along with the Image classification and identifying the objects with localization and providing specific locations of the objects found.

### **Agriculture**

In Agriculture the image processing simultaneously with the Artificial Intelligence helps to enhance the quality and durability of the grains. Its applications are also found in the detection of weeds and other foreign plants which have got naturally grown by their self. These weeds, foreign plants, and the crops of interest that are sown can be compared. This strategy will help the crops of interest to get better environmental conditions, water, fertilizers and sunlight. The Artificial Intelligence can also implement the Edge-based machine classifiers that can detect the self-grown weeds.

Similarly, Infrared image based technology can also be implemented for the analysis and in assisting the understanding and the monitoring of different irrigation systems. Another intelligence, the infrared image based analysis, can also be implemented and used to predict the harvest time. Same as in machine learning in the money laundering [8].

### **Conclusion**

The Benefits of the Artificial Intelligence and its combination with Image processing will provide a vast transformation in the field of image processing which has no limitation to these fields and applications. The greatest potential is also yet to be discovered and implemented, however there is an uncertainty about the potential of the image processing about different individual vision in different domains. There are numerous problems associated with this domain where almost every data that is captured by cameras all around the world

has concluded with a gap between the research and investigation to examine more in finding the inclinations of image processing in collaboration with machine intelligent learning.

### **REFERENCES**

- [1] Lézoray, Olivier, et al. "Machine learning in image processing." *EURASIP Journal on Advances in Signal Processing* 2008,1: 1-2.
- [2] Chien, Steve A., and Helen B. Mortensen. "Automating image processing for scientific data analysis of a large image database." *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 1996, 18.8: 854-859.
- [3] Kiechle, Martin, et al. "A bimodal co-sparse analysis model for image processing." *International Journal of Computer Vision*, 2015, 114.2-3 233-247.
- [4] Arman, Farshid, Arding Hsu, and Ming-Yee Chiu. "Image processing on compressed data for large video databases." *Proceedings of the first ACM international conference on Multimedia*, ACM, 5(2), 1993.
- [5] Ramík, Dominik Maximilián, et al. "A machine learning based intelligent vision system for autonomous object detection and recognition." *Applied intelligence* 40.2: 358-375, 2014.
- [6] Huang G, Chen D, et al. *Multi-Scale Dense Networks for Resource Efficient Image Classification*, 2018, arXiv: 1703.09844, 2017.
- [7] Diogo V. Carvalho et al. *Machine Learning Interpretability: A Survey on Methods and Metrics*, MDPI Electronics Journal, 8(8), 2019.
- [8] Martin Jullum, Anders Løland, et al. *Detecting money laundering transactions with machine learning*, Emerald Insights journals, 23(1), 2020.