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Study of Image Recognition Using Machine Learning

Shubhangi C. Deshmukh
Electrical & Electronics Engineering Department, Sanjay Ghodawat University

Abstract: ***This article presents a survey of machine learning for image recognition. Image Recognition is the task of identifying objects of interest within an image and recognizing which category the image belongs to. The common goal of image recognition is the classification of detected objects into different categories. Image processing technology based on machine learning has been widely used in feature image, classification, segmentation and recognition and is a widely used in various fields. In this paper use of machine learning for image recognition is discussed.***
Keywords: Machine learning, image recognition, deep learning, neural network, classifier.

I. INTRODUCTION

Image processing technology based on machine learning has been widely used in image classification, segmentation, and recognition [1]. With the development of machine learning and the introduction and improvement of various machine learning algorithms, machine learning is of great significance to various application fields in human life. Machine Learning is a multidisciplinary subject involving many disciplines such as probability theory, statistics, approximation theory, convex analysis, and algorithm complexity theory. It is the core of artificial intelligence, and it is the fundamental way to make computers intelligent [2]. Machine learning is widely used in many fields. For example, speech recognition is a combination of audio processing technology and machine learning. Speech recognition technology is generally not used alone, and generally incorporates related techniques of natural language processing. The current related applications are Apple's voice assistant siri and so on. In image processing techniques, images are processed into inputs suitable for entry into a machine learning model, and machine learning is responsible for identifying relevant patterns from the images. There are many applications related to computer vision, such as Baidu map, handwritten character recognition, license plate recognition and so on. This field is very promising and is also a hot research direction. With the development of deep learning in the new field of machine learning, the effect of computer image recognition has been greatly promoted, so the future development of computer vision industry is immeasurable [3].

II. IMAGE RECOGNITION

Image recognition is an application of computer vision that often requires more than one computer vision task, such as object detection, image identification, and image classification. Image recognition technology is also divided into the following steps: information acquisition, pre-processing, feature extraction and selection, classifier design and classification decision. The acquisition of information refers to the conversion of information such as light or sound into electrical information through sensors. That is to obtain the basic information of the research object and transform it into information that the machine can recognize by some means. Pre-processing mainly refers to operations such as de-drying, smoothing, and transforming in image processing, thereby enhancing important features of the image. Feature extraction and selection means that in pattern recognition, feature extraction and selection are required. The simple understanding is that the images we study are various. If we need to distinguish them by some method, we must identify them by the characteristics of these images. The process of acquiring these features is feature extraction. Features obtained in feature extraction may not be useful for this recognition. At this time, useful features are extracted, which is the choice of features. Feature extraction and selection is one of the most critical techniques in the image recognition process, so the understanding of this step is the focus of image recognition [4].

Image recognition with machine learning uses algorithms to learn hidden knowledge from a dataset of good and bad samples. Machine learning is a process of extracting useful information from unordered data. It spans multiple disciplines such as computer science, engineering, and statistics and requires multidisciplinary knowledge. In the Internet age, people create and collect a large amount of data. How to extract valuable information from these data is a topic worth studying.

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Now is also the era of "data is king", companies are crazy to collect user data, personal information, usage habits, search records, watch records and even email content... hope to find user preferences and tap users' needs . Who has the data, who has the next opportunity.

However, it is not enough to have such data. The massive data has exceeded the feasibility of direct calculation. To extract information efficiently from it, a special learning algorithm is needed. This is the role of machine learning [4].

A. How does Image Recognition Work?

Image recognition involves the creation of a neural network that processes the individual pixels of an image. These networks are fed with as many pre-labelled images as we can, in order to "teach" them how to recognize similar images. Image recognition process has following simple steps:

1) We need a dataset containing images with their respective labels. For example, an image of a dog must be labelled as a dog or something that we can understand.

2) Next, these images are to be fed into a Neural Network and then trained on them. Usually, for the tasks concerned with images, we use convolutional neural network. These networks consist of convolutional layers and pooling layers in addition to Multi perceptron layers (MLP).

3) We feed in the image that is not in the training set and get predictions.

By following these simple steps, below Fig.1 shows an example of classifier that can recognise RGB images of different kinds of animals[5].

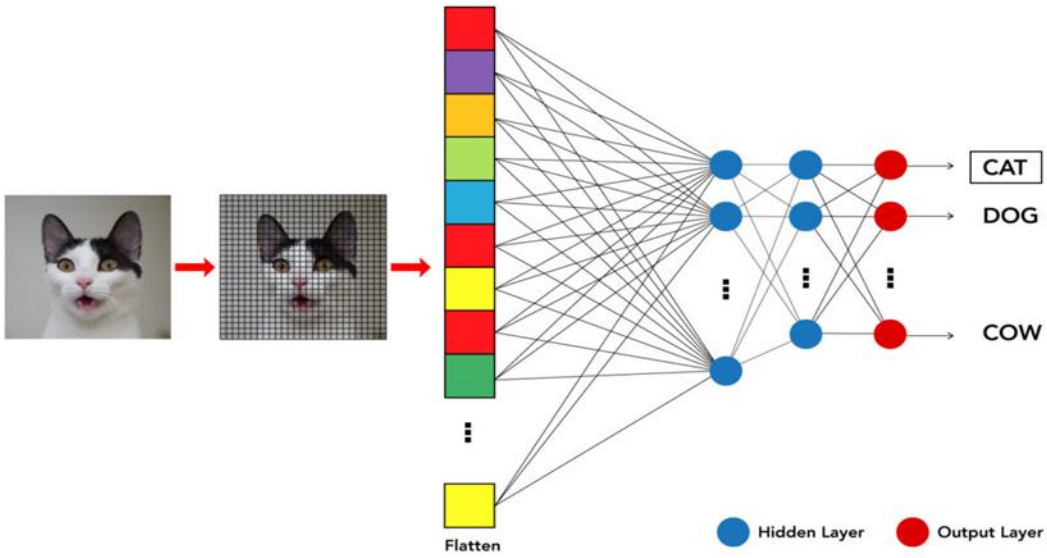


Fig.1

III. MACHINE LEARNING ALGORITHMS

The most popular machine learning models are as below:

A. Support Vector Machines

SVMs work by making histograms of images containing the target objects and also of images that don't. The algorithm then takes the test picture and compares the trained histogram values with the ones of various parts of the picture to check for matches.

B. Bag of Features Models

Bag of Features models like Scale Invariant Feature Transformation (SIFT) and Maximally stable extremal regions (MSER) work by taking the image to be scanned and a sample photo of the object to be found as a reference. The model then tries to pixel-match the features from the sample photo to various parts of the target image to see if matches are found.

C. Viola-Jones Algorithm

A widely-used facial recognition algorithm from pre-CNN (Convolutional Neural Network) times, Viola-Jones works by scanning faces and extracting features that are then passed through a boosting classifier.

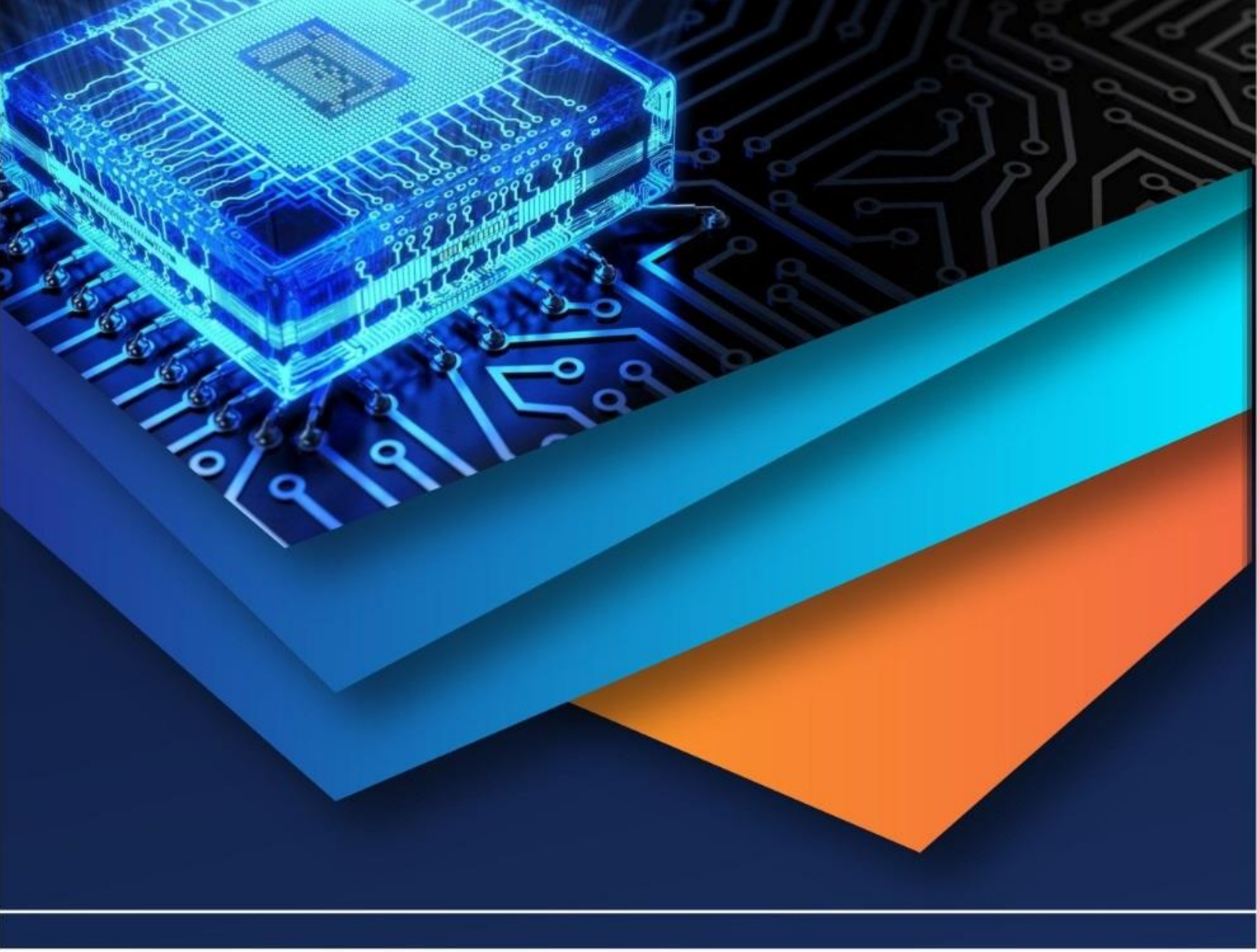
This, in turn, generates a number of boosted classifiers that are used to check test images. For a successful match to be found, a test image must generate a positive result from each of these classifiers[5].

IV. CONCLUSIONS

In this paper image recognition technology based on machine learning is discussed. Image recognition technology is divided into different steps such as information acquisition, pre-processing, feature extraction and selection, classifier design and classification decision. Also popular machine learning algorithms are discussed. This field is very promising and is also a hot research area.

REFERENCES

[1] Wang B., Chen L.L, Novel image segmentation method based on PCNN, Optik, 187, 193-197, 2019.
[2] Wang, Q., & Lu, P. (2019) "Research on Application of Artificial Intelligence in Computer Network Technology", International Journal of Pattern Recognition and Artificial Intelligence, 33(5), 1959015, 2019.
[3] Sachi Nandan Mohanty, E. Laxmi Lydia, Mohamed Elhoseny, Majid M. Gethami Al Otaibi, K. Shankar, Deep learning with LSTM based distributed data mining model for energy efficient wireless sensor networks, Physical Communication, 2020, In Press (DOI:https://doi.org/10.1016/j.phycom.2020.101097).
[4] Lijuan Liu, Yanping Wang, and Wanle Chi," Image Recognition Technology Based on Machine Learning", DOI 10.1109/ACCESS.2020.3021590, IEEE Access,2017.
[5] COMPUTER VISION (HTTPS://VISO.AI/BLOG/COMPUTER-VISION/).



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