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Image Recognition Using Machine Learning

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ABSTRACT

Image recognition is important side of image processing for machine learning without involving any human support at any step. In this paper we study how image classification is completed using imagery backend. Couple of thousands of images of every, cats and dogs are taken then distributed them into category of test dataset and training dataset for our learning model. The results are obtained using custom neural network with the architecture of Convolution Neural Networks and Keras API.

Keywords: CNN, Machine-learning, Deep learning, Image-recognition

I. INTRODUCTION

Image classification came into existence for decreasing the gap between the pc vision and human vision by training the pc with the info. Artificial Intelligence has for decades been a field of research in which both scientists and engineers have been making intense efforts to unravel the mystery of getting machines and computers to perceive and understand our world tolerably to act properly and serve humanity. One of the foremost important aspect of this research work is getting computers to know visual information (images and videos) generated everyday around us. This field of getting computers to perceive and understand visual information is understood as computer vision. During the rise of artificial intelligence research in the 1950s to the 1980s, computers were manually given instructions on how to recognize images, objects in images and what features to look out for. This method are traditional algorithms and were called Expert Systems, as they require that humans take the pain of identifying features for every unique scene of object that has to be recognize and representing these features in mathematical models that the pc can understand. That involves an entire lot of tedious work because there are hundreds and thousands of varied ways an object are often represented and there are thousands (or even millions) of different scenes and objects that uniquely exist, and thus finding the optimized and accurate mathematical models to represent all the possible features of every objects or scene, and for all possible objects or scene is more of work that will last forever. In the 1990s, the concept of Machine Learning was introduced and it ushered in an era during which rather than telling computers what to

seem out for in recognizing scenes and objects in images and videos, we will instead design algorithms which will make computers to find out the way to recognize scenes and objects in images by itself, just like a child learns to know his/her environment by exploring. Machine learning opened the way for computers to find out to acknowledge almost any scene or object we would like them too.

In the running world, there is growing demand for the software systems to recognize images when information is scanned through Google vision API. Image recognition, in the context of machine vision, is the ability of software to identify objects, places, people, writing and actions in images. Computers can use machine vision technologies in combination with a camera and artificial intelligence software to achieve image recognition. While human and animal brains recognize objects with case, computers have difficulty with the task. Inorder to overcome this problem faced by computer softwares are used. Current and future applications of image recognition include smart photo libraries, targeted advertising, the interactivity of media, accessibility for the visually impaired and enhanced research capabilities. Google, Facebook, Microsoft and Apple are some of the major companies which uses this technology.Facebook can now perform face recognize at 98% accuracy which is comparable to the ability of humans. Facebook can identify your friend's face with only a few tagged pictures. The efficacy of this technology depends on the ability to classify images. Classification is pattern matching with data. Images are data in the form of 2-dimensional matrices. In fact, image recognition is classifying data into one category out of many. One common and an important example is optical character recognition (OCR). OCR converts images of typed or handwritten text into machine-encoded text. The major steps in image recognition process are gather and organize data, build a predictive model and use it to recognize images.

Furthermore, the human accuracy for classifying an image of a face in one of 7 different emotions is 65% + 5%. One can observe the difficulty of this task by trying to manually classify the FER-2013 dataset images within the following classes ("angry", "disgust", "fear", "happy", "sad", "surprise", "neutral").

Gender classification was first perceived as an issue in psychophysical studies; it focuses on the efforts of understanding human visual processing and identifying key features used to categorize between male and female individuals [1]. Research has shown that the disparity between facial masculinity and femininity can be utilized to improve performances of face recognition applications in biometrics, human-computer interactions, surveillance, and computer vision. However, in a real-world environment, the challenge is how to deal with the facial image being affected by the variance in factors such as illumination, pose, facial expression, occlusion, background information, and noise dependent on the type of classifier chosen, which is in turn dependent on the feature extraction method applied.

II. THEORITICAL BACKGROUND

One of the core objectives is to confirm whether a person's face matches a known identity. This is used in various security and access control systems, such as unlocking smartphones, accessing secure facilities, and online account authentication. Ensuring the authenticity of a user by requiring them to present their face as proof of identity. This is commonly used in biometric authentication systems to protect sensitive information and accounts.

Analyzing facial expressions to determine emotions or moods, which can be used for market research, customer feedback analysis, and mental health monitoring. Assisting individuals with disabilities by using facial recognition for tasks like hands-free control of devices or facilitating communication

III. METHODOLOGY

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 . 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.

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

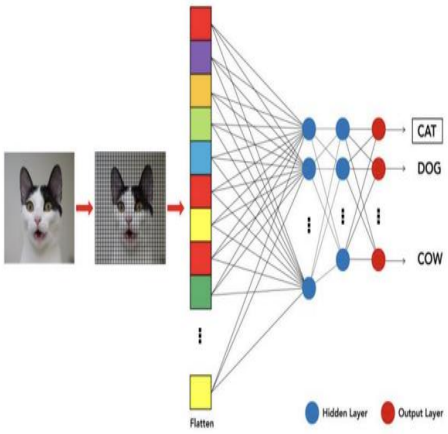
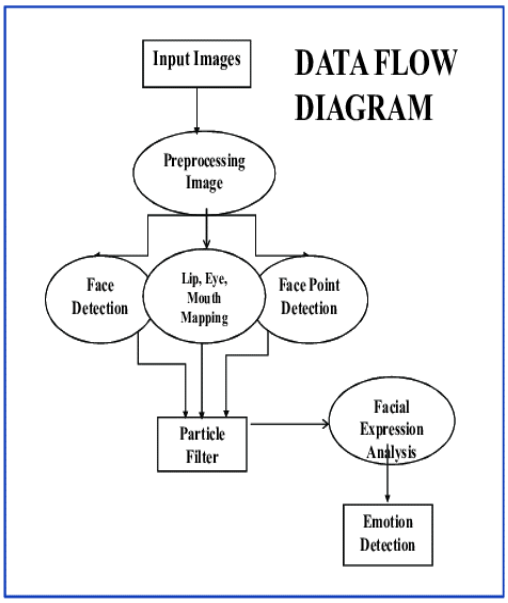


Fig.1

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.



Multi-Modal Verification: Combining multiple biometric modalities, such as facial recognition, fingerprint recognition, and voice recognition, for more robust and secure identity verification. Multi-modal verification enhances accuracy and reduces susceptibility to spoofing.

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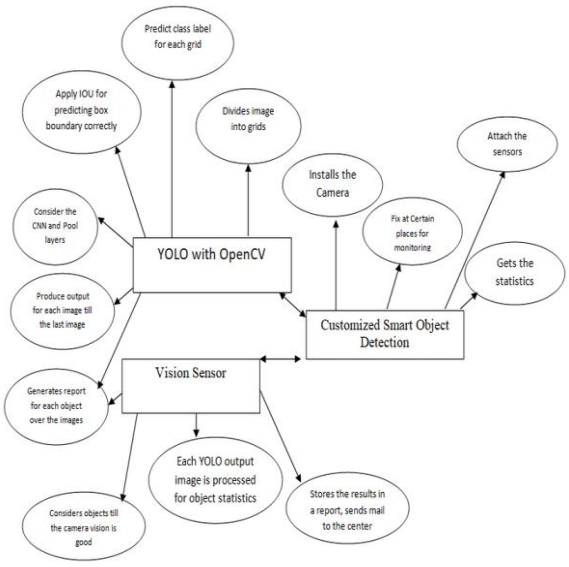

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IV. CONCLUSION

The testing of random images came out to be successful. The image dataset was pulled from google repository directly. The convolutional neural network is used in-hand with Keras for classification purpose. From the experiments we observe that the images are classified correctly even if the same images were scaled in different sizes or trimmed or rotated to get entirely new image for the input showing the effectiveness of deep-learning algorithm.

V. 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]COMPUTERVISION (HTTPS://VISO.AI/BLOG/COMPUTER-VISION/).