

Image Recognition Using Artificial Intelligence

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Abstract -. This paper primary objective is to create a new technique for picture identification utilizing Python and its library tools, including NumPy, Bing image downloader, matplotlib and many more for the use of machine learning and its features, including support vector machines (SVM). Images can now be recognized using a method that makes advantage of the images' individual properties. This method is different from the chemist image method in that it does not demand as much information on the sizes or types of the photos in the training set as the chemist image method does. The usage of this technique is very beneficial for detecting pictures with fixed form and, such as paintings and papers.[1]

Keywords : Artificial Intelligence, Image Preprocessing, Image Recognition, Machine Learning

I. INTRODUCTION

It can also be possible to refer to the image recognition system for portable computers as the capacity of laptops, tablets, and other comparable electronic and electrical equipment or technologies to analyze and reason what individuals "see" in video or photos as in.[6] This crucial activity, often known as "image categorization" or "picture tagging" could additionally be an interpretive half-find of numerous laptops, portable computers, as well as other comparable electrical and electronic devices or system learning anomalies. So does photo recognition actually work .There are many viewpoints, what are the potential benefits and drawbacks, and how can you apply it to your line of work. If there are many perspectives, what are the possible benefits and drawbacks, and how can users apply it to your line of work

This concept image recognition device of measurements must take a photo as its input, and its output tags must provide information about the image. For instance, the system may look this approximately if there were to develop a photo recognizing technology that instantly identified whether or not such a specific image was terrible: a model for image recognition that was also trained on pictures labelled "not really a cricNet bat" or "cricNet bat".[11]

The two categories into which one can generally split picture recognition are and multiclass recognition. When recognizing images as a single entity, prototypes only offer one tag per image. Since there are only two units of measurement, people have such a tendency to look for guidance from this (cricNetbat;cricNet).

II. AIMS AND OBJECTIVE

a) Aim

Object detection and word recognition inside photos are made easier by image recognition, which also speeds up the classification of images into many different categories.[9]

b) Objective

- There is a lack of RAM, CPU, GPU, TPU, and other computing resources but with data, users can boost accuracy.
- The most pertinent image analysis application is face recognition.
- Building an automated system that can detect faces as well as a human is a real challenge.[10]
- Humans are adept at recognizing familiar faces, but they struggle when faced with a large number of unfamiliar ones.
- A non-human face recognition system can benefit from human face recognition skills.

III. LITERATURE SURVEY

Paper 1: Edge detection techniques for image segmentation

Interpretation of image contents is one of the objectives in computer vision specifically in image processing. It has gained a lot of attention from researchers in this day and age. The division of the image into object and backdrop is a serious stage in image interpretation. An image is

segmented into its individual areas or objects. To effectively read an image and precisely identify its content, image segmentation must separate the object from the background. An essential tool for image segmentation in this situation is edge detection.[7]

Paper 2: Subspace Methods for Pattern Recognition in Intelligent Environment

The technique of dividing a digital image into several parts is known as segmentation in computer vision (sets of pixels, also known as super pixels). Image segmentation is frequently used to identify objects and boundaries in images (such as lines, curves, etc.). Image segmentation, more properly, is the process of giving each pixel in an image a label so that pixels with the same label share specific visual features. A series of segments that collectively encompass the full image, or a set of contours taken from the image, are the outcomes of image segmentation. Regarding a characteristic or computed feature, such as color, intensity, or texture, every pixel in a region is comparable.[5]

PAPER 3: For A Study Of Image Segmentation Algorithms For Different Types Of Images

The technique of dividing a digital image into several parts is known as segmentation in computer vision (sets of

pixels, also known as super pixels). Typically, image segmentation is used to identify objects and boundaries (such as lines, curves, axis etc.) in images. This ensures better results in Image Recognition. In more detail, the process of image segmentation entails giving each pixel in a picture a label so that pixels with the same label have specific visual traits. Image segmentation produces either a group of segments that collectively cover the full image or a series of extracted contours from the image. [9]

IV. EXISTING SYSTEM

The ability for computers, laptops, and other related electrical or electronic devices of devices that analyze or interpret what individuals "see" in video or images is known as image recognition. A crucial step in multimedia processing is image enhancement and visualization, also called as "image categorization" or "picture tagging." Computer vision continues to struggle with the problem of extracting the optimum characteristics that can precisely capture the essential information in images. Nevertheless, very little research has been conducted on this topic in recent years. [6]

V. COMPARATIVE STUDY

Sr no.	Paper Name	Author	Publication	Purpose
1.	Edge detection Technique for Image Segmentation	Muthukrishnan.R1 and M.Radha2,	IJCSIT,2011	Alex Net. Study of edge detection for image segmentation.
2	Subspace Methods for Pattern Recognition in Intelligent Environment	Chen, Yen-Wei, Jain, Lakhmi C.	SPRINGER, 2014	ImageNet. It includes application facial recognition, image clustering etc
3.	For A Study Of Image Segmentation Algorithms For Different Types Of Images	Krishna Kant Singh, Akansha Singh	IJSCT,2010	ImageNet. It includes application facial recognition, image clustering

VI. PROBLEM STATEMENT

The process of labelling photographs in accordance with their types is known as image categorization (classes).

The issues with image classification are as follows:

- 1) Interclass Variation
- 2) Changes in scale
- 3) Diverse points of view
- 4)occlusion

VII. PROPOSED SYSTEM

Users will go through a number of steps in this phase, including image recognition and image detection. selecting the appropriate algorithm to train the data sets, uploading

the datasets, and lastly recognizing the images. There are certain databases of photographs for a specific image or object, and it will want to be able to identify it by name, so first, it will construct a Bing image downloader. Via this, it can download as many datasets of photos and like, analyze them using NumPy, matplotlib, and learn, perform numerical calculations, and then, after producing an error matrix, simply say the name of the image as the anticipated result with greater accuracy.[6]

VIII. ALGORITHM

Step 1: Start

Step 2: Loading a sample image

```
from tensorflow.python.keras.applications import vgg16
```

```

from tensorflow.python.keras.applications.vgg16 import
preprocess_input

from tensorflow.python.keras.preprocessing.image import
ImageDataGenerator, load_img

from tensorflow.python.keras.callbacks import
ModelCheckpoint

from tensorflow.python.keras import layers, models,
Model, optimizers

Step 3: Image Augmentation train_datagen
<- ImageDataGenerator(
rescale <- 1./255, rotation_range <- 10,
zoom_range <- 0.1,
width_shift_range <- 0.1,
height_shift_range <- 0.1, horizontal_flip <- False,
brightness_range <- (0.9,1.1), fill_mode <- 'nearest'
)

Step 4: training/validation accuracy and loss def
load_train_data(n):
lst <- []
for i in range (1, n+1):
filename <- str(i)+'+'.jpg'
x <- mpimg.imread('face reco/train/'+filename) x <-
cv2.resize(x, (160,160))
lst.append(x)
df <- np.array(lst)
y_train<-pd.read_csv('face reco/train/y_train.csv',header <-
None) y_train <- y_train.values
return df,y_train

Step 5: Making the prediction def predict (path, filename):
x <- mpimg.imread(path+''+filename) x <- cv2.resize(x,
(160,160))
x <- x.reshape(1,160,160,3)
x<-embedder.embeddings(x)
if(max(model.predict_proba(x)[0])<0.25):0.25 is the
threshold print
return else:
return model.predict(x)

Step 6: Stop

```

IX. MATHEMATICAL MODEL

1. SVM :

A Support Vector Machine (SVM) is a type of supervised learning algorithm widely used for classification and

regression analysis. The main goal of SVM is to find a hyperplane or a line in a high-dimensional space that separates the data points into different classes with the maximum margin between them.

Hyperplane can be formulated as :

$$f(x) = a^T x + c$$

Here, a = dimensional coefficient, c = offset

2. KNN :

K-Nearest Neighbors (KNN) is a supervised machine learning algorithm which is widely used for classification and regression analysis. The algorithm works by finding the K closest data points to a new data point and assigning the label of the majority of those K data points to the new data point. Euclidean distance is used, and the equation is as follows:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Where,

“d” is the Euclidean distance (x₁, y₁) is coordinate of the first point (x₂, y₂) is coordinate of the second point the

3.CNN:

CNNs are designed to recognize patterns in images and videos by using convolutional layers that apply a set of learned filters to the input image, producing a set of feature maps.

The equation for a single filter operation is:

$$(W * x)[i,j] = \text{sum}(\text{sum}(W * x[i:i+f,j:j+f]))$$

One of the activation function is the Rectified Linear Unit (ReLU):

$$\text{ReLU}(x) = \max(0, x)$$

X. SYSTEM ARCHITECTURE

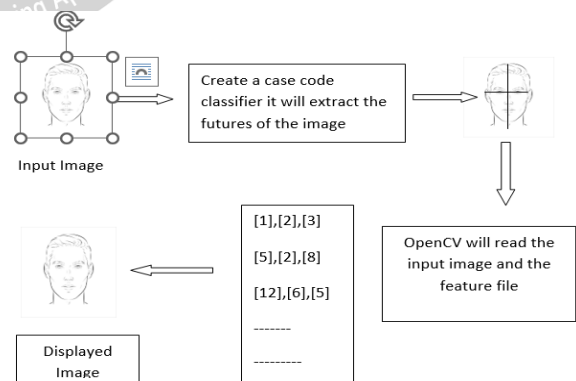


Fig.1: System Architecture

Description:

1)User Registration and Login : Here the user has to register himself by giving his info and he has to set a strong password. Once he has registered then admin will activate his account and now user is ready to use.

2) Upload an Image for AI test :There are 10 trained datasets through which user can get help to recognize the image and Image AI will give us the maximum output so that it's easier for us to recognize the image.

3) Client Side Process: The processing which takes place on the users computer is client side process .

User can register, upload image and get the final output

4) Server Side Process: The processing that takes place on a web server is server side process. HTTPs://localhost8000

XI. ADVANTAGES

- Helps resolve challenging real-world problems with a range of restrictions.
- Address problems like the frequent issue of a lack of easily accessible tagged data.
- Simplicity of knowledge transfer across task- and domain-based models.
- It provides a way to eventually develop artificial global intelligence and automatically recognizes the key characteristics without any human control.
- Fewer Memory, CPU, GPU, or TPU or other computing resources are available.
- With fewer data points, we can obtain more precision

XII. DESIGN DETAILS

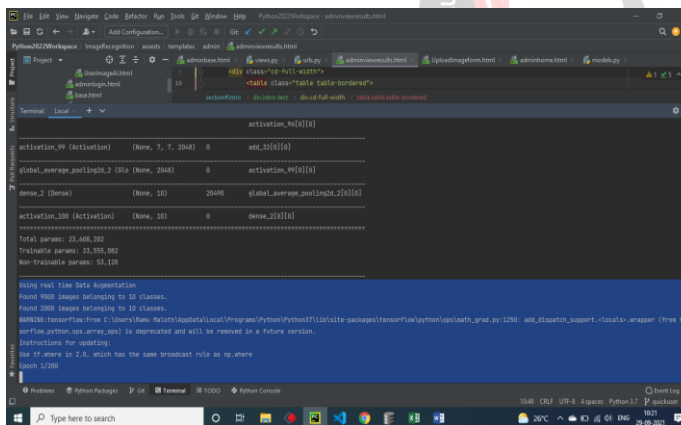


Fig 2: Result

XIII. CONCLUSION

Thus we have tried to implement the paper School of Economics & Management Nanchang University Nanchang, Jiangxi, 330000, IEEE) "Image Recognition Using Artificial Intelligence" 2021 21st ACIS International Winter Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing (SNPD-Winter) (ACCTCS) WeiCao,2021 and the conclusion as follows:

Machines can be taught to analyze and interpret images in the way required for a particular task with the help of deep learning algorithms and neural networks. The progress in the application of AI-based image processing is spectacular

and opens up a wide range of opportunities in industries ranging from medicine and agriculture to retail and law enforcement. Key members of the replacement intelligence team have a keen interest in AI and machine learning, thus we keep track of new developments in AI-powered image processing and apply this information while working on our AI systems. the above project was successfully implemented.

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