“A Learning Method for Object Detection from Low Resolution Image”

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Abstract: Object recognition the use deep neural networks has been most typically used in real applications. We propose a framework for identifying items in pics of very low decision through collaborative study of two deep neural networks. It includes photo enhancement network object popularity networks. The picture correction community seeks to decorate images of much lower decision faster and more informative images with the usage of collaborative gaining knowledge of indicators from object recognition networks. Object popularity networks actively participate in the mastering of photograph enhancement networks, with skilled weights for photographs of excessive resolution. It uses output from photograph enhancement networks as augmented studying records to reinforce the overall performance of its identity on a very low decision object. We established that the proposed method can improve photograph reconstruction and classification overall performance.

Keywords: Image acquisition, Image Segmentation, Feature Extraction, Artificial Neural Network.

I. INTRODUCTION

The current work for object detection is based entirely ogre-Net, through which objects are ideon perception models such as Alex-Net and Gontifed and identified. The first challenge is for the image enhancement network to convert an image of low resolution to high resolution. After obtaining the image of high resolution, it then applied object recognition and recognition. Hence an object detection system is needed for a low resolution image based on machine learning for better accuracy and higher reliability[1]. We are going to invent low resolution image object detection and prediction frameworks based on machine learning and image processing. We are going to work on different types of image datasets. We are using convergence neural networks to achieve high accuracy in object detection. The purpose behind this system is to increase its recognition performance on very low resolution objects using output from image enhancement networks as augmented learning data[2]. Our motivation is to propose methods that can improve image reconstruction and classification performance. The current implementation scope is to develop systems for real-time object recognition such as real-world objects such as individuals, vehicles, animals, fruits, etc.

II. LITERATURE

| No | Paper name | Concept | Advantages | Problems identified |
|----|------------|---------|------------|---------------------|
| 1  | Karen Sunyany. “VERY DEEP CONVOLUTIONAL NETWORKS FOR LARGE-SCALE IMAGE RECOGNITION” ICLR 2015 | In this work we investigate the effect of the Convolutional network depth on its accuracy on the large-scale image recognition setting. Our main contribution is a thorough evaluation of networks of increasing depth using an architecture with very small (3×3) convolution filters. | They have made our two best-performing Conv-Net models publicly available to facilitate further research on the use of deep visual representations in computer vision. | The bad initialization can stall learning due to the instability of gradients in deep nets. |
| 2  | Christian Sengely. “Going Deeper with Convolutions”, CVF 2015 | They propose a deep Convolutional neural network architecture composed of inception blocks that achieve the new state of the art for classification and detection in the ImageNet. | The main hallmark of this architecture is the improved utilization of the computing resources inside the network. | No new data sources were used for training. |
| 3  | Kaiming He, “Deep Residual Learning for Image Recognition”, IJCV 2015. | Deeper neural networks are more difficult to train. We present a residual learning framework to ease the training of networks. | They showing that these residual networks are easier to train, and can gain accuracy from considerably increased depth. | But experiments show that our current solvers on hand are unable to find |
III. EXISTING SYSTEM APPROACH

There are different approaches to object detection that have been used previously. Different object images from the dataset are used for further processing. Digital image processing is an area that analyzes image processing methods. Mathematically, the image is a form of light intensity over a two-dimensional field. The image to be processed by the system or computer, an image with numerical value must be presented statistically[6]. A digital image can be said by a two-dimensional matrix F (M, N) consisting of M columns and N rows. Color image processing [RGB], are different models such as hue and saturation, value (HSV) models[7]. This model is used with an object in which a certain color can be identified and the intensity of unwanted light from the outside can be overcome. Further tests on the pictures used six types of colors, such as brown, yellow, green, blue and black and white.

Images containing objects or text are found through a system dataset of text or object images[8]. This image mainly consists of color combination of RGB (Red, Green and Blue) form. A color transformation structure is created for the RGB image, and then, a device-independent color space transformation is applied to the color transformation structure[9]. To remove noise in image or other object removal, various pre-processing techniques are considered. Image grabbing is done using grab cuts like methods, namely cropping the object image is to get the image area of interest. Smoothing filter is commonly used for image smoothing[10]. The contrast enhancement of the image is for smoothing images. Image segmentation refers to the separation of a set of images based on the basis of the image feature and nothing else. Partition can be done using various methods like Otsu’s method, k-means clustering, converting RGB image to HIS model.

IV. PROPOSED SYSTEM APPROACH

In a planned system, we have a tendency solution over existing work done by providing most interesting visual programming learning techniques. In proposed work we are going to invent object detection framework for extremely low resolution image data set as well as high resolution datasets. We are going to train our system into two phases first is to train by using low resolution image data set. Second high resolution dataset trained separately using high resolution images same as low resolution image data count. In last case we are combining low resolution image (LRI) and high resolution image (HRI) dataset to train our model.

After training our model drafted accordingly class labels which we are going to train. The whole process is done under network named image enhancement network (IEN). For train purpose we are using neural network and tensor flow framework of machine learning to gain high accuracy over object detection. In testing phase we are giving image of different objects like cars, animals, humans, and real world objects etc. After getting image inputs of low resolutions it will be converted into a high resolution images by using pre defined image enhancement network. After getting high resolution input image get recognized and detected objects from it with the help of our trained model.

2) Image Processing

After getting object image it will send for image processing module. In image processing image gets converted in gray format by removing noise in it using Gaussian filter. After gray conversion image thresholding by setting RGB colour values to zero and preserving only black and white [0 and 1] values. Gray to binary conversion is done by using OTSU’s method. After getting black formatted image hand shape get extracted from image. The exact shape of hand will get by drawing edge using canny edge detection method. After processing unit extract exact objet area from input image.

3) Feature Extraction

After getting exact shape of object area features get extracted from it by using pixels weight calculations. The image pixels get drafted in matrix by using weight gradient functions only on drawn area of object detected. Feature extraction done on all image dataset for training model creation and drafting. The train model creation done by using deep learning (ANN) algorithm.

V. FEATURE MAPPING & MODEL GENERATION

The image dataset is going through image processing and subsequent phases of feature extraction. After getting image features these statistical features get mapped on machine file which is nothing but trained model. The runtime testing image gets matched with pre trained model and respective outcomes will be generated. After outcome generation those results is nothing but our desire object and text recognition results.

VI. IMAGE ENHANCEMENT

Image enhancement is a technique that have a trained high resolution image.
VII. ALGORITHM

Artificial Neural Network

Step 1: Pick a Network Architecture (i.e. Connectivity Pattern among the neurons)
Number of input gadgets = size of functions \( x(i) \)
Number of output units = variety of classes
Number of hidden gadgets consistent with layer = usually greater the better (ought to stability with value of computation as it will increases with more hidden gadgets)
Defaults: 1 hidden layer. If you’ve extra than 1 hidden layer, then its miles recommended that you have the same number of devices in every hidden layer.

Step 2: Random Initialization of the Weights
Step 3: Implement Forward Propagation to induce initial prediction for any \( x(i) \)
Step 4: Implement the value oprate for the Systematic Neural Network (ANN)
\[ L = \text{total variety of layers in the network} \]
\[ sl = \text{number of units (not counting bias unit) in layer l} \]
\[ K = \text{number of output units/classes} \]
Step 5: Implement back-propagation to compute partial derivatives to reduce our price operate J using an optimal set of parameters in theta.
Step 6: Use gradient checking to verify that your back-propagation works. Then disable gradient checking.
Step 7: Use gradient descent or an intrinsic optimization oprate to reduce the price oprate with the weights in theta.

VIII. EXPERIMENTED RESULTS

A) Training Models

In object recognition work we are used tensor flow for training and validating our models dataset. In which real time 100 categories of object image samples are trained for object recognition models. We have used image enhancement network with predefined machine learning and image processing libraries for enhancement of images. Finally plot files generated as an output of our trained model.

B) Testing Models

In final phase of data testing in which real time low resolution and high resolution image dataset used to test our model accuracy. The low resolution images get accurately recognized get 95% accuracy. The high resolution images get above 95% accuracy while object recognition.

In our experimental setup, In table 1 describe our system modules and respective generated output.

| Sr. No. | Real time object Images | Testing dataset Object recognition |
|---------|-------------------------|-----------------------------------|
| Recognition rate | 91.05% | 96% |
| Accuracy | 90% | 98% |

C) Comparative Study Graph

D) Accuracy Rate of Object Recognition

All object sample images trained by our trained model based on YOLO. The object images trained based on 100 groups of objects, so we have been conclude the accuracy rate above 95%. We achieved 95% accuracy in low resolution object detection model. For high resolution image object detection get achieved nearly 98% accuracy.

IX. CONCLUSION

We are palming to invent the planned systematic collaboration between deep networks can function an green answer for to the challenge of very low resolution object popularity. To resolve object quality downside, the planned framework perhaps carried out to totally different low resolution issue, consisting of faces and letters.

FUTURE WORK

Our future work will used for developing solutions for detection of objects from video contents.

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