TEST Engineering & Management

January - February 2020
ISSN: 0193 - 4120 Page No. 12279 -12283

Implementation and Study of the Latest Technology in Fine Grained object Detection

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Article Info
Volume 82
Page Number: 12279 -12283
Publication Issue:
January-February 2020

Article History
Article Received*: 18 May 2019*
Revised*: 14 July 2019*
Accepted*: 22 December 2019*
Publication*: 23 February 2020*

Abstract

In this paper first we have elaborated our research and knowledge about the all latest machine learning and deep learning as it's the best technology today. We have addressed object detection where intra class variations are more that is in fine grained object detection.

1. INTRODUCTION

In this paper we are going to create a new perspective in artificial intelligence and AI. If we add natural human intelligence to humans in which humans can learn we say it is artificial intelligence to machines. Tesla car is in auto pilot mode in which it can adjust between the car and the objects. It uses a combination of computer vision, image recognition and deep learning. Healthcare technologies are using Artificial intelligence to diagnose diseases faster and with better accuracy. Python due to its high data handling capacity and open source thing of python it is used in gaming, web development, graphics and various other implementations. So looking at the algorithms we have various models which are discussed in my previous papers. Lets look at the libraries available in machine learning, artificial intelligence and deep learning today. Numpy is one in which it forms the foundation of machine learning, it is used in matrices, standard deviation, transposing, getting trace and diagonal of matrix, generating random values and day to day operations in ML. Pandas are used to read csv files and links. Checking correlations, marginal histograms. deviations, area charts, pie chart, histogram density plot and there is a different type of visualization technique. Scikit learn is free and supports , helps to make machine learning easier. Seaborn helps to provide higher level interface, it has beautiful default styles and designed to work with panda. It has various plots. Tensorflow is a open source library for numerical computation and large machine learning. It uses python to provide a front end API and can run deep learning algorithm. Keras is an open source library to compute fast experimentation with deep neural network. NLTK is used for lemetization, tokenization etc. it has many third party and plenty of approaches to natural language processing. We already know computer vision is really having scope today but it can be daunting for new comers. Open cv contains more than 25000 algorithms. Pytorch is a python machine

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learning package. It helps in accelerating neural network computation by more than 50 times.

So lets go to methods of dimensionality reduction. Principal component analysis(PCA) is used for dimensionality reduction in machine learning, it is the ability to generalize in machine learning. PCA uses eigen vectors and eigen values. Linear discriminant analysis(LDA) is the second method. It is a dimensionality reduction analysis used in supervised learning. Used to project features from a higher dimensionality to lower dimensionality. It used both x and y axis to project into a new axis. Next is K fold cross validation method used to estimate the skill of machine learning model. K fold cross model is a re sampling model used evaluate model under limited data sample. K is a single parameter used to find the groups under which the parameter is used to split into. Deployment of machine learning models is another important part. Option one is rewriting the entire code in one form which involved a lot of time. Like javascript does not have libraries to use with. Backpropagation is the '**essence'** of neural network training. Drop out is removal of some activation function that is the neurons are not trained in some way. Pooling and max pooling is the next form of method as discussed in previous paper. Pooling is a filter operation. The pooling operation has average pooling and max pooling. Max pooling calculates the max value and average value calculates the max value in the maximum patch. Cross entropy is a thing from the Shannon theory which involves bits of information as probability. Flattening involves transforming the entire cold feature it is a part of neural network.

In this paper we are going to use google's open source tensor flow library. We will go through various functions. So tensor flow was invented and designed by google brain team for heavy numerical operations. It has found its use in machine learning and deep learning.

Tensor flow can be used in object detection and it is open source and can be efficiently used in various computational models.

We are trying to create new algorithms in this paper which will be helpful in the future in deep learning and help ours in designing better prospects in object detection and computation. Does anyone know what is that what is really required. That we are trying to find out. Tensorflow is good but getting old and we need open source something like Tensorflow and Theano.

We at our company ovation will try to use tensorflow in our numerical computations which are very tough and in large scale in machine learning in the future. Going to the traditional and old master support vector machines(SVMs). No not going into that method in this paper though, we explore convolutional neural netrworks in object detection. We know that cnn have been established as state of the art in all object detection problem solvers. Though there is slow computation time due to large mathematical operations these have limited their applications in problem solving. We know that efficiency should be the prime criteria in such problems.

There is research being done in object detection right from the seventies and now we have come to 2020 where we are working with the latest problems and techniques to solve object detection problems. We have used computer vision and deep learning at high levels but in this paper we are going to deal with it at a finer level, i.e., where the interclass level difference is very very high and still we are going to detect the different objects with high accuracy. Only a mother can detect a twin but we want a computer to detect objects using deep learning. There has to be developed a suitable algorithm to deal at finer levels for a suitable distinctions. The technique here is that for fine grained recognition, whatever parts are detected are gone further for localized features where the regions of discrimination is possible.

2. TECHNIQUES

We have designed various models in which this new model of Brownian motion in fine grained

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object detection.Rectified linear unit is explained, in sigma function.

Creating Brownian motion models in object detection:

$$dX_t = \mu(t)dt + V(t)dW_t$$

This is nothing but an equation of a line in linear format and rectifies linear unit is nothing but that same activation function.

We have used the optical flow equation from horn and schunck.

U is the horizontal optical flow

V is the vertical optical flow

We have used it for video analysis using open cv and it can also be done using matlab though it has nothing to do with fine grained object detection.

So in this technique we are going to explore the Brownian motion object to represent the model using.

$$dX_t = 0.3dW_t.$$

obj = bm(0, 0.7)

we have used this equation for the object.

StartTime: 0

StartState:

Correlation: 1

Drift: drift rate function F(t,X(t))

Diffusion: diffusion rate function G(t,X(t))

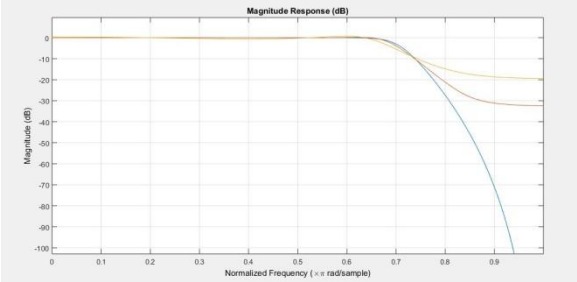
Simulation: simulation method/function simByEuler

Mu: 0 (column vector)

Sigma: 0.7 (sigma is a matrix)

[b90,a90] = invfreqz(h,w,3,3,wt,30)% 90 iterations

fvtool(b,a,b4,a4,b90,a90)



In the above simulation we show the magnitude and phase response, we have used a brown parametric model which describes a parametric modeling technique.butterworthfilter for 90 iterations.

The blue line is the original magnitude, green line is the first estimate and orange line is the second estimate.

The values for the 90th iteration

a90 =1.0000 0.5313 0.5264 -0.0873

we use this technique for high spatial resolution spectral estimation.

We have used invfreqz in this estimation and the below plot since it uses an equation error method to identify the best model from the data.

b and a are estimated in this equation by

$$\min_{b,a} \sum_{k=1}^{n} wt(k)|h(k)A(w(k)) - B(w(k))|^2$$

We use a system of linear equations to solve it with matlab simulator.

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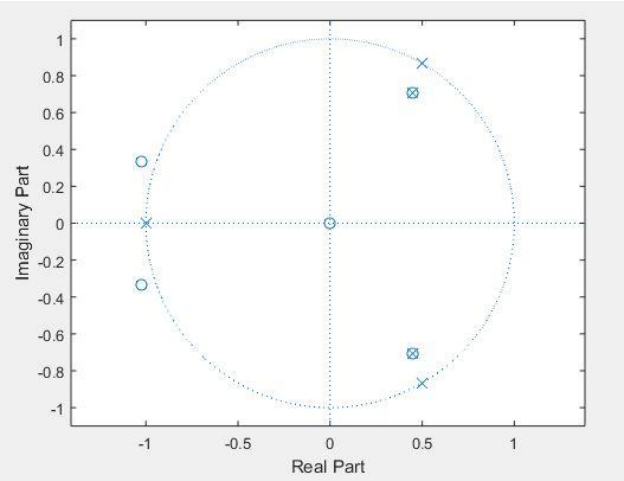


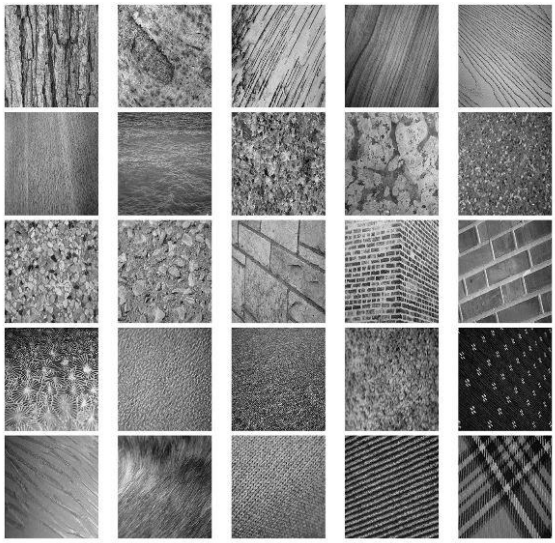
This is a stable system as it has poles and zeros inside and on the circle. Though two zeros are outside on the left side.

So coming back to fine grained object detection in the training set of data we have to take images of cars or whatever which are similar and same brand and colour. Its very difficult even with the human brain to detect it but today also we are not able to detect the cars even if we take multiple and plenty images of the cars in various direction.

This image is of similar looking suvs and we would like to determine though they are of different colours and second image is of cars too.

Problem of identifying all suv cars

We are looking to find an accurate model to detect the cars from each other.



These are similar tiles which need to be discriminated from each other. The method uses something in this known as the dragon algorithm or BDADNN for classifying texture images. Its based on primary dragon fly with deep neural network based fitness function. We are trying to come up with a genetic algorithm using the fitness function in detecting the images. The function or chromosome with a higher fitness value is given more chances of mating than the function with lower fitness value.

RESULT: In this paper we come to the conclusion that object detection is possible in cases with convolutional neural networks and we have explored fine grained detection to good study.

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