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IMAGE CLASSIFICATION ON BLURRED IMAGES

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ABSTRACT

Blur Image is a common degradation which widely exists in aerial remote-sensing image, medical treatment image, digital camera or video image and missile guidance image, etc. Classification of image is a process that could be affected by many factors, classification of blurred image regions are very important for different multimedia analyzing tasks. Image classification means grouping things together of similar type. The main aim is to place the summarization of major advanced classification approaches and techniques used for improving classification accuracy. This approaches can be further used for image segmentation, depth estimation and information retrieval, etc.

Keywords: Blur image classification, Support Vector Machine [SVM], Decision tree Algorithm.

I. INTRODUCTION

Machine learning have attracted the attention of researchers from various scholars. In this paper the main aim is to classify and identify three types of image blur including sharp images, motion blur, out-of-focus blur. Blur classification is an important and widely-studied problem in computer vision. Image blur type classification is significant to blur image restoration, meanwhile, it is a challenging problem because various factors can lead to image blurring. Image classification can be accomplished by many machine learning algorithms such as (logistic regression, random forest and SVM). But all the machine learning algorithms require proper features for doing the classification. If you feed the raw image into the classifier, it will fail to classify the images properly and the accuracy of the classifier would be less.

(a) **(b)** **(c)**

Figure 1: a) Sharp Image b) Defocused Blur c) Motion-blur Image

Image blur is a very common degradation nowadays, which exists in various types of images such as aerial remote-sensing image, video image, medical treatment image, digital camera and missile guidance image, etc. Blur Image type classification is significant to image blur restoration. It is one of the challenging problems because various factors can lead to image blurring. For instance, blurring of image can occur due to following reasons like the interference of the natural fog, optical lens distortion, and the relative motion between camera and targets during exposure and atmospheric turbulence ,etc. The rise of big data and rapid popularization of high-performance computing devices in recent years have contributed to the unprecedented development of machine learning.

The Support Vector Machine (SVM) and other supervised learning algorithms are adopted to solve classification problems, SVM algorithm are used in classification and regression problems, these algorithms are very good and accurate for classifying purpose, they can be applied to linear problems. The classification approaches and the techniques is used for improving classification accuracy. So, our method analyzes which algorithm best suites to have a great classification techniques for Blurred images.

II. RELATED WORK

The Review article [1]Blurred image regions are first detected by examining singular value information for each image pixels. It describes two image feature that are used for detecting and classification techniques. One feature is Alpha channel feature that can be used for blur type classification. The other feature is single value feature that can be used as a blur metric to detect image blur accurately and effectively. They have used their proposed technique to extract blurred regions of images. Regions is extracted based on the constructed singular value blur map and a blur mask is built based on the threshold obtained in the previous subsection to divide blurred/non blurred regions. They first manually extract the blurred regions of partially blurred images as ground truth to evaluate the accuracy. The blurred image regions extracted by are then evaluated based on their comparison with the ground truth image regions.

The review article [2] An approach to partial blur identification which combines different types of local blur measures to build classifiers for partial blur detection and blur type. To find its solution, they analyze the deficiencies and incorrect usage of some previous local blur measures. Developed an easy-to-use graphical segmentation tool and created large-size training/testing datasets for patch-based classification using the tool. The results on the datasets shows the approach achieves a significant improvement over the state-of-the-art approach of Liu et al.

The review article [3] A novel method based on cepstrum peak detection is presented to classify and identify three types of image blur. Discriminative classifier training samples are generated by patches from abundant datasets, after the Fourier transform and their designed edge detection. In the training stage, deep belief networks have been applied in a semi-supervised way, the network is trained in an unsupervised manner and then the backpropagation fine-tunes the weights. The results shows superiority of their TDBN compared to the state-of-the-art methods.

The review article [4] Image Blur regions are classified into globally blurred images and locally blurred images. To detect and estimate blur extent of an image for globally blurred images SVM is used and to estimate PSF. For locally blurred images they find the blurred regions using a segmentation method, and the point spread function estimation on the blurred region can sort out the images with depth of field or moving object. This method for blur extent estimation is highly accurate and not heuristic.

The review article [5] Blur identification in images are mainly divided into two groups, the handcrafted feature-based methods and the learned feature-based methods. A convolution neural network (CNN) of Simplified-Fast-Alexnet(SFA) based on the learning features is proposed for handling the classification for blur type images. The experiment results demonstrate that the performance of classification accuracy of SFA, Alexnet are superior to other classification methods. Therefore, the SFA possesses the strong competitiveness when compared to other classification methods in dealing with the blur image classification task.

III. PROBLEM SPECIFICATION

The main objectives of the present study is to make a detailed analysis on classification techniques, to predict which classifier best suites in Machine learning classification algorithm, To the best of our knowledge, in order to classify we must first detect the blur regions for this problem.

IV. METHODOLOGY

Blurred image dataset are given as input, it preprocesses and converts to sobel and laplace operator, then the blur regions to be detected after detection it classifies images into 3 types sharp images, Defocused images, Out-of-focus image.

V. IMPLEMENTATION

Environmental setup

The research is implemented in Jupyter Environment , installed ideally with Python 3.7 Version, Pandas 0.20.3 is installed with numpy (mathematical operation) and other libraries Scikit, Sklearn 0.19.1,Seaborn and Matplotlib is installed.

VI. EXPERIMENTAL RESULTS

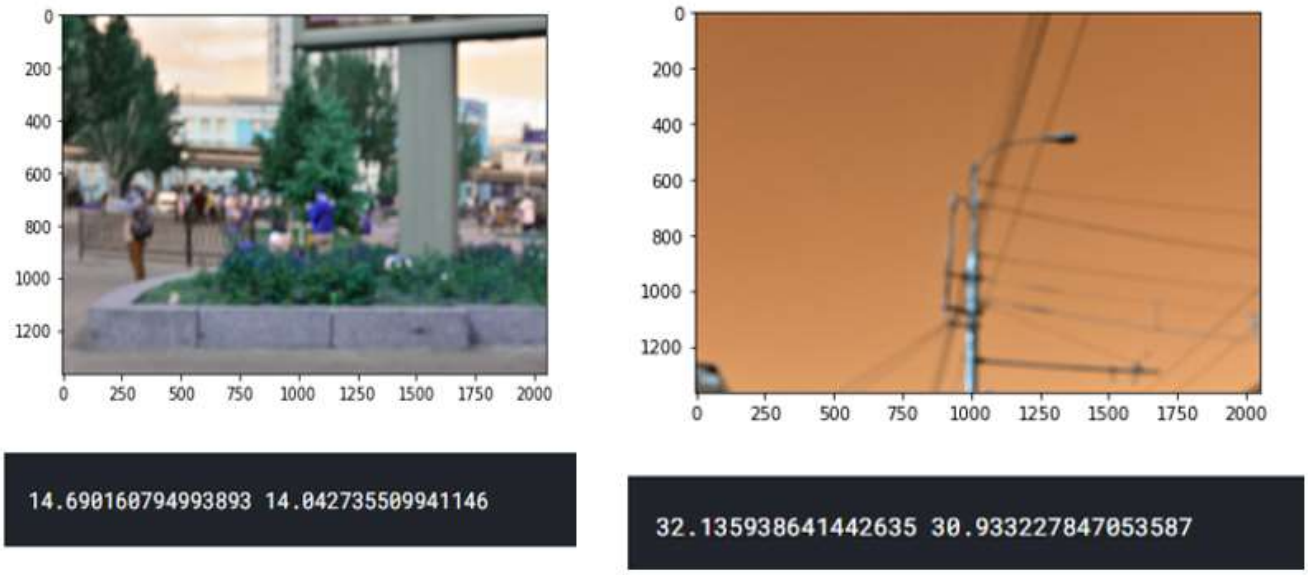

Figure 2: Blur Image Analysis of Defocused Blur Images.

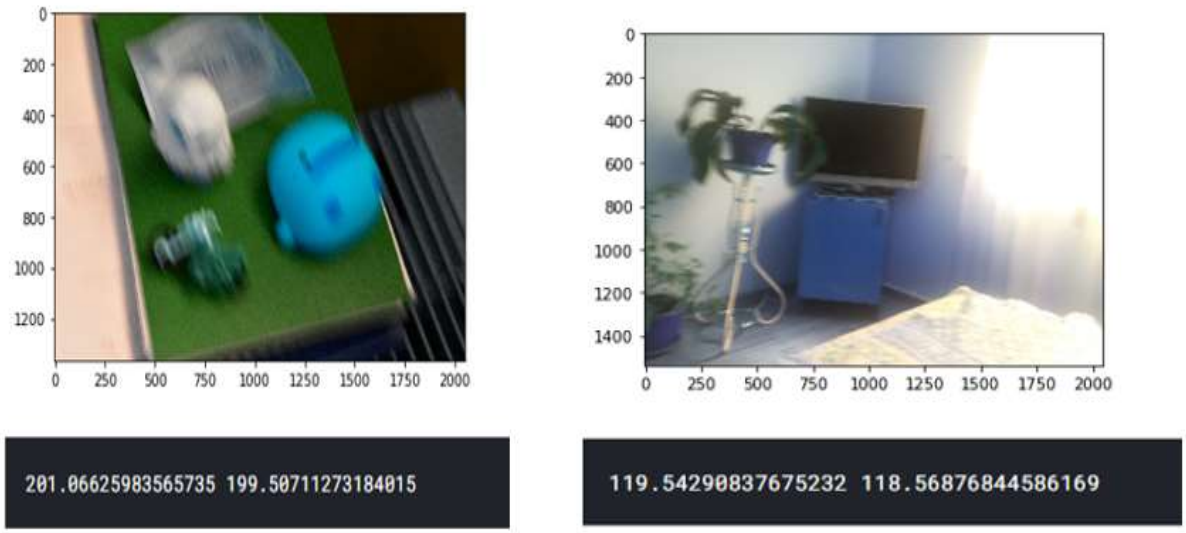

Fig 3: Blur Image Analysis of Motion Blur Images

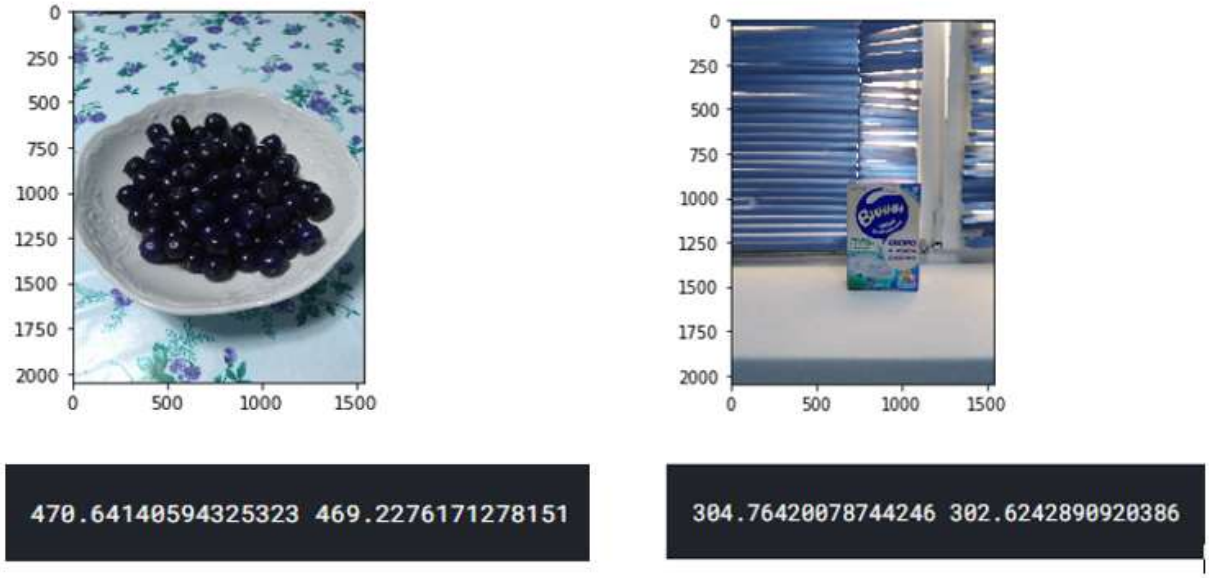

Fig 4: Blur Image Analysis of Sharp Images

From the above Fig 2,3,&4 we have set a threshold at 110 for defocused blur images, values greater than 110 classifies image as Motion blur images and threshold for Sharp images is set at 280,values greater than 280 are classified as sharp images.

VII. PERFORMANCE EVALUATION

In our proposed method, on SVM algorithm it gives us the 85% of accuracy and on Decision tree algorithm it gives us the accuracy of 79%. From the Below table we observe that in every aspect SVM is giving best results. SVM performances is comparatively giving better results.

TABLE 1: Result Analysis from SVM and Decision tree methods.

Methods	Accuracy	Precision	Recall	F1_score
SVM	0.85	0.76	0.81	0.78
Decision tree	0.79	0.69	0.70	0.68

VIII. CONCLUSION

In this paper, to classify the images on blurred dataset. We proposed model follows detecting the blurred regions and classifies the images into 3 types Defocused blur Images, Motion blur Images, Sharp Images. There are many interesting future directions in machine learning algorithms, Our method with SVM[Support vector machine],supervised learning is one of the top used algorithms for classification. This project provides the analysis of various image classifiers which work on Blurred images. This study shows the supervised approaches worked well for Image classification. There is high need for machine learning and Artificial neural network for classification techniques. Our method using SVM yielded an accuracy of 85% and using Decision tree yielded an accuracy of 85%. In Future there is high scope for machine learning algorithms for image classification. As the results are accurate.

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