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Boosting Image classification using Refined Feature Extraction-A Case study of Image Classification

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Abstract-In real life large amount of data are collect and understand not possible. Here feature extraction helps to reduce the amount of data without losing any important or relevant information. This paper survey on pre-processing, feature extraction for deep convolution neural network, support vector machine classifier. Feature extraction is the process of transforming image data pixel into binary or real value. Feature extraction involves identifying and extracting features based on applications. A designated convolutional neural network feature extraction algorithm extracts most significant features by the first layer of a convolutional neural network or layers of network. Finally, the challenges in convolutional neural network for future extraction research re discussed.
Keywords: Feature extract, patch match, convolutional neural network, support vector machine classifier.

1. INTRODUCTION

Digital image processing is a very popular and rapidly growing area application under computing engineering. Digital image processing is the technology of manipulating these groups of pixels to enhance the quality of image. in Digital Images get artificial during data transmission and compression [1]. Digital image processing is a rising technology which helps to enhance the image quality. Noise restraint using mean filtering with grayscale images of a fixed pixel block size is considered [2]. Original image obtain from the image acquisition system are affected by different conditions, such as uneven brightness and noise image. For this reason, the original images must be retransmitted. Preprocessing technique can be divided in to three process image grating, image geometric changing and image enhancement. The purpose of image grating is to transform from the color image into grayscale images to reduce the amount of data. In this time, image geometric is changing to correct the image error caused by the image acquisition system. Image enhancement used for enhance the image effects and remove the background noise expands difference between features within the image and improve the image quality. Feature extraction is reducing the feature dimension and improves the accuracy. Here there are three methods existing, such as support vector machine, artificial neural network and decision tree. In Artificial neural network convolutional neural networks are used to feature extraction and classification. Convolutional neural network used to reduce high level feature. There are various types of approaches for image classification, most of classifier such as maximum likelihood, minimum distance and making definitive decision. Support vector machine for image classification. Classification based on features extracted from the images. In regulate to

produce better classification results and the focus is on the feature extraction level. In order to distinguish a pattern that can provide some useful insights into what combination of features is most likely to result in an deviation and this knowledge is then given to machine learning algorithms. The prediction is explored using various machine learning classification algorithms such as Naive Bayes, Support Vector Machine, Artificial Neural Network and Logistic Regression [3]. Support Vector Machine chooses the extreme points/vectors that help in creating the hyper plane.

2. REVIEW OF LITERATURE

This review paper shows details such as dataset, adopted method, advantage and limitation of existing research papers based on Patch Match, Convolution Neural Network and Support Vector Machine.

III. Challenge in feature extraction

1. Identify and extract object features.
2. Visual data is much harder in noisy unregimented 2D or 3D.
3. Some of the feature extraction algorithms wouldn't be feasible to run if the datasets are huge.
4. Another challenge is Scalability.
5. The problem of extracting features from given input data is of critical importance for the successful application of machine learning.

3. CONCLUSION

Image processing is the growing concept in any field such as medical, education, industry, etc. In the world, image processing delivers significant information on decision making. The collection of raw images is not suitable for direct processing due to the various noises present in database. Some of the noise is low contrast, image acquisition, poor illumination, etc. These unwanted noises are removed by various pre-processing techniques. Feature extraction aimed at extracting the most effective and essential features that reflect the target image. Using features extracted from a Convolutional neural network, patch match and support vector classifier provided good results. The research paper mainly focuses on review papers details in convolution neural network, patch match, support vector machine adopted method, advantage and satisfy the limitation.

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Appendix A: Review of Literature-Table1

Table-1

S.No	Title	Year	Proposed method	Dataset	Advantage	Limitation
1.	Light field image super-resolution using deformable convolution[4]	2021	1.Bicubic 2.VDSR 3.EDSR 4.RCAN 5.ESRGAN 6.LFBMS5D 7.GBRESLF	1.Light field dataset a)EPFL b)HClnew c)HCold d)INRIA e)STFgantry	1.It is used to generate high-quality (i.e., high-resolution and angular consistent) 2.LFs to	1.Improve the visual quality of reconstructed images and achieve light field

			8.LFSSR 9.LF-InterNet 10.LF-DFnet		benefit downstream tasks	image super resolution with large scaling factors
2.	Deconvolved Image Restoration from Auto-Correlations[5]	2021	1.L-divergence optimization 2.Turning formalism into an iterative scheme inspired by Bayesian based approaches	1. A large number of experimental situations, ranging, from adaptive astronomy to optical microscopy.	1.The optimization is proved efficient and feasible.	1.Error reduction in phase retrieval method
3.	A novel feature extraction methodology using siamese convolutional neural networks for intrusion detection[6]	2020	1.Fuzzification 2.Vec2im(Vector to image) 3.Normallization 4.Convolution neural network Siamese 5.Convolution neural network 6.Rectified linear unit 7.Adaptive moment estimation 8.Linear discriminant analysis 9.Support vector machine 10.Adaboost 11.Random forest 12.Decision tree 13.K-nearest neighbor	1.NSL-KDD	1.Computationally fast 2.Simple to implement 3.Work well with high dimension	1.Small range data

			classifier			
4.	Aerial scene classification through fine-tuning with adaptive learning rates and label smoothing[7]	2020	1.ResNet50 2.Linear decay scheduler 3.Inception V3 4.Cyclical learning rate 5.Xecption 6.Softmax classifier linear 7.SVM classifier 8.RBF 9.SVM classifier	1.Aerial image dataset a)NWPU-b)RESISC45 dataset(Google earth imagery)	Perform well with non linear boundary depending on the kernel used.	It is not suitable for large training set.
5.	A Novel and Effective Image Super Resolution Reconstruction Techniques via Fast Global and Local Residual Learning Model [8]	2020	1. Super Resolution Convolution Neural Network. 2. Fast global and local residual learning model. 3. Deeply Recursive Convolution Network. 4. Deep recursive Residual Network. 5. Fast Super Resolution Convolution Neural Network. 6. Very deep Convolution Neural network.	1.Set5 2.Set14 3.Urban 100 4.BSD100	1.Reduces parameter size. 2.Reduce the computational complexity	1.Computation time is high
6.	Image classification Algorithm based on deep	2020	1. Stacked Sparse Auto encoder. 2. Stacked	1. Daily database: cannon, coin, duck, horse,	1. Deep learning complete complex	1. Lower accuracy

	learning kernel function [9]		Sparse Auto encoder model and Training ideas. 3. Classifier design for optimizing nonnegative sparse representation of kernel functions.	microwave, mouse. 2.Medical Dataset Cancer Impact Archive: TCIA-CT open source database. 3.OASIS-MRI nuclear magnetic resonance biomedical image database.	function. 2. Reduce dimension information. 3. Image classification effect is improved.	
7.	PLANET: Improved Convolutional Neural Network with Image Enhancement for image classification [10]	2020	1.PLANET Inner move 2.TSCNN 3.Resnet18 4.GoogleNet without inner move	1.CIFAR-10 2.CIFAR-100 3.ICIAR(BACH) 2018	1. High resolution image classification. 2. Inner move is effective and feasible for data enhancement in image classification task.	1. Inner move is not investigated on image segmentation and object detection.
8.	Evaluating parameterization methods for Convolutional neural network (CNN) - based image operators [11]	2019	1.Training Separated networks 2.Concatenating one-hot vectors 3.Concatenating parameter values 4.Decoupled network.	1.Berkeley segmentation dataset 2.Wateloo Exploration Data set	1.De-noising, de-blocking image smoothing and super resolution.	1. Non linear approach
9.	Building footprint generation by integrating convolution neural network with feature pair	2019	1.Proposed building footprint generation framework 2.Data preprocessing 3. Future pair	Study Sites cover four cities	1.It is effective in producing sharp boundaries and fine-grained segmentation results.	1. Very few instance segmentation types are used. 2.Small types of graph

	wise conditional random field[12]		wise conditional random field.			models are used.
10.	Feature Extraction and classification based on Spactial-Spectral Convlstm Neural Network for Hyper Spectral Images[13]	2019	1.Long short term memory 2.2-D Spatial spectral Convolutional LSTM 3.3-D Spatial spectral Convolutional LSTM	Hyper spectral datasets 1.Indian Pines 2.Salinas Valley 3.University of Pavia	2.Fast and efficient computation and quick data training	Small training Size