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Lane Segmentation for Self-Driving Cars using Image Processing

Aman Tanwar¹, Jayakrishna², Mohit Kumar Yadav³, Niraj Singh⁴, Yogita Hambir⁵

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Abstract - Technology is advancing day by day, more advanced cars are being built every year but still we are not able to reduce the no. of road accidents. Approximately 1.35 million people die each year as a result of road traffic crashes. Road traffic crashes cost most countries 3% of their gross domestic product. More than half of all road traffic deaths are among vulnerable road users: pedestrians, cyclists, and motorcyclists.

When the vehicle is four-wheeler and an accident occur than the chances of serious injuries or even deaths increases. We need more efficient systems which can prevent the accidents and help us to reduce them. One of the most common mistakes committed by human driver is talking on phone while driving or not paying attention on the road. Sudden change of the lanes leads to accident.

A lane detection system can be built and which can identify the lanes and indicate the driver on sudden alteration in the lanes. Most of the car companies have ongoing projects on these technologies. This can be done with the help of image processing.

I. INTRODUCTION

A lane segmentation system is built using image processing. Image processing can be done with help of the python library like OpenCV. OpenCV provides various functions and tools to work on frames captured by the camera. With the help of OpenCV many complex calculations can be done easily.

For making a prototype we need a camera, a bot and a raspberry pi. The camera will be mounted on the top of the bot and the raspberry pi will be fit on it. The raspberry pi will be operated with the help of a battery. The camera will capture the live events and provide them to raspberry pi. The camera captures frames which are then passed to the raspberry pi which does further processing on the frames. We can even control the frame rate too. We need to import NumPy library in our code which provides a high-performance multidimensional array object, and tools for working with these arrays.

For better efficiency and good outcome, we need powerful cameras.

The model architecture is shown in figure 1.

A. Morphological Transformations:

Morphological transformations are operations which are performed on the images on the basis of their shapes. The image is first converted in binary form and then the transformations are applied. Two inputs are given to the function. First is the original image and second is the kernel or the structuring element which decides the nature of the operation. There are many types of morphological transformations. The two basic types are Erosion and Dilation.



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Machine learning based classifier model for autonomous distracted driver detection and prevention

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ABSTRACT

Recent researches and surveys have provided us with the evidence that distracted driver is a major cause of vehicle crashes all around the world. In-vehicle information systems (IVIS) have raised driver safety concern and thus, detecting distracted driver is of paramount importance. The project (or paper) shows a method of real-time distraction detection and initiates safety measures. In the realization of this project we have used Web-Cam, Raspberry Pi (a low cost, small size computing device), along with concepts of deep learning and convolutional neural networks. We classify drivers into multiple categories of distraction, some of them are texting, drinking, operating IVIS etc. Web-Cam feeds the classifier with real-time images of the driver of a particular vehicle. The system also constitutes a buzzer alarm which rings once the distraction is detected.

Keywords: Machine Learning, Convolutional Neural Network, Classification, Hyper parameters.

1. INTRODUCTION

Distracted driving is characterized as a movement which redirects a man's concentration or consideration from his fundamental errand of driving. These sorts of exercises incorporate utilizing a cell phone, eating and drinking, discussion with co-travelers, self-preparing, perusing or watching recordings, modifying the radio or music player and notwithstanding utilizing a GPS framework for exploring areas. Among the greater part of the above, cell phone utilization is said to be the most diverting component. Diverted driving has been distinguished as an essential hazard factor in street activity wounds. Cell phone use has formed into an essential wellspring of driver diversion as it can prompt drivers to take their consideration off the street,

causes four kinds of commonly non-selective diversions – consequently making vehicle tenants more helpless against street crashes. The utilization of cell phones while driving visual, sound-related, subjective and manual/physical. While visual diversions make drivers turn away from the roadway, manual diversions require the driver to grasp their hands off

the guiding wheel; sound-related diversions cover those and Sounds that are critical for the driver to hear while driving and intellectual ones incite the driver to consider an option that is other than driving.

A system with web-cam integrated to raspberry pi running python classifier can be used to capture the image and classifying it into either distracted state or safe driving state. If the driver is in a distracted state, a buzzer alarm is generated. For classifier, we have obtained the dataset of drivers driving in different states. This is fed in as our

trainingdata set and with an open source machine learning python library Scikit-Learn a classifier is generated to predict the distracted state of the driver. Following states of the driver isto be predicted: texting, talking to co-passengers, phone call,looking left or right, reaching back seat, self-grooming, operating IVIS and eating or drinking. We aim at building an integrated system of webcam and classifier model based on Convolutional Neural Network which would classify images based on different states of the driver. The training set used for building the model has been taken using a static driving

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Effect of chromium addition on properties of sinter-forged Fe-Cu-C alloy steel

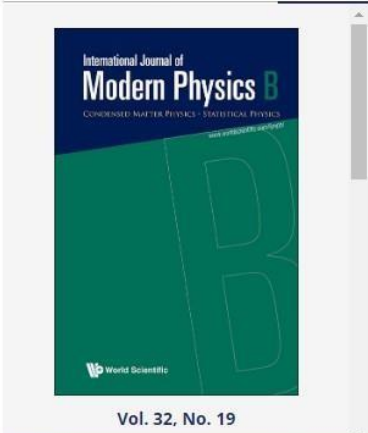
Vinay R. Kulkarni, Jagannath Nayak and Vikram V. Dabhade

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Vol. 32, No. 19

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Effect of number of turns and medium between coils on the Wireless Power Transfer efficiency on AIMD's, Dr B P Patil

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Biomedical Engineering: Applications, Basis and Communications | VOL. 31, NO. 02 | No Access

EFFECT OF NUMBER OF TURNS AND MEDIUM BETWEEN COILS ON THE WIRELESS POWER TRANSFER EFFICIENCY OF AIMD'S

B. P. Patil, Deepali Newaskar, Kunal Sharma, Tarun Baghmar and Mahesh Ku. Rajput

<https://doi.org/10.4015/S1016237219500169>

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Hybrid Technique For ECG Signal Compression Using Parallel And Cascade Method, Dr Surekha KS, Dr B P patil

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Fast Denoising Filter For MRI using Parallel Approach, Dr S D oza

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Fast Denoising Filter for MRI using Parallel Approach

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¹Department of Electronics and Telecommunication, Army Institute of Technology, India
²Department of Electronics and Telecommunication, PES Modern College of Engineering, India

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Bilateral filter
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Shared memory
Texture memory

ABSTRACT
Real time medical image processing is necessary in the domain of remote medical care, diagnostics and surgery. To provide fast MRI diagnostics especially for neuro imaging, the research work proposes CUDA GPU based fast denoising filter with a parallel approach. Bilateral filter is the most suitable candidate for denoising, as it has unique ability to retain contours of soft tissue structures of the brain. The work proposes improvised memory optimization techniques for the GPU implementation to achieve superior performance in terms of speed up when compared with existing work. For a 64Megapixel brain MR image, shared memory approach gives speed up of 256.5 while texture memory usage with tiling approach stands the next in speedup with 42.16 over its CPU counterpart. The results indicate that in spite of increase in image size, the execution time of the filter does not increase beyond 500msec keeping the performance real time.

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Spectral Efficient Blind Channel Estimation Techniques for MIMO-OFDM Communications , Dr Renuka Bhandari

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Journal of Advanced Research in Dynamical and Control Systems
ISSN 1943-023X

Spectral Efficient Blind Channel Estimation Technique for MIMO-OFDM Communications
Renuka Bhandari and Sangeeta Jadhav

Abstract:

With emerge of increasing research in the domain of future wireless communications, massive MIMO (multiple inputs multiple outputs) attracted most of researchers interests. Massive MIMO is high-speed wireless communication standards. A channel estimation technology plays the essential role in the MIMO systems. Efficient channel estimation leads to spectral efficient wireless communications. The critics of Inter-Symbol Interference (ISI) are the challenging tasks while designing the channel estimation methods. To mitigate the challenges of ISI, we proposed the novel blind channel estimation method which based on Independent component analysis (ICA) in this paper. Proposed channel estimation it works for both blind interference cancellation and ISI cancellation. The proposed Hybrid ICA (HICA) method depends on pulse shape filtering and ambient removal to improve the spectral efficiency and reliability for MIMO

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Novel Spectral Efficient Technique for MIMO- FDM Channel Estimation with Reference to PAPR and BER Analysis, Dr Renuka Bhandari

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Insight on Blind Channel Estimation of MIMO-OSTBC Using Higher Order Statistics with Kalman Filter (HOS-KF), Dr Renuka Bhandari

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Insight on Blind Channel Estimation of MIMO-OSTBC Using Higher Order Statistics with Kalman Filter (HOS-KF)

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Abstract
A Blind channel estimation of Multiple-Input Multiple-Output-Orthogonal Space Time Block Code (MIMO-OSTBC), using Higher Order Statistics with Kalman Filter (HOS-KF), is proposed. It offers better performance, improvement in spectral efficiency and moderate computational complexity. This paper focuses on channel estimation without CSI information for fast time varying MIMO systems. It adds advantages of HOS as well as of KF. Minimization of cost function obtained by higher order kurtosis is done by Kalman filter. KF estimates the value after each iteration and then update it. Matlab simulation used to evaluate the channel estimation. Performance parameters, Bit Error Rate (BER) and Mean Square Error (MES) versus Signal to

scattering, communication suffers multipath fading. When signal reaches to receiving antenna, it is a composite signal of all multipath signals [3]. The multipath signals arrive at the receiver side have different delays and amplitudes which affect overall signal estimation as well as reliability of the system. Space-time Block Codes (STBC) is a method that receiver usually employed into systems to improve the reliability of data transmission using multiple antennas[4]. Advantages of MIMO systems include, Beam forming, Spatial Multiplexing and Spatial Diversity[5]. Spatial Diversity can be achieved with MIMO-STBC system. MIMO with STBC shows improved performance in fading channels. Tarokh et al.[6], suggested Space-Time Coding (STBC) and transmitter diversity with two transmitter antennas

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1. Spectral Efficient Blind Channel Estimation Technique for MIMO-OFDM Communications, Dr Renuka Bhandari

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Spectral Efficient Blind Channel Estimation Technique for MIMO-OFDM Communications

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Army Institute of Technology Pune-411015, India

<p>Article Info</p> <p><i>Article history:</i> Received Jun 9, 2017 Revised Feb 20, 2018 Accepted Mar 11, 2018</p> <p>Keyword: Blind channel estimation Error rates Independent component</p>	<p>ABSTRACT</p> <p>With emerge of increasing research in the domain of future wireless communications, massive MIMO (multiple inputs multiple outputs) attracted most of researchers interests. Massive MIMO is high-speed wireless communication standards. A channel estimation technology plays the essential role in the MIMO systems. Efficient channel estimation leads to spectral efficient wireless communications. The critics of Inter-Symbol Interference (ISI) are the challenging tasks while designing the channel estimation methods. To mitigate the challenges of ISI, we proposed the novel blind channel estimation method which based on Independent component analysis (ICA) in this paper. Proposed channel estimation it works for both blind interference cancellation and ISI cancellation. The proposed Hybrid ICA (HICA) method depends on pulse shape filtering and ambiguity removal</p>
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Performance Evaluation on Large MIMO, Dr B P patil

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Published: 24 October 2018

Performance Evaluation of Large MIMO

Rajashree A. Patil, Maflin Shabby & B. P. Patil

Wireless Personal Communications **104**, 821–836 (2019) | [Cite this article](#)

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Abstract

In wireless network, MIMO (multiple inputs multiple output) is an advance antenna in which multiple antennas are employed at basis and target terminals. The hopeful expansion of advance MIMO structure is to connect tens with numerous antennas. Particularly, when it united by synchronous development of a widespread quantity of client terminals then this contains numerous modernized throughput and energy ability. Whereas, if OFDM (orthogonal

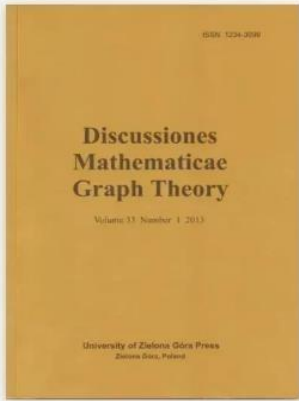
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[Y.M. Borse](#) and [Ganesh Mundhe](#)

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