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Vehicle or Object Speed Detection System

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ABSTRACT: Every day, we see countless accidents that result in the loss of priceless lives. Many people have lost their everyday activities as a result of this serious issue, putting their lives at danger for future activities. Road traffic thus became a significant issue, which has led to an increase in traffic accidents or crashes on a daily basis. Vehicle overspeed is another factor in traffic collisions. To gauge a vehicle's or an object's speed, a device is created. The MOTION DETECTION technique in OPEN CV is used in the suggested solution to determine a vehicle or object's speed. OpenCV is a Python bindings built-in module used to address computer vision issues. With this technique, we record live footage and analyse it to determine the vehicle's speed.

INTRODUCTION

People's daily lives are becoming more difficult as urban populations rise and traffic congestion rises as a result of high demand and sparse supply of roads and infrastructure. It is crucial to look for efficient methods to lessen these issues because their consequences are significant in daily living. Acquiring car speed is crucial when taking the law of speed decrease into consideration, since it represents traffic conditions. Historically, radar technology—specifically, radar detector and radar rifle—was used to detect or monitor vehicle speed. The Doppler shift phenomenon is a term used to describe how a radar system operates. This program's fundamental concept is the Doppler switch, which happens when the created sound is audible in a moving car and the frequency of the restored sound is slightly altered. The location and equipment, along with this route, influence the moving vehicle's speed. This method still has some flaws, though, comparable to the cosine mistake that happens when the radar gun is pointed in the wrong direction relative to the approaching vehicle. Cosine mistake happens when the radar gun is pointed in the wrong direction relative to the approaching vehicle.

Additionally, blurring (the radar wave reflecting from two different vehicles of different lengths) and radio interference (error caused on by the use of the same radio frequency for transmission and broadcast) are two other significant factors that contribute to speed gain errors. Finally, the radar sensor's ability to track only one vehicle at a time is another drawback of this method.

The camera just needs to be installed precisely above the road for the procedure to work. Simple geometric and analytical model-based camera measurement is described in the paper. Additionally, just the camera's specifications—such as its frame rate and frame size, which are accessible through the software—which are crucial to the measurement are needed. However, getting speed is difficult and takes a long time, thus a new approach was suggested. The new algorithm utilizes opencv in Python to determine an object's or car's speed. It uses the motion detection technique to find an item, and an entirely other algorithm to find the vehicle's speed. Python is the programming language used for this project. It is simple to use and very efficient in determining an object's speed.

RESEARCH ELABORATION

INTRODUCTION TO OPENCV

OPEN-SOURCE COMPUTER VISION IS REFERRED TO AS OPENCV (LIBRARY). THIS IS THE MOST WELL-KNOWN, WELL-UTILIZED, AND WELL-WRITTEN COMPUTER VISION LIBRARY. AN OPEN SOURCE PACKAGE CALLED OPENCV COMBINES VARIOUS COMPUTER VISION TECHNIQUES. PERFORMANCE ON COMPUTERS IS IMPROVED BY OPENCV, WHICH ALSO HELPS WITH REAL-TIME APPLICATIONS. OFFERING A USER-FRIENDLY AND INTUITIVE COMPUTER VISION INFRASTRUCTURE THAT ENABLES PEOPLE TO CREATE MORE INTRICATE COMPUTER VISION APPLICATIONS MORE QUICKLY IS ONE OF OPENCV'S KEY GOALS. AN OPEN SOURCE COMPUTER AND DIGITAL LIBRARY PROGRAMME FOR LEARNING IS CALLED OPENCV (OPEN SOURCE COMPUTER VISION LIBRARY). OPENCV IS CREATED TO ACCELERATE THE USAGE OF MACHINE VISION IN COMMERCIAL GOODS AND TO OFFER A COMPLETE INFRASTRUCTURE FOR COMPUTER VISION APPLICATIONS.

Packages for OpenCV contain a variety of independent or shared libraries. There are the following key modules available:

1. Core Functionality (core): This integrated module describes the fundamental data structures, identical parts, and functions that are used by other modules.

2. Image Processing (imgproc): This module offers the tools required to improve images or extract images for various uses.

3. Video Analysis: Algorithms for motion recognition, background removal, object or location detection, and execution are all included in video analysis modules.

4. Camera Calibration and 3D Reconstruction (calib3d): This module contains techniques to help calibrate the camera and capture the form and appearance of real things.

5. 2D Features Framework (features2d): A framework for characterising an image's or video's fundamental characteristics, such as shape, colour, texture, or movement, among other things, and for spotting significant trends.

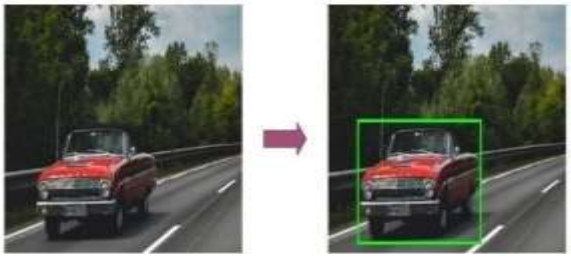
6. Object Detection (objdetect): Using pre-defined inputs, this module locates objects.

The largest computer library at the moment in terms of services is OpenCV. OpenCV, which uses more than 2500 algorithms, has advanced significantly over time. A visual organization between modules was not discovered through file format analysis.

OPEN CV FOR VEHICLE DETECTION AND SPEED ESTIMATION

A automobile detection system is an object detection system that focuses on tracking the car utilizing linkages to images or videos that it has in its collection. Numerous tools might be used to create this programme; however, in the following part, we'll use the OpenCV library.

This program's goal is to find links to cars and center videos on those cars. For instance, have a look at the picture frame below, where a binding box is constructed around an automobile and identifies linkages to a car.



Let's examine the following techniques in order to test variations in vehicle movement.

Frame Divergence

We are aware that a video is basically a compilation of photo frames that have been played continuously. It is noticeable that the car shifts its location and, consequently, the linkages in each new frame. Additionally, it should be emphasised that in these successive frames, only the pixels that correspond to the car will change. In order to identify changes in pixel and moving automobile position, the frame separation approach was developed.

Image Thresholding

We are aware that a movie is basically a compilation of individual photo frames that is streamed continuously.

It is noticeable that the car shifts its location and, consequently, the linkages in each new frame. Additionally, it should be emphasised that in these successive frames, only the pixels that correspond to the car will change. In order to identify changes in pixel and placement of the moving car, the frame separation approach was developed.

Finding contours

By drawing borders around the subject matter (the car) in the photo frames, the shape of the vehicle can be determined. In the next steps, we may locate the car and links to these pins in the picture frame. We can quickly locate a car's motion in a video or image frame by employing these

strategies carefully. We also employ a totally different technique to measure the speed of moving objects.

PROPOSED METHODOLOGY

THE NEW ALGORITHM DETERMINES A VEHICLE OR OBJECT'S SPEED USING OPENCV IN PYTHON. IT USES A MOTION DETECTION TECHNIQUE TO DISCOVER THE OBJECT, AND AN ABSOLUTE DIFFERENCE ALGORITHM TO DETERMINE THE VEHICLE'S SPEED. PYTHON IS THE PROGRAMMING LANGUAGE USED FOR THIS PROJECT. IT IS THE BEST METHOD FOR DETERMINING AN OBJECT'S SPEED BECAUSE IT IS SIMPLE TO USE**.**

ALGORITHM

Step 1: Import required libraries and capture video using camera.

Step 2: Finding the object or vehicle in the video using motion detection technique in opencv to implement this find contours function.

Step 3: After detecting the moving vehicle or object, the RGB values are converted into gray level values usingcvtColour function.

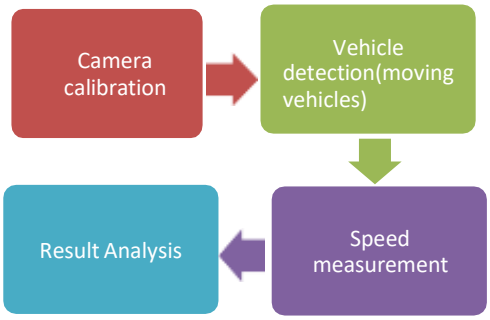
Step 4: By using a for loop we will detect whether the vehicle is moving form right side or left side.

Step 5: After analyzing the direction of the vehicle, the steps 2 and 3 are repeated even if the vehicle is coming fromleft or right side of the camera

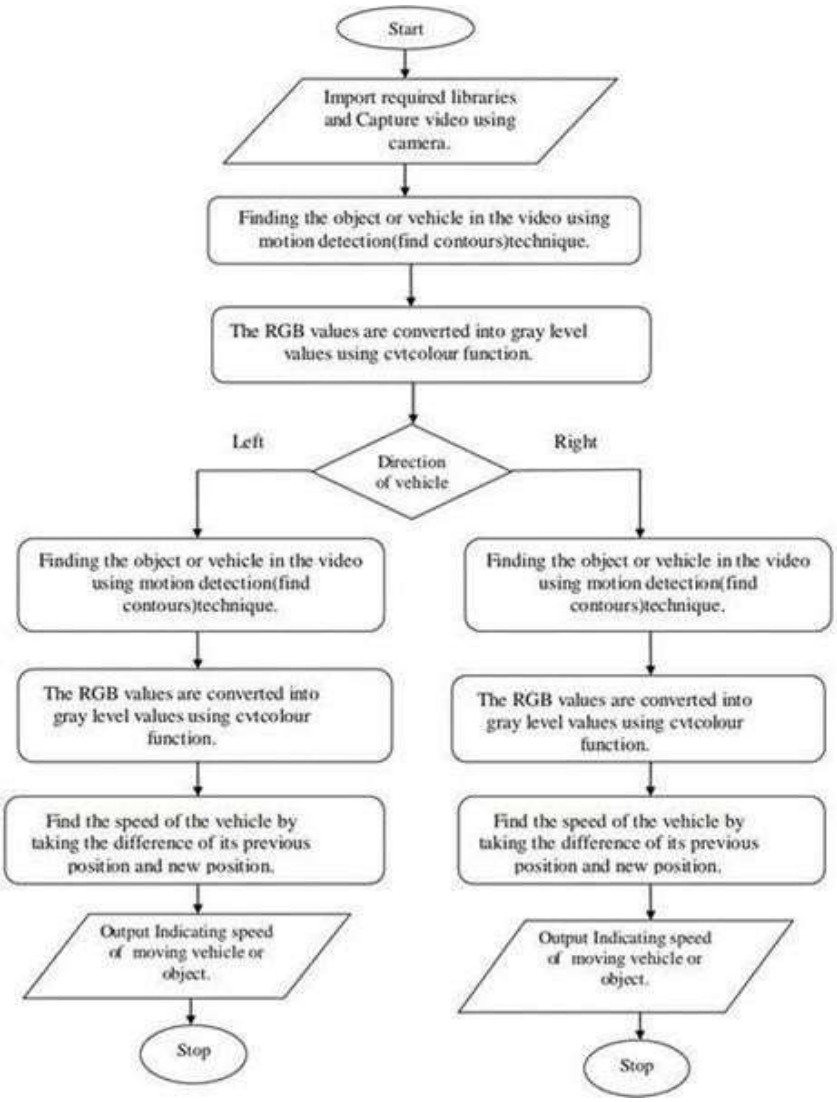
Step 6: We find the speed of the vehicle by taking the difference of its previous position and new position. Step 7: A green box indicating the speed of the vehicle in px/sec is observed.

Step 8: The same steps are repeated for any number of vehicles or objects.

BLOCK DIAGRAM



FLOW CHART



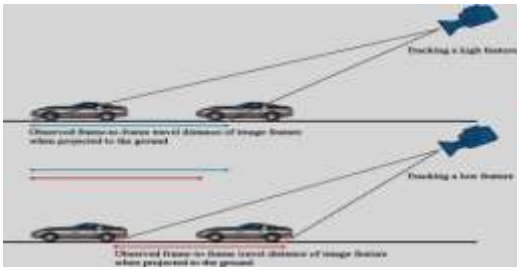
One of the key elements of study is camera measurement. While the cars in the real world are 3-D, the locations of the cars in the video images are 2-D (size). However, as the cars cannot leave the road area, the movement of the cars is likewise 2-D (Figure 2), and the vehicles connect to a 2D-to-2D map that can be generated exactly. At this point, the pattern function between the image's motor links and its real-world linkages is calculated. When video images of road traffic are captured, how the video camera is installed and what aspects are involved should be considered. Geometric calculations can be used to estimate the relationship between the camera lens angle and the background that is covered by the camera.

STEPS FOR MOTION DETECTION AND SPEED MEASUREMENT USING OPENCV IN PYTHON

1. Real-time video capture on camera or video recording.
2. Read the two frames in the video source.
3. Find the Differences between the next frame and the previous frame.
4. Use image manipulation such as blurring, Thresholding, finding contours, etc.
5. Finding the location of the Spear to detect movement.

6. Rectangle Drawing on Identified Movements.
7. Display video in the window.
8. Absolute difference technique basically uses the difference between two successive positions of a vehicle in order to detect the speed of the vechicle

Absolute difference = |frame n – frame 0|



RESULTS OR FINDINGS

The below figures shows the output of the proposed model.

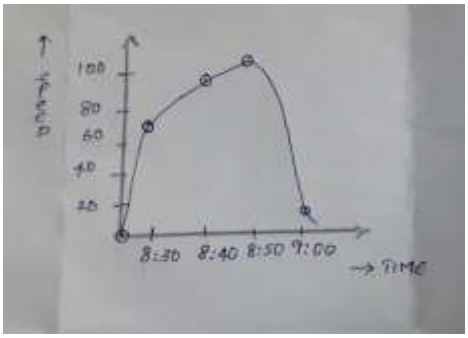
(A) OUTPUT FOR OBJECT SPEED DETECTION

(B) OUTPUT FOR VEHICLE SPEED DETECTION

TABULAR FORM

Status of vehicle orobject	Vehicle or object number	Speed
Stationary object	1	No Output
Moving object	1	670 px/sec
	2	409 px/sec
	3	16 px/sec
	4	56 px/sec
	5	6 px/sec
Stationary vehicle	1	No Output
Moving vehicle	1	294 px /sec
	2	31 px/sec
	3	12 px/sec
	4	5 px/sec
	5	212 px/sec
	6	54 px/sec

EXPECTED GRAPH



BENEFITS OF PROPOSED SOLUTION

- The proposed method reduces the complexity in existing solution.
- It tracks the speed efficiently even if there are large number of vehicles.
- Rate of accidents per day can be reduced.
- It is very simple to Implement and easier to understand**.**

CONCLUSION

WE MAY DRAW THE CONCLUSION THAT AS THE POPULATION GROWS, SO DOES THE AMOUNT OF TRAFFIC ON THE ROADS, WHICH INCREASES THE RISK OF ACCIDENTS. IF EVERYONE COMPLIES WITH TRAFFIC REGULATIONS, MANY LIVES CAN BE SPARED. THEREFORE, IT IS EVERYONE'S RESPONSIBILITY TO BE AWARE OF THE TRAFFIC LAWS AND TO OBEY THEM CORRECT IN ORDER TO PREVENT ACCIDENTS.

THEREFORE, THE SUGGESTED METHOD IS PARTICULARLY EFFICIENT IN DETERMINING A VEHICLE'S OR OBJECT'S SPEED. BECAUSE IT MAKES USE OF AN OPEN CV BUILT-IN MODULE IN PYTHON, IT IS QUITE SIMPLE TO IMPLEMENT.

REFERENCES

[1] Asaad AMA, Syed IA (2009). “Object identification in video images using morphological background estimationscheme” Chapter, 22: 279-288.

[2] Bailo G, Bariani M, Ijas P, Raggio M (2005). ”Background estimation with Gaussian distribution for image segmentation, a fast approach,” Proc. IEEE Intl. workshop on Measurement Systems for Homeland Security, Contraband Detection and Personal safety, pp. 2-5.

[3] Ferrier NJ, Rowe SM, Blake A (1994). Real--time traffic monitoring. In WACV94, pp. 81—88.

[4] Fumio Y, Wen L, Thuy TV (2008). "Vehicle Extraction And Speed Detection From Digital Aerial Images" IEEE International Geosciences and Remote Sensing Symposium, pp. 1134- 1137.

[5] Huei-Yung L, Kun-Jhih L (2004). "Motion Blur Removal and Its Application to Vehicle Speed Detection", The IEEE International Conference on Image Processing (ICIP 2004), pp. 3407-3410.

[6] Jianping W, Zhaobin L, Jinxiang L, Caidong G, Maoxin S, Fangyong T (2009). "An Algorithm for Automatic VehicleSpeed Detection using Video Camera" Proc. IEEE 4th Int. Conference Comput. Sci. Educ., pp. 193-196.

[7] Melo JN, Bernardino A, Santos-Victor AJ (2006). Detection and classification of highway lanes using vehicle motion trajectories, IEEE Trans. Intelligent Trans. Syst., pp. 188- 200.

[8] Pumrin S, Dailey DJ (2002). "Roadside Camera Motion Detection for Automated Speed Measurement". IEEE 5th International Conference on Intelligent Transportation Systems", Singapore, pp. 147-15.

9. **Dr**.R.Chinnaiyan , M.S.Nidhya (2018), " Reliability Evaluation of Wireless Sensor Networks using EERN Algorithm" , Lecture Notes on Data Engineering and Communications Technologies, Springer International conference on Computer Networks and Inventive CommunicationTechnologies (ICCNCT - 2018), August 2018 (Online)
10. Dr.R.Chinnaiyan , R.Divya (2018), " Reliable AI Based Smart Sensors for Managing Irrigation Resources in Agriculture" , Lecture Notes on Data Engineering and Communications Technologies, Springer International conference on Computer Networks and Inventive CommunicationTechnologies (ICCNCT - 2018), August 2018 (Online)
11. Dr.R.Chinnaiyan , S.Balachandar (2018) , " Reliable Digital Twin for Connected Footballer" , Lecture Notes on Data Engineering and Communications Technologies, Springer International conference on Computer Networks and Inventive Communication Technologies(ICCNCT - 2018), August 2018 (Online)
12. Dr.R.Chinnaiyan , S.Balachandar (2018) , " Centralized Reliability and Security Management of Data in Internet of Things (IoT) with Rule Builder"
, Lecture Notes on Data Engineering andCommunications Technologies, SpringerInternational conference on Computer Networks and Inventive Communication Technologies(ICCNCT - 2018), August 2018 (Online)
13. Dr.R.Chinnaiyan, Abishek Kumar (2017) " Reliability Assessment of Component BasedSoftware Systems using Basis Path Testing" , IEEE International Conference on Intelligent Computing and Control Systems, ICICCS 2017, 512 – 517
14. Dr.R.Chinnaiyan, AbishekKumar(2017)
,"Construction of Estimated Level Based Balanced Binary Search Tree", 2017 IEEE International Conference on Electronics,Communication, and Aerospace Technology (ICECA 2017), 344 - 348,
978-1-5090-5686-6.
15. Dr.R.Chinnaiyan, AbishekKumar(2017), Estimation of Optimal Path in Wireless Sensor Networks based on Adjancy List, 2017 IEEE International Conference on Telecommunication,Power Analysis and Computing Techniques (ICTPACT2017)
,6,7,8th April 2017,IEEE 978-1-5090-3381-2.
16. Dr.R.Chinnaiyan, R.Divya (2017)," Reliability Evaluation of Wireless Sensor Networks", IEEE International Conference on Intelligent Computing and Control Systems, ICICCS 2017, 847 – 852
17. Dr.R.Chinnaiyan, Sabarmathi.G (2017)," Investigations on Big Data Features , Research Challenges and Applications", IEEE International
Conference on Intelligent Computing and Control Systems, ICICCS 2017, 782 – 786

18. G.Sabarmathi , Dr.R.Chinnaiyan (2018), "Envisagation and Analysis of Mosquito Borne Fevers – A Health Monitoring System by Envisagative Computing using Big Data Analytics" in ICCBI 2018 – Springer on 19.12.2018 to 20.12.2018 (Recommended for Scopus Indexed Publication IEEE Xplore digital library)
19. G.Sabarmathi , Dr.R.Chinnaiyan, Reliable Data Mining Tasks and Techniques for Industrial Applications, IAETSD JOURNAL FOR ADVANCED RESEARCH IN APPLIED SCIENCES, VOLUME 4, ISSUE 7, DEC/2017,PP- 138-142, ISSN NO: 2394-8442
20. Dr. M. Thangamani, Jafar Ali Ibrahim, Information Technology E-Service Management System, International Scientific Global Journal in Engineering Science and Applied Research (ISGJESAR). Vol.1. Issue 4, pp. 13-18, 2017. http://isgjesar.com/Papers/Volume1,Issue4/paper2.pdf
21. Ibrahim, Mr S. Jafar Ali, K. Singaraj, P. Jebaroopan, and S. A. Sheikfareed. "Android Based Robot for Industrial Application." International Journal of Engineering Research & Technology 3, no. 3 (2014).
22. Ibrahim, S. Jafar Ali, and M. Thangamani. "Momentous Innovations in the Prospective Method of Drug Development." In Proceedings of the 2018 International Conference on Digital Medicine and Image Processing, pp. 37-41. 2018.
23. Ibrahim, S. Jafar Ali, and M. Thangamani. "Prediction of Novel Drugs and Diseases for Hepatocellular Carcinoma Based on Multi-Source Simulated Annealing Based Random Walk." Journal of medical systems 42, no. 10 (2018): 188. https://doi.org/10.1007/s10916-018-1038-y ISSN 1311-8080, https://acadpubl.eu/hub/2018-119-16/1/94.pdf
24. Jafar Ali Ibrahim. S, Mohamed Affir. A "Effective Scheduling of Jobs Using Reallocation of Resources Along With Best Fit Strategy and Priority", International Journal of Science Engineering and Advanced Technology(IJSEAT) – ISSN No: 2321-6905, Vol.2, Issue.2, Feb-2014, http://www.ijseat.com/index.php/ijseat/article/view/62
25. M. Thangamani, and Jafar Ali Ibrahim. S, "Knowledge Exploration in Image Text Data using Data Hiding Scheme," Lecture Notes in Engineering and Computer Science: Proceedings of The International MultiConference of Engineers and Computer Scientists 2018, 14-16 March, 2018, Hong Kong, pp352-357 http://www.iaeng.org/publication/IMECS2018/IMECS2018_pp352-357.pdf
26. M. Thangamani, and Jafar Ali Ibrahim. S, "Knowledge Exploration in Image Text Data using Data Hiding Scheme," Lecture

Notes in Engineering and Computer Science: Proceedings of The International MultiConference of Engineers and Computer Scientists 2018, 14-16 March, 2018, Hong Kong, pp352-357 http://www.iaeng.org/publication/IMECS2018/IMECS2018_pp352-357.pdf

27. S. Jafar Ali Ibrahim and M. Thangamani. 2018. Momentous Innovations in the Prospective Method of Drug Development. In Proceedings of the 2018 International Conference on Digital Medicine and Image Processing (DMIP '18). Association for Computing Machinery, New York, NY, USA, 37–41. https://doi.org/10.1145/3299852.3299854
28. S. Jafar Ali Ibrahim and Thangamani, M "Proliferators and Inhibitors Of Hepatocellular Carcinoma", International Journal of Pure and Applied Mathematics (IJPAM) Special Issue of Mathematical Modelling of Engineering Problems Vol 119 Issue. 15. July 2018
29. Thangamani, M., and S. Jafar Ali Ibrahim. "Ensemble Based Fuzzy with Particle Swarm Optimization Based Weighted Clustering (Efpso-Wc) and Gene Ontology for Microarray Gene Expression." In Proceedings of the 2018 International Conference on Digital Medicine and Image Processing, pp. 48-55. 2018. https://dl.acm.org/doi/abs/10.1145/3299852.3299866
30. Testing" , IEEE International Conference on Intelligent Computing and Control Systems, ICICCS 2017, 512 – 517
31. Dr.R.Chinnaiyan, Abishek Kumar(2017) ,"Construction of Estimated Level Based Balanced Binary Search Tree", 2017 IEEE International Conference on Electronics,Communication, and Aerospace Technology (ICECA 2017), 344 - 348, 978-1-5090-5686-6.
32. R.Chinnaiyan, S.Somasundaram (2012) , Reliability Estimation Model for Software Components using CEP", International Journal of Mechanical and Industrial Engineering (IJMIE) , ISSN No.2231-6477, Volume-2, Issue-2, 2012, pp.89-93.
33. R.Chinnaiyan, S. Somasundaram (2011) ,"An SMS based Failure Maintenance and Reliability Management of Component Based Software Systems", European Journal of Scientific Research, Vol. 59 Issue 1, 9/1/2011, pp.123 (cited in EBSCO, Impact Factor: 0.045)
34. R.Chinnaiyan, S.Somasundaram(2011), "An Experimental Study on Reliability Estimation of GNU Compiler Components - A Review", International Journal of Computer Applications, Vol.25, No.3, July 2011, pp.13-16. (Impact Factor: 0.814)
35. R.Chinnaiyan, S.Somasundaram(2010) "Evaluating the Reliability of Component Based Software Systems " ,International Journal of Quality and Reliability Management , Vol. 27, No. 1., pp. 78-88 (Impact Factor: 0.406)
36. Dr.R.Chinnaiyan, Abishek Kumar(2017), Estimation of Optimal Path in Wireless Sensor Networks based on Adjancy List, 2017 IEEE International Conference on Telecommunication,Power Analysis and Computing Techniques (ICTPACT2017) ,6,7,8th April 2017,IEEE 978-1-5090-3381-2.