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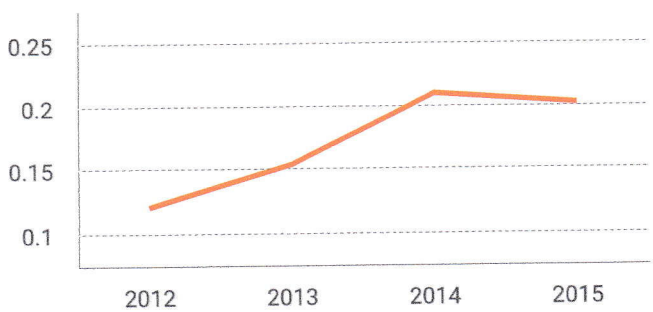
12
H Index

Quartiles

The set of journals have been ranked according to their SJR and divided into four equal groups, four quartiles. Q1 (green) comprises the quarter of the journals with the highest values, Q2 (yellow) the second highest values, Q3 (orange) the third highest values and Q4 (red) the lowest values.

Category	Year	Quartile
Engineering (miscellaneous)	2012	Q4
Engineering (miscellaneous)	2013	Q3
Engineering (miscellaneous)	2014	Q3
Engineering (miscellaneous)	2015	Q3

SJR



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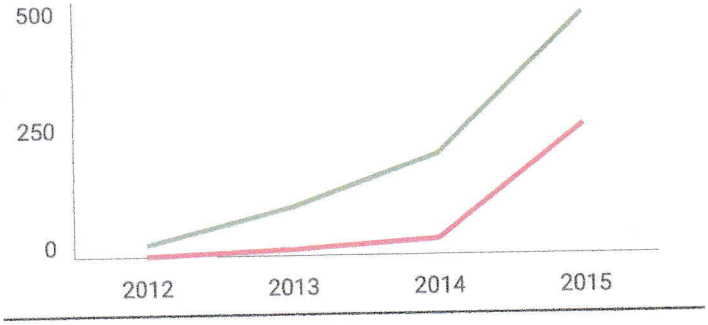

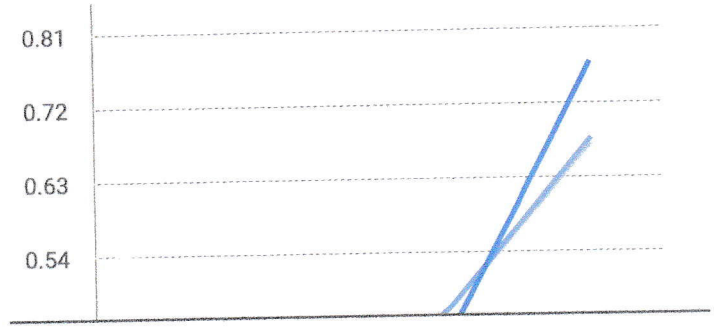

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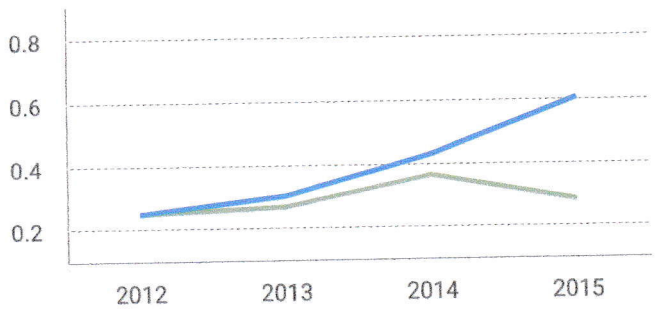
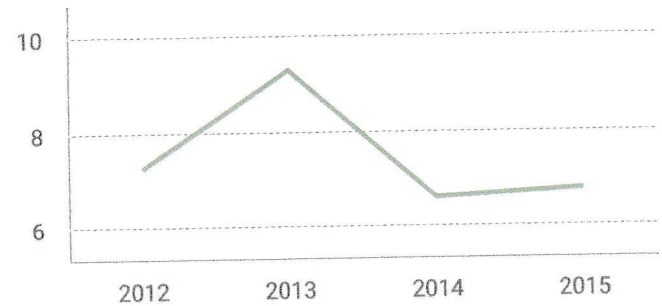


% International Collaboration



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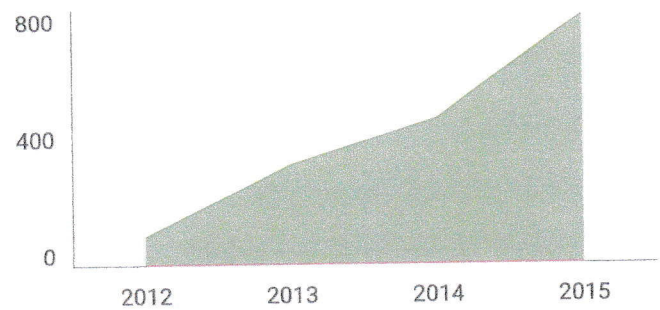

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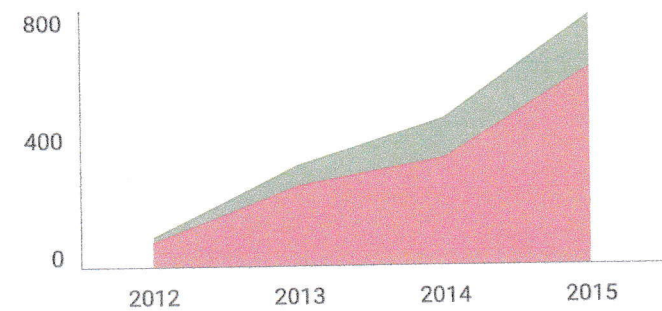

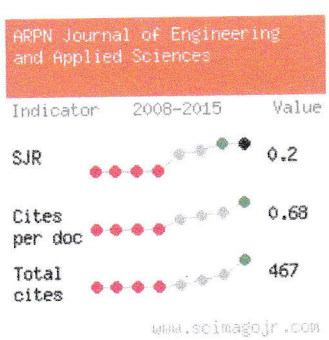

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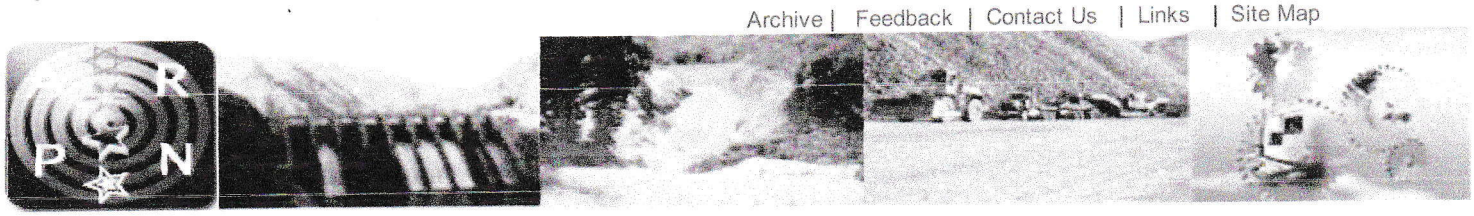

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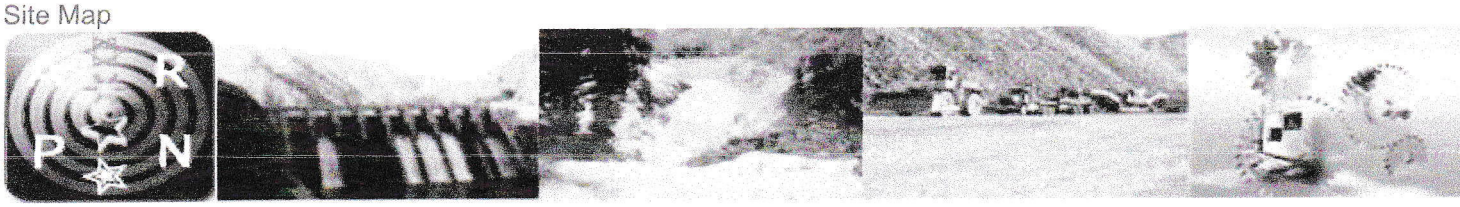

ARPN Journal of Engineering and Applied Sciences ISSN 1819-6608 (Online)

Title: Evaluation of feature extraction algorithm for multi-ethnic facial sketch recognition

Author (s): Andrew Japar, Anto Satriyo Nugroho, James Purnama and Maulahikmah Galinium

Abstract: There are many cases of criminal where some biometrics factors difficult to be identified and the photo image of a suspect is not available. Therefore, facial sketch recognition system to identify suspects face from sketches is very important to assist the process of investigation. Main purpose of this research is to get the best facial sketch recognition system by comparing the ROC (Receiver Operating Characteristics) curve using local-feature based approach and appearance-based approach. Based on the experiments, the ROC curve proves that local-feature based approach using LFDA framework [1] show better recognition result with less error rate than appearance-based approach. Local-feature based implemented inside facial sketch recognition system return between 85% to 90% accuracy rates against good quality viewed sketches.

Full Text

Title: Automated classification of malaria plasmodia from thin blood smears microphotograph

Author (s): Maulahikmah Galinium, Raymond Septevan Chandra, Anto Satriyo Nugroho, Made Gunawan, Vitria Pragesjvara, Ismail Ekoprayitno Rozi and Puji Budi Setia Asih

Abstract: Malaria is one of the malignant diseases which can be found in a tropical climate country like Indonesia. Automated malaria detection using host blood samples is an important approach to improve time efficiency for diagnosing the disease and giving the treatment as soon as possible. This automated detection uses a thin blood smears microphotograph which is stained using a Giemsa stain as input material. Furthermore the microphotograph is proceed using image processing algorithm which consists of image pre-processing, image thresholding using Otsu method, blood cell segmentation, suspected erythrocyte classification, and plasmodium classification. Two stages of classification are used in plasmodium classification by observing the size of object and the intensity supported by the Bayes classifier. The output from this program is expected to determine the plasmodium species of human plasmodium i.e. Plasmodium falciparum, Plasmodium malaria, Plasmodium viva, and Plasmodium ovale.

Full Text

Title: Fuzzy concepts compression using Principal Component Analysis with Singular Value Decomposition

Author (s): Noor Hafhizah Abd Rahim

Abstract: Recent years, the volume of data is increasing rapidly. There is a huge of information available that lead to extremely large datasets. Most of data comes in unstructured forms such as Twitter, Face book, Blogs, and others. Formal Concept Analysis (FCA) is a way to organize data. However, large dataset leads to the complex formal lattice and becomes unreadable. Principal Component Analysis (PCA) using Singular Value Decomposition (SVD) are used to reduce the high dimension of data. This method is able to be used with both fuzzy and crisp formal contexts. In order to select principal components, we combine two rules; first rule is we use Cumulative Explained Variance Fraction and second rule is we examine Cattell's Scree Graph. This method is compared with other methods using Edit Distance measurement that quantify the distance between original lattice and reduced lattices.

Full Text

Title: Ensemble based majority voting for point-to-point measurements of Gyrodactylus species identification

Author (s): Rozniza Ali, Amir Hussain and Andrew Abel

Abstract: In the 21st Century, a key challenge in both wild and cultured fish populations for control and management of disease is to securely and consistently perform pathogen identification. To provide automated accurate classification for the challenging Gyrodactylus species, we introduce an ensemble based majority voting approach for their classification. In this system, an ensemble classification approach is created that utilizes a combination of multiple feature sets and classifiers for Gyrodactylus species identification. The classifier base makes use of K-Nearest Neighbor (K-NN) and Linear Discriminant Analysis (LDA) approaches; with three different feature sets used for successful multi species

Linear Discriminant Analysis (LDA) approaches, with three different feature sets used for successful multi-species classification, considering 25 point-to-point data measurements, as well as smaller feature sets chosen using different feature selection techniques. The results show that our proposed ensemble based approach is accurate and robust, with ensemble based majority voting of classifiers and feature sets together found to be more effective than only combining feature sets.

Full Text

Title: TransATH: Transporter prediction via annotation transfer by homology

Author (s): Faizah Aplop and Greg Butler

Abstract: A significant deficiency in the existing state-of-the-art for the reconstruction of metabolic pathways is the ability to associate genes and proteins to the transport reactions that move specific compounds across the membranes of the cell. This paper presents TransATH, which stands for Transporters via ATH (Annotation Transfer by Homology), a system which automates Saiers protocol and includes the computation of subcellular localization and improves the computation of transmembrane segments. The choice of thresholds for the parameters of TransATH is investigated to determine optimal performance as defined by a gold standard set of transporters and non-transporters from S. cerevisiae. We demonstrate TransATH on the fungal genome of A. niger CBS 513.88 and evaluates the correctness of TransATH using the curated information in AspGD (the Aspergillus Database). A website for TransATH is available for use.

Full Text

Title: Adaptive scientific visualization of color information in HDR image

Author (s): June-Hwan Lee and Yong-Hwan Lee

Abstract: While tone mapping operation of high dynamic range (HDR) images for realistic display is commonly researched, scientific visualization for analyzing scene luminance within HDR image has much less attention from researches. This paper has presented and implemented an approach for the reproduction and visualization of the colour information in HDR images. We attempt several simple color visualizing functions, and estimate their effectiveness through the evaluation factors with common HDR images. The experimental result shows that sigmoidal mapping function is better performance in the visualization, compared to other approaches.

Full Text

Title: Evaluation of articles published in Mendeley and CrossRef in relation to the Google Scholar pages

Author (s): Adian Fatchur Rochim and Riri Fitri Sari

Abstract: This paper aims to show the performance of a researcher from their published articles. Our software crawled 10 (ten) most cited articles on the Google Scholar (GS), Mendeley and CrossRef with several of crawling methods. The method used in data retrieval is scrapping due to the limitations on the Application Programming Interface (API) provided by the Google search engine. To retrieve the Digital Object Identifier (DOI) data from Crossref, the API method has been used. In order to count the number of reader of paper on the Mendeley we used the API method. We used the R programming language, Python and Bash scripting shell. The operating system was based on Ubuntu 8.04 Linux and Mac OS. The Apache webserver were used to serve the website and we used the MySQL database to store the data. The database of MySQL is used for interfacing between R with the PHP language purposes. The Hypertext Preprocessor (PHP) is used for server-side scripting. Data was obtained by scrapping the best 10 articles from 100 Indonesia's scientists indexed on the GS. Firstly, the data samples (S') were obtained from the list of Indonesian scientists in Webometrics as the input of the GS scrapping. Secondly, the data resulted (S'') were used as the input of the Crossref's API query to obtain the DOI of each article. Finally, the DOIs were used as the input for the API query to get the number of the result to show the number of readers of each to article on Mendeley. The software produced can crawl the data from Google Scholar, Crossref and Mendeley reader count.

Full Text

Title: Implementation of information display device for estimation of bus arrival time

Author (s): Fauzi Maulana, Misbahuddin, Riri Fitri Sari, Ruki Harwahyu, Anak Agung Putri Ratna, and Ellen S. W. Tangkudung

Abstract: The purpose of the research is to implement a device that functions as a real-time display of the estimated arrival time of the yellow bus in University of Indonesia. The device uses an 8-bit Atmel AVR microcontroller based on Arduino platform as its main controller, and utilizes GPRS-based connection to transmit the data to the server. The system fetches the data of the calculated estimation arrival time of the Yellow Bus for each bus stop. The information will be updated periodically by the server. The testing results show that the success rate of the data-fetching was 99.6% for the duration of 23:53 until 02:46, and 99.7% for the duration of 07:24 until 09:43. The average usage of GPRS quota was 10.3 MB for a period of 10 days. Finally, the device's additional function for maintenance and debugging by utilizing SMS service has been proved to work properly.

Full Text

Title: Inferring an optimal algorithm for detecting brain neuron network connectivity in response to external stimuli

Author (s): Rahul Mani and Vinod Dubey

Abstract: The focus of neuroscience research over the years has been to understand how neurons respond to a variety of stimuli and communicate with each other and to construct models that attempt to predict responses to similar stimuli. Findings have been used for establishing better treatments for human diseases like, epilepsy, stroke and Alzheimer's. This in turn has also been helpful in designing appropriate prosthetic devices. The recent advances in multiple-electrode recording and computational capacity have made it possible to study the simultaneous spiking activity of multiple neurons. A systematic analysis and understanding of simultaneous spike recording of multiple neurons using computational algorithms offers new promise for investigating some of the fundamental questions concerning how the brain works. This research contributes to this growing literature through using new datasets and computational techniques. In this paper, we develop a computational algorithm to estimate the neural connections of a simulated neuronal network data of 10 cultured neurons obtained from the MLRio Lab at George Mason University. The inferred

neuronal network data of 10 cultured neurons obtained from the NLBIO+ Lab at George Mason University. The inferred brain network derived from the algorithm was then compared using statistical techniques such as RMSE and MAE with observed truth data which mimic actual functioning of the brain. The results suggest that average error between truth and simulated network decreases as the number of time steps increases. This means, longer it takes between the stimuli and firing of neuronal responses, the closer we get to the optimal network. This type of research is very relevant as it can help neuroscientists design complex experiments and as a consequence, answer some of the key on the functioning of the brain.

Full Text

Title: An integrated semi-supervised clustering model for time course gene expression data

Author (s): Peter Juma Ochieng and Taufik Djatna

Abstract: Clustering the time course data using basic conventional clustering methods often, present computational challenges and most algorithms are porn error when dealing with such data structures. Thus, the aim of this study is to introduce an integrated semi-supervised model for clustering time course gene expression data. The proposed model implement four series approximation to account for the periodic gene expression; AR(1) mixed random effect to account for the auto correlated data structure for time course gene expression and rejection controlled EM algorithm to minimize the computational cost during m-step. The interest of the proposed method is illustrated by its application to yeast cell life cycle dataset. Simulation results indicate the proposed method to cluster the various genes expression to their correct profiles. Further empirical comparison indicates the proposed method to outperform the HMRF-Kmean with 0.154 error rate; 0. 785 rand index and 0.592 adjusted rand index. Therefore, integrating the Fourier series approximation, AR (1) random effect model and rejection controlled EM algorithm the proposed model provides a more reliable and robust method for clustering time-course data since the model allows for the correlation among observations at different time points.

Full Text

Title: High-performance computing and communication models for solving the complex interdisciplinary problems on DPCS

Author (s): Norma Alias, Riadh Sahnoun and Victor Malyshkin

Abstract: The paper presents some advanced high performance (HPC) and parallel computing (PC) methodologies for solving a large space complex problem involving the integrated difference research areas. About eight interdisciplinary problems will be accurately solved on multiple computers communicating over the local area network. The mathematical modeling and a large sparse simulation of the interdisciplinary effort involve the area of science, engineering, biomedical, nanotechnology, software engineering, agriculture, image processing and urban planning. The specific methodologies of PC software under consideration include PVM, MPI, LUNA, MDC, OpenMP, CUDA and LINDA integrated with COMSOL and C++/C. There are different communication models of parallel programming, thus some definitions of parallel processing, distributed processing and memory types are explained for understanding the main contribution of this paper. The matching between the methodology of PC and the large sparse application depends on the domain of solution, the dimension of the targeted area, computational and communication pattern, the architecture of distributed parallel computing systems (DPCS), the structure of computational complexity and communication cost. The originality of this paper lies in obtaining the complex numerical model dealing with a large scale partial differential equation (PDE), discretization of finite difference (FDM) or finite element (FEM) methods, numerical simulation, high-performance simulation and performance measurement. The simulation of PDE will perform by sequential and parallel algorithms to visualize the complex model in high-resolution quality. In the context of a mathematical model, various independent and dependent parameters present the complex and real phenomena of the interdisciplinary application. As a model executes, these parameters can be manipulated and changed. As an impact, some chemical or mechanical properties can be predicted based on the observation of parameter changes. The methodologies of parallel programs build on the client-server model, slave-master model and fragmented model. HPC of the communication model for solving the interdisciplinary problems above will be analyzed using a flow of the algorithm, numerical analysis and the comparison of parallel performance evaluations. In conclusion, the integration of HPC, communication model, PC software, performance and numerical analysis happens to be an important approach to fulfill the matching requirement and optimize the solution of complex interdisciplinary problems.

Full Text

Title: Spectrum-less communication by virtualizing the core network of 4G wireless network

Author (s): Ardian Ulvan, Melvi Ulvan, Robert Bestak and Hery Dian Septama

Abstract: The efficiency of spectrum in mobile and wireless network might be achieved by exploiting the technical specification within the spectrum itself, and by introducing the new technical mechanism called network virtualization. The latter emphasis's the enhancement of control and user planes of the network rather than utilize the spectrum. This research work focuses on the network virtualization, particularly on virtualizing the network elements in LTE-based core network (Evolved Packet Core EPC). A design of network virtualization is built from the end-user to the core network, which includes all the functionality of the network elements. The EPC is assumed as the main core network system, while the 2G/3G/4G systems are as client stations. Testing, measurement and performance analysis are done by developing a testbed of cloud network in the Local Area Network where the access rate is up to 100 Mbps. Subsequently, the traffic loads of 0 Mbps, 10 Mbps, 50 Mbps, 75 Mbps, and 100 Mbps, based on TCP and UDP transport protocols, are generated into the testbed. All elements of the EPC-LTE on this testbed (i.e., HSS, MME, S-GW, P-GW and PCRF) are logically separated from one another in a cloud network. Two parameters of Quality of Service (QoS), i.e., jitter and delay, are used as performance parameters. Based on the test and measurement it is found that the highest value of jitter and delay are 26.87 ms and 6.53 ms respectively, when network is loaded with traffic at 100Mbps. From the results, it can be concluded that the network virtualization can be implemented.

Full Text

Title: Three-dimensional advance dynamic culture system promotes microvessel development from cultured endothelial cells in vitro

Author (s): Mohd. Ramdan, Irza Sukmana, Nur Syazana, Noor Jasmawati, Mohammed Rafiq and Ardiyansyah Syahrom

Abstract: The present study describes a dynamic system that can be used in a three- dimensional (3D) in vitro cell culture environment which promotes new microvessel formation. Human umbilical vein endothelial cells (HUVECs) were used in this study to form the inner lining of the microvessel, guided by the dynamic flow produced by our system within a

3D matrix made from fibrin. A 2D environment was used as a comparison. The dynamic flow was set to produce 5, 10, 15 or 20 dynes/cm2 shear stress to the cells in culture. Cultured HUVECs were observed for the increase in cell numbers and formation of microvessels. Cells cultured after 2 days demonstrated an increase in cell numbers when subjected to 10dynes/cm2 or more. By day 4, cells appeared to have altered morphologies and were oriented towards the direction of fluid flow. From the fluorescence images observed, it became apparent that there were microvascular channels forming in the 3D cultures. Our dynamic flow system appears to influence endothelial cells to promote microvascular formations in a 3D environment.

Full Text

Title: Airplane design: The superiority of FSW aluminum-alloy pure monocoque over CFRP black constructions

Author (s): Stefano Cassani

Abstract: CFRP composite structures offer a noteworthy weight lessening over traditional aluminum-alloy semi-monocoque airplanes. This weight lessening enhances the fuel effectiveness of the aerial vehicle by around 20%, which results in a cost sparing in fuel. In this paper introduced a contrasting option to CFRP. Aluminum lithium alloy 2195 with FSW (Friction Stir Welding) is acquainted as a successful option to CFRP structures. The "tough skin" monocoque plan is examined. An old WWII Reggiane 2005 has been upgraded both to CFRP and 2195-FSW. The outcome is a further reduction in weight much more important for different perspectives, as large scale manufacturing cost, reparability and environmental impact. The choice of the Reggiane 2005 is because of the complete knowledge on the original flying machine geometry and burdens. This outcome can be straightforwardly exchanged to larger aerial structures. On a pure mass premise, the advantage of the CFRP Reggiane 2005 is extremely light over the monocoque 2195-FWS. However, the monocoque structure is advantaged in the mounting of accessories. In fact, aluminum alloy structures can be easily machined with extreme precision and modifications can be introduced with extreme flexibility both in the design and the prototyping phase. On the contrary, way CFRP structures are extremely difficult to work and to modify. The though skin and the protected structure approach give approximately the same results. However, the though skin approach has the advantage of easier production technique. On the maintenance and disposal point of view the 2195-FSW structure has larger advantages [1-5].

Full Text

Title: Optimization of kerf width obtained in WEDM of Aluminum hybrid composite using Taguchi method

Author (s): A. Muniappan, C. Thiagarajan and S. Somasundaram

Abstract: In this paper, an experiment is conducted to optimize the kerf width of wire electrical discharge machining (WEDM) on Aluminum hybrid composite with Zinc coated brass wire using Taguchi method. Aluminum metal matrix composites (MMCs) reinforced with silicon carbide particulate (SiCp) find several applications due to their improved mechanical properties for a wide variety of aerospace and automotive applications. The hybrid composite (Al6061/Sic/Graphite) is prepared by stir casting route. Parameters considered for this study is pulse on time, pulse off time ,peak current, gap set voltage, wire feed and wire tension. Taguchi orthogonal method is used to design the experiment (L27). In this analysis of results shows that kerf width is mostly influenced by the peak current.

Full Text

Title: The cost of traffic accident and equivalent accident number in developing countries (Case study in Indonesia)

Author (s): Gito Sugiyanto

Abstract: Many developing countries like Indonesia have a serious road accident problem. Traffic accidents data in 2014 was recorded 95,906 cases that resulted in 28,297 people died, 26,840 people serious injuries, and 109,741 people slightly injuries. There are 108,883 accidents involving motorcyclists. Various attempts have been made to reduce the number of traffic accidents. One of the parameters to perform cost-benefit analysis of the program conducted the necessary value of the accidents cost. The aims of this study is to analysis traffic accidents cost using Gross Output Method and determining the value of an equivalent accident number based on accident cost. The research location is in Purbalingga, Indonesia using accident data from 2010-2012. The accident cost analysis based on the casualty severity of accidents is fatality, serious injury, slight injury, and Property Damage Only (PDO). Components of accident costs include costs to repair vehicle, loss of productivity, medical expenses, administrative expenses, and cost of pain, grief and suffering as well as the costs incurred by family. Casualty accident costs by severity type fatality is IDR263,025,680.96; serious injury is IDR12,066,000; slightly injury is IDR1, 904, 312.87, and PDO is IDR1, 562, 909.09. Total accident cost in Purbalingga was estimated IDR27, 582, 518,750 or 0.38% of the gross domestic product. Equivalent accident number using conversion accident cost Fatality: Serious-injury: Slight-injury: PDO = 168:8:2:1.

Full Text

Title: Modified critical path method to solve networking problems under an intuitionistic fuzzy environment

Author (s): T. Yogashanthi and K. Ganesan

Abstract: In this paper, we propose a new method to solve networking problems under an intuitionistic fuzzy environment. We use triangular Intuitionistic fuzzy numbers to represent activity duration in the project network. We obtain the intuitionistic fuzzy critical path for the project network using a new type of arithmetic operations and a ranking function on triangular intuitionistic fuzzy numbers. Numerical example is provided to show the efficiency of the proposed algorithm.

Full Text

Title: Project of multi-purpose research nuclear installation on fast neutrons is to ensure the national economy safety

Author (s): V. A. Rudenko, M. V. Golovko, S. A. Tomilin and A. A. Marchenko

Abstract: The article considers some opportunities of perspective nuclear power development which being guarantee of branch competitiveness in the internal and external markets, make essential impact on formation of national economy safety potential. In the conditions of an unstable environment of the raw markets the nuclear power strengthens the priority in system of instruments of increase of an economical and political statehood in the world community. Accumulation of

Full Text

Title: A new proposed adaptive Cognitive Radio detection system based on MLP neural network for different modulation schemes

Author (s): Hadi T. Ziboon and Ahmed A. Thabit

Abstract: The frequency spectrum of the electromagnetic radio is crowded day by day due to the expansion in wireless devices and applications. It has been additionally found that the allocated spectrum is underutilized as a result of the static portion of the spectrum. Cognitive radio (CR) allows for usage of licensed frequency bands by unlicensed users. These unlicensed users need to monitor the spectrum continuously to avoid possible interference with the licensed users. Spectrum usage regulations not permitting unlicensed users to authorized in a licensed spectrum. It has been seen that the whole licensed spectrum is not used at all places constantly. An unlicensed user can exploit advantage of such a situation to communicate thereby increasing spectrum efficiency. This is the fundamental thought behind Cognitive Radio. Demand for spectrum is expected to increasing rapidly and it would get in future. As more and more technologies are moving towards fully wireless, demand for spectrum is enhancing. In this paper, a proposed adaptive CR detection system is designed based on statistical features using neural network (multi layer perceptron) for intermediate frequency stage. Matlab simulation program is used to obtain the results. In order to evaluate the performance of the proposed CR detection systems, different modulated digital signals (2FSK, 4FSK, BPSK, QPSK, 8PSK, 4QAM, 16QAM, 64QAM and 256QAM) are generated at low SNR values. Multilayer perceptron is better than single layer due to their speed and nonlinearity solving problem. This is clearly seen in the obtained results such as Pd =100% for Pf=0.1 at SNR= -16dB, also Pd=90% at SNR= -40 dB and 95% at SNR= - 24dB with sensing time ?10? ^(-4) sec at AWGN noisy channel.

Full Text

Title: Identification of black spot and equivalent accident number using Upper Control Limit method

Author (s): Gito Sugiyanto, Ari Fadli and Mina Yumei Santi

Abstract: Traffic accident is one of the serious problems faced by the Indonesian Government. The traffic accident rate in Indonesia is still considerably high. In 2014, 28,297 people died in traffic accidents, 26,840 people serious-injury and 109,741 people slight-injury. The aim of this research is to identify black spot location and equivalent accident number using Upper Control Limit (UCL) method. The study location is in Purbalingga, Central Java, Indonesia. Database of traffic accidents from January 2010 to December 2013 were obtained from Purbalingga Police. The results showed that the equivalent accident number for death victims or fatality is 10, a serious injury is 4.25, a slight injury is 2.33, and property damaged only is 1. Seven roads have weighted accident number value greater than the upper control limit value and identified as a black spot location. Black spot location in Purbalingga district are Jln. Raya turut Desa Bojongsari, Jln. Raya turut Desa Jetis, Jln. Raya Bayeman, Desa Tlahab Lor; Jln. Raya Mayjend. Sungkono, Blater; Jln. Raya turut Desa Penaruban; Jln. Raya turut Desa Kembangan and Jln. Raya turut Desa Gembong.

Full Text

Title: Routing discovery scheme for high mobility in MANET

Author (s): Haider Alani and Raed Alsaqour

Abstract: Mobile Ad-hoc Network (MANET) is an important technology that is widely used in many applications. Routing discovery and route maintenance are important issues in MANET. Broadcasting is used in a MANET to discover a route in on-demand routing protocols. Establishment and regular maintenance of a route represent the challenges issue. Therefore, nodes require to broadcast control packets among themselves. This situation leads to broadcast storm problem, which increases overhead of control packets and decreases the performance of the network. In this paper, the Ad-hoc On-demand Distance Victor (AODV) routing protocol is used for implementing the propose scheme, namely AODV-Packet Timing Information (PTI), to reduce the unnecessary control packets for discovery routing. In addition, the proposed AODV-PTI scheme reduced the network overhead. Network Simulation version 2.35 (NS2.35) was used to compare the proposed scheme with AODV routing protocol in terms end-to-end delay, average throughput, packet delivery ratio, and packet overhead ratio.

Full Text

Title: Power speed reduction units for general aviation part 2: General design, optimum bearing selection for propeller driven aircrafts with piston engines

Author (s): Luca Piancastelli and Stefano Cassani

Abstract: The power speed reduction unit (PSRU) is the device that is loaded by the generating unit and the thrusters. Propeller induced, gyroscopic and inertia loads are extremely important for PRSU bearing selection and life evaluation. Engine powers become easily a secondary factor for bearings and housing design. For this reason, it is important to select the best bearing assembly for the specific application with the required propeller. After a general discussion about PRSU and housing design, a very simplified method for bearing life calculation is introduced in this paper. It is based on similar, proven and extremely successful design of existing PRSUs. This method compares the life of this design with the new one. Aerobatics and general aviation loads are also compared. This paper demonstrates that the selection of a CFRP fixed pitch propeller for aerobatics keeps the load approximately to the same level of a general aviation aircraft. This is true in the case of plywood-reinforced off-the-shelf propeller for the general aviation load history. Aluminum alloy propellers are to be discarded for aerobatic use [1-2].

Full Text

Title: Semantic search using Latent Semantic Indexing and Word Net

Author (s): Anita R., Subalalitha C. N., Abhilash Dorle and Karthick Venkatesh

Abstract: Semantic Search and Information Retrieval forms an integral part of various Search Engines in use. Famous search engines such as, Yahoo, Google, Lycos etc. use the concept of semantic search, where the only comparator for the objects under study is semantic similarity between the objects. The general method involves document-to-document similarity search. This sort of search involves the sequential search of documents one after the other, which involves

numerous noise effects. An efficient way of improving this technique is the Latent Semantic Indexing (LSI). LSI maps the words under study on a conceptual space. The conceptual space depends on the queries and the document collection. It uses a mathematical function to figure out the similarity between the words, something called as Singular Value Decomposition. It utilizes the words under study and the ones that are being compared and produces appropriate results. The results obtained are free of semantics like synonymy, polysemy etc. Integrating Word Net, a large lexical database of English language is an efficient way to increase the search result. The word under consideration is linked to the application and the semantic similarities of the word are found out. Documents similar to these similarities are then indexed and listed. The proposed model is tested with standard set of Forum for Information Retrieval (FIRE) documents and a comparison with the term based search has been done.

Full Text

Title: An efficient revocation scheme for stateless receiver with less encryption and less key storage

Author (s): Abdullah Rashed and Samir Hammami

Abstract: In the revocation scheme for stateless receivers, the center delivers information securely to the authorized users over a public channel, where the receivers do not update their state from session to session. This paper presents a view of multimedia Conditional Access Systems (CAS) one-way broadcasting and suggests a new approach. The proposed approach is an efficient revocation scheme for stateless receivers. It reduces the number of private keys used in traditional CAS and number of encryptions as it does not need to encrypt the ciphering keys. Furthermore, the presented approach eliminates the proposed key refreshment presented in (Zhang, Yang, Liu, Tian, 2009) and (Koo, Kwon, & Kim, 2005). The researchers applied the proposed system using AES algorithm. A numerical example is used to demonstrate the effectiveness of the presented approach.

Full Text

Title: Numerical analysis on the performance of a compact scroll compressor with vapor injection

Author (s): S. W. Jang and Y. L. Lee

Abstract: Applying vapor injection to refrigeration compressors may improve the heating capacity and COP. However, a small scroll compressor may not be commercialized due to the increase of the internal leakage and the production costs. In this study, a compact scroll compressor was considered to apply vapor injection for the improvement of the cycle efficiency. To this end, the performance of the compressor was numerically analyzed with vapor injection. The results show that vapor injection is still applicable to relatively small refrigerant compressors resulting in increased cooling capacity and COP.

Full Text

Title: A 0.5V low power single stage folded cascode amplifier for bio-signals

Author (s): D. Hari Priya, A. S. C. S. Sastry and K. S. Rao

Abstract: Long term monitoring and measurement of bio signals requires new techniques that promise light weight devices consuming low power and are maintenance free. The basic block in processing analog signal happens to be operational trans-conductance amplifier (OTA) and the design of sub-threshold OTA for low voltage low frequency applications consuming less power is proposed. With an operating voltage of 0.5V the gain achieved is 58dB and CMRR of 88.5dB. The input referred noise is measured as 1.159μV and the power consumption has 620nW. The circuit was implemented in 0.18μm technology using Cadence tool.

Full Text

Title: Analyze of pilot reuse with achievable sum rate for massive MIMO cellular uplink

Author (s): A. Salh, L. Audah, N. S. M. Shah and S. A. Hamzah

Abstract: The last ten years have seen important developments of massive multi-input multi-output (MIMO) in wireless communication. Massive MIMO has currently been presented in the 5G wireless standards. The number of terminals is increasing with additional appliances. At the same time, high transmission sum rates and communication reliability are required. Moreover, the multi-cell MMSE scheme, which includes an uplink MMSE and MRT precoder. Furthermore, this paper focuses how the MMSE activities all obtainable pilots for interference suppression. Specifically, this paper investigates the spectral efficiency of the massive MIMO, pilot contamination, which MMSE exploits all available pilots for interference suppression, and estimated locally at every BS, to actively suppress both intra-cell and inter-cell interference. Consequently, the average sum rate is proportional with SINR, using the linear scheme all of MMSE, ZF and optimal MMSE, while the sum rate is reverse proportional with linear precoding MRT. Then, when the number of base stations increases, the linear schemes MMSE, ZF and optimal MMSE have more convergence, while when the number of BS decreases the linear precoding schemes only have convergence except for MRT. However, at high SNR a higher number of antennas achieve better than a low number of antennas.

Full Text

Title: Airport classification based on freight ratio and Federal Aviation Administration (Case study in Indonesia)

Author (s): Gito Sugiyanto, Purwanto Bekti Santosa, Aris Wibowo and Mina Yumei Santi

Abstract: There are seven airports in Indonesia with production of cargo very high i.e.: Soekarno-Hatta Airport, Sentani Airport, Sultan Hasanuddin Airport, Kuala Namu Airport, Hang Nadim Airport, Juanda Airport, and Sultan Aji Muhammad Sulaiman Sepinggan Airport. The airfreight distribution in Indonesia spread unevenly. The solutions for freight shipments problem is evaluate the hub and spoke airport networks. The flight route in Indonesia has not been fully developed in accordance with the concept of hubs and spokes. The aim of this paper is to analysis the hub and spoke airport in Indonesia based on freight ratio and percentage of annual passenger boarding and cargo volume according to Federal Aviation Administration. The freight ratio value for domestic flight from thirty-four airports 0.443 to 75.564 kg per passenger. Sentani Airport in Jayapura has the highest of freight ratio value and the category as a freight interest airport or cargo interest. The freight ratio value for international flight from nineteen airports 0.182 to 48.306 kg per passenger. Sultan Aji Muhammad Sulaiman (Sepinggan) International Airport in Balikpapan, East Kalimantan has the

passenger. Sultan Aji Muhammad Sulaiman (Sepinggan) International Airport in Balikpapan, East Kalimantan has the highest of freight ratio value and the category as a freight interest airport or cargo interest. Total of cargo production for domestic flight is 754,422,165 kg. The percentage of cargo production for domestic flight from thirty-four airports in Indonesia is 0.003% to 38.229%. Total of cargo production for international flight is 370,240,491 kg. The percentage of cargo production for international flight is 0.002% to 88.162%. Soekarno-Hatta International Airport has the highest of percentage of cargo production. The percentage of cargo volume in Soekarno-Hatta International Airport is 38.229% for domestic flight and 88.162% for international flight.

Full Text

Title: Content based image classification and retrieval using Visual bag of Features and adaboost algorithm

Author (s): Parthiban S. and Srinivasa Raghavan S.

Abstract: This paper proposes the content based classification and retrieval of images using Visual bag of Features and adaboost classifier. The Visual bag of Features has been extracted from the input images and then the visual bag of features is classified using the adaboost classifier algorithm. The proposed algorithm greatly reduces the Storage cost and efficient search using the inverted data structure. The efficiency of the proposed algorithm is tested with Mean Opinion Score (MOS).

Full Text

Title: Image retrieval based on hybrid features

Author (s): Talluri Sunil Kumar, V. Vijaya Kumar and B. Eswara Reddy

Abstract: The present paper put forward efficient content-based image retrieval (CBIR) system by extracting structural, texture and local features from images. The local features are extracted from local directional pattern (LDP). The LDP produces a steady local edge response in the presence of noise, illumination changes. The LDP coded image is converted in to a ternary pattern image based on a threshold. The structural features are derived by extracting textons on the "local directional ternary pattern (LDTP") image. The texture features are derived by constructing grey level co-occurrence matrix (GLCM) on the derived texton image. Image retrieval results on various data base images based on various classifiers have proved the discrimination power of the proposed method over existing methods.

Full Text

Title: Automatic data processing system of renewable electric power prices in end-use residential sector of USA

Author (s): Maleeva E. A., Moshenets M. K. and Kritski O. L.

Abstract: We propose a computer-based automatic system of electric power prices processing and finding an optimal price level for renewable electric energy produced in USA. We implement classical Markowitz portfolio theory to electric energy prices in all regions of USA. For given margin volatility we find shares of electric power that should be bought in different US regions for making K.W.H. as cheap as possible for US residents.

Full Text

Title: Power Speed Reduction units for general aviation part 5: Housing/casing optimized design for propeller-driven aircrafts and helicopters

Author (s): Luca Piancastelli and Stefano Cassani

Abstract: The purpose of this paper is to focus on the design of casings for aircrafts and helicopters PSRU (Power Speed Reduction Unit). This paper introduces a rigorous and practical design procedure for gearboxes. The work starts from the experience of the Authors in Formula 1 and Aircraft gearboxes. For certification, safety and durability reasons, aircraft and helicopter gearboxes did not have the same development rate of the Formula 1 counterparts. A brief history of Formula 1 PRSU/gearboxes forms the first part of this paper. This part includes also an introduction to material and manufacturing technologies. Then the modal analysis of the gearbox is discussed, along with the influence of tolerances and operating temperatures. Then cooling is briefly introduced. The gear train is focus of the PSRU. Proper gear meshing in any load and environmental condition is the main requirement of the PSRU. Unfortunately gears and transmissions are the source of many forcing time-varying forces that act on the housing. This forces not only vary with tolerances, temperatures and loads, but also with wear. Therefore, a comparison of the natural frequency of the housing, the torsional critical speed of rotor system and the flexural critical speeds of each of the shafts with the exciting frequency clearly may be used to qualify the gearbox housing. A finite element modelling of the gearbox housing can be carried out to obtain its natural frequency, stress distribution and forced response. Unfortunately, the excitation frequencies vary with tolerances and operating conditions. Furthermore, in aircraft PRSUs, it is common practice to vary the transmission ratio (and the gears) in the same housing. Therefore, the housing should dampen a fairly large number of exciting frequencies. This result is obtained by curved surfaces, ribbing and double walling. This approach also reduces the noise produced by the transmission. In fact, noise radiated by a gearbox is directly related to the vibratory level of its housing. Therefore, an additional aim of this study is to analyze the transfer mechanisms between the static transmission error of a gear pair and the dynamic responses of gear and housing of a gearbox. Aerospace and Formula 1 transmissions have many similarities, with Aerospace engineers working on both sides and importing solution. The great advantage of Formula 1 gearboxes was (until the unlucky Regulations of 2010) that it was extremely easy to make experiments. This is due to the fact that all Formula 1 cars are prototypes with test pilots on board. Therefore, this paper will take advantage of the knowledge achieved in Formula 1 to transfer these data to aerospace PSRU and transmissions [1-2].

Full Text

Title: Rheological model parameters for bentonite drilling mud treated with local cassava starch

Author (s): Harry T. F., Joel O. F., Ademiluyi F. T. and Oduola K.

Abstract: Rheological model parameters were determined for bentonite muds treated with two local cassava starches (TMS 98/0581 and M98/0068) and an imported starch. The parameters were that of Power Law, Casson and Herschel-Bulkley models which predict the shear stress - shear strain rate relationships. Physicochemical properties were determined for

the starches. Herschel-Bulkley model provided the best correlation with experimental data, while Casson model was next. Correlation between Casson and Herschel models yield stresses was good. The yield stress was found to increase with increase in temperature and behaved differently with the starches. It was found to be highest at 1.0 percent M98/0068 starch concentration in the bentonite mud system. However, the yield stress did not differ significantly for the mud system with TMS 98/0581 starch concentrations. For the imported starch, the yield stress was highest at 2.0 percent concentration at 80oF and 120oF, while it was highest at 0.5 percent at 150oF and 190oF. The yield stresses ranged between 3 and 30 Pa for the bentonite starch mud systems investigated. The model parameters predicted the shear stress - shear rate relationships for bentonite-local polymer drilling mud system and supported the utilization of the local cassava starches as drilling fluid additives.

Full Text

Title: A SWOT analysis tool for Indonesian small and medium enterprise

Author (s): Husni Thamrin, Rahmandani Herlambang, Bella Brylian, Aldino K. A. Gumawang and Agus Makmum

Abstract: Small and medium enterprises (SMEs) play important role in the growth and stabilization of Indonesian economy. SMEs face many challenges that affect their growth and existence. However, they rarely adopt strategic management planning such as SWOT analysis that considers the external environment for opportunities and threats and internal conditions for strengths and weaknesses. SME operators are somewhat aware of the factors but many have limited understanding of how to employ the analysis. In this work, we develop "Sparta", a SWOT analysis tool that is easy to operate by novice users. The tool has many features. A user needs only to input profile data and answer a set of questionnaire. From the answers, Sparta calculates strength and competitive posture, maps many aspects of SMEs condition into S, W, O and T categories and provides general strategies. Sparta helps doing the 8 steps of a normal

SWOT analysis session so that they can be executed in approximately 15 minutes, compared to hours when doing them manually.

Full Text

Title: Identification and quantification of anthocyanins in muscadine grapes by HPLC and HPLC-MS

Author (s): Eduardo Pastrana-Bonilla and Casimir C. Akoh

Abstract: Total anthocyanin content and individual anthocyanin profile of ten cultivars of muscadine grapes were assessed. Total anthocyanin content was determined by a pH differential method. Individual anthocyanins were analyzed by HPLC and their identity confirmed by HPLC-MS. The total anthocyanin content and the sum of the individual anthocyanins had a high correlation (R = 0.98). The average anthocyanin content of muscadine grapes was lower than published values for red European and other American red grapes. However, the purple muscadine grapes have anthocyanins levels that may be considered important from the nutraceutical point of view.

Full Text

Title: SINR performance by combining Fractional Frequency Reuse and Dynamic Power Control methods based on simulation model

Author (s): Mastura Rosdi, Azita Laily Yusof, Norsuzila Ya'acob and Darmawaty Mohd. Ali

Abstract: In order to cope with the increase in demand for stable and high data rates among mobile users, femtocell or called as Home Evolve Node B (HeNB) has been developed to improve indoor capacity and coverage. Femtocell is a small base station aims for indoor usage such as at home or enterprise. The femtocell transmits a cellular signal that is received by mobile users then backhauled through the user's wired broadband connection. It is very user deployed so it reduces operations cost for mobile operators, and at the same time provide a high user experiences to users. However, femtocell deployments caused interference between femtocells itself and also to the existing macrocells. This paper analyzed the interference management which are combining of Fractional Frequency Reuse (FFR) and Dynamic Power Control (DPC) methods by looking on the Signal to Interference plus Noise Ratio (SINR) performance based on the proposed fraction of cell radius (rth), fraction of system bandwidth (ß) and path loss compensation factor (a) value in our previous papers. The proposed rth, ß and a are then used in the simulation model in order to analyzed the SINR performance between the proposed method and the conventional method. The simulation results showed that the proposed method gives the higher values of SINR and show that there is a significant reducing of interference occurrence compared to the conventional method.

Full Text

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IDENTIFICATION OF BLACK SPOT AND EQUIVALENT ACCIDENT NUMBER USING UPPER CONTROL LIMIT METHOD

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ABSTRACT

Traffic accident is one of the serious problems faced by the Indonesian Government. The traffic accident rate in Indonesia is still considerably high. In 2014, 28,297 people died in road traffic accidents, 26,840 people severe injury and 109,741 people minor injury. The aim of this research is to identify black spot location and equivalent accident number using Upper Control Limit (UCL) method. The study location is in Purbalingga, Central Java, Indonesia. Database of traffic accidents from January 2010 to December 2013 were obtained from Purbalingga Police. The results showed that the equivalent accident number for death victims or fatality is 10, a severe injury is 4.25, a minor injury is 2.33, and property damaged only is 1. Seven roads have weighted accident number value greater than the upper control limit value and identified as a black spot location. Black spot location in Purbalingga regency are Jln. Raya turut Desa Bojongsari, Jln. Raya turut Desa Jetis, Jln. Raya Bayeman, Desa Tlahab Lor; Mayjend. Sungkono Street, Blater; Jln. Raya turut Desa Penaruban; Jln. Raya turut Desa Kembangan and Jln. Raya turut Desa Gembong.

Keywords: black spot, equivalent accident number, traffic accident, road safety, upper control limit.

INTRODUCTION

Traffic injury severity is an important safety concern of the transportation system. Traffic accident is one of the serious problems faced by the Indonesian Government. Data from the Police Department shows that 28,297 people died in traffic accidents, 26,840 people suffered severe injury, and 109,741 people suffered minor injury in 2014 [1]. The traffic accident rate in Indonesia is still considerably high, as reported by the national police, with around 262 accident casualties per day in 2014. To estimate the economic cost of traffic accidents, availability of traffic accident data will be necessary. Obtaining the kind of data that could properly represent the impact of traffic accidents on national economic indicators is far from easy. Traffic accident cost is one of the externality costs which are forgotten by road users [2]. According to a national police report, the total loss resulting from accidents was IDR 41 billion in 2002 [3].

The majority cause of the accident in Indonesia was male and the majority of vehicles are motorcycles. The highest accident causal is the human error factor [4]. Global Road Safety Partnership (GRSP) is a partnership between business, civil society, and government dedicated to the sustainable reduction of death and injury on the roads in developing and transition countries. The aim is to increase awareness of road safety [5]. The World report on road traffic injury prevention, launched jointly in 2004 by the World Health Organization(WHO) and the World Bank, identified improvements in road safety management that have dramatically decreased road traffic deaths and injuries in industrialized countries that have been active in road safety. The report showed that the use of seat belts, helmets and child restraints has saved thousands of lives. The introduction and enforcement of appropriate speed limits, the creation of safer infrastructure, the enforcement of blood alcohol concentration limits and improvements in vehicle safety, are all interventions that have been tested and repeatedly shown to be effective [5]. One of the alternatives to reduce the accident cost is identification of black spot location [6].

Traffic accident locations have an effect on the severity of accidents. Abdel-Aty distinguishes between different locations looking at roadway segments, intersections, and toll stations [7]. Study about the differences between accidents in rural and urban areas when trucks are involved and find significant differences for the two areas was done by [8]. Manner and Wünsch-Ziegler stated that accidents during daylight and at interchanges or construction sites are less severe. Accidents caused by the collision with roadside objects, involving pedestrians and motorcycles, or caused by bad sight conditions tend to be more severe [9].

Factors influencing the accident frequency may sometimes be different from the ones influencing the severity and it may therefore be reasonable to analyse the two separately. For example, guardrails have been found to affect the severity but not the frequency of accidents [10]. Study about accident severities when motorcycles are involved was done by[11, 12].

Accident costs can be reduced by reducing accident frequency and reducing injury severity. Primary safety measures reduce accident frequency e.g. improved road geometry, determination of speed limit, installation of signs and road markings, and relocation of poles [13]. There are four basic strategies for accident reduction using countermeasures. These are [14]:

a) Single site (black spot programs)-the treatment of specific types of accident at a single location.

b) Mass action plans-the application of a known remedy to locations with a common accident problem.

c) Route action plans-tile application of known remedies along a route with a high accident rate.

d) Area with schemes-the applications of various treatments over a wide area of town/city, i.e. including traffic management and traffic calming (speed reducing devices).

The aim of traffic accident analysis is to identify factors that can be influenced by policymakers in order to reduce the frequency and severity of accidents or to study the effectiveness of certain measures. Kim, *et al*. empirically show that speed limits can have large effects on accidents involving cars and bicycles finding a threshold effect for the speed of 32.2 km/h. [15] Lee and Mannering analyse the effect that roadside conditions have on the frequency and severity of accidents. They note that the marginal effect of these factors is computed to provide an indication of the effectiveness of potential countermeasures [16].The effectiveness of ice warning signals on accidents caused by icy conditions is rejected by [17].

Based on Law 22, 2009 (Traffic and Land Transport), traffic accident is classified in three categories, fatal accidents, severe accidents, and slightly or minor accidents [18]. The severity of accidents should be taken into account, as accidents with fatal and severe injuries are more costly in both social and economic terms. If sufficient research has been carried out to identify the costs of accidents of different types and with different severity, then they can be weighted relative to their cost. Thus, if a fatal sideswipe accident costs a society 20 times more than a similar slight/minor injury accident, then it can be counted as 20 accident units. Using weightings, however, has the disadvantage that a few, random fatal accidents can sometimes dominate the selection. Alternatively, if such cost information is not available, qualitative weighting can be applied. For example, in South Korea and in Trinidad and Tobago, the Equivalent Accident Numbers (EAN) used for initial ranking purposes are 12 for a fatal; 3 for an injury accident and 1 for a damage-only accident. An EAN score can thus be awarded to each site, based on the sum of EAN values [14].

The aim of this study is to analysis the black spot location and equivalent accident number using Upper Control Limit (UCL) method. The study location is in Purbalingga Regency, Central Java, Indonesia.

LITERATURE REVIEW

Equivalent accident number (EAN)

Equivalent accident number is numbers that are used to grade the weighting accident; this value is based on the value of an accident with damage or loss of material [19]. EAN is a numeric economic scale to weigh the degree of accidents. It is calculated by comparing the estimated economic loss caused by various degrees of accident, namely death victims or fatality (FAT), serious injuries or severe injury (SVI), slight or minor injuries (MNI), or property damaged only (PDO). Technique of identifying the ranking of crash site is carried out by determining the Weighted Accident Number (WAN). There are several types or degrees of accident based on the victim severities so the accident number needs to be weighted by equivalent accident number to become WAN. The ranking by weighting the accident rates using a conversion cost of accidents.

a) Using a comparison of the monetary value of the costs of accidents, shown in equation 1.

$$M : B : R : K = M/K : B/K : R/K : 1 \quad (1)$$

With:
M is meninggal dunia or fatality (FAT).
B is luka berat or severe injured (SVI).
R is luka ringan or minor injured (MNI).
K is kerugian materi or property damage only (PDO).

b) Using the equivalent accidents number with the weighting system, which refers to the cost of the accident: M: B: R: K=12: 3: 3: 1, shown in equation 2 [19].

$$WAN = 12xFAT + 3xSVI + 3xMNI + 1xPDO \quad (2)$$

Weighted Accident Number is calculated by counting the accidents at every kilometre long road then multiplied by the weight value or Equivalent Accident Number (EAN) according to the severity. Weightage accident number are 12 for death victims or fatality (FAT), 6 for a severe injury (SVI), 3 for minor injuries (MNI) and 1 for property damaged only (PDO). The formula of equivalent accident number based on Directorate General of Land Transportation is shown in equation 3 below [20].

$$WAN = 12xFAT + 6xSVI + 3xMNI + 1xPDO \quad (3)$$

Weighting accident number with Accident Point Weightage (APW) method, within the guidelines of Operation Accident Black spots Investigation Unit (ABIU)-Traffic Accident Research 2007. Weightage accident number for death victims or fatality (FAT) is 6, a severe injury (SVI) is 3, minor injuries (MNI) is 0.8, and property damaged only (PDO) is 0.2, shown in equation 4 [21].

$$WAN = 6xFAT + 3xSVI + 0.8xMNI + 0.2xPDO \quad (4)$$

There are several EAN values suggested as shown in Table-1. Using the rationalized average value of EAN shown in Table-1 below:

Table-1. Equivalent accident number in Indonesia.

Degree of accident	Puslitbang jalan	Ditjen hubdat	Polri	ABIU-UPK	Average value
	(1)	(2)	(3)	(4)	(5)=(1+2+3 +4)/(4)
Fatality (FAT)	12	12	10	6	10
Severe injury (SVI)	3	6	5	3	4.25
Minor injury (MNI)	3	3	1	0.8	2.33
PDO	1	1	1	0.2	1

Source:
(1) Puslitbang Jalan or Institute of Road Engineering Ministry of Public Works and Housing, 2005 [19]
(2) Direktorat Jenderal Perhubungan Darat or Directorate General of Land Transportation in [20]
(3) Korps Lalu Lintas Kepolisian Republik Indonesia, Indonesian National Police in [22].
(4) Accident Black spots Investigation Unit (ABIU)-Traffic Accident Research, 2007 [21]

UPPER CONTROL LIMIT (UCL)

According to the Guidelines for Handling Accident Prone Area (Pd. T-09-2004-B) in [19], the accident-prone location determination using statistical quality control chart Upper Control Limit (UCL), shown in equation 5.

$$UCL = \lambda + \Psi \times \sqrt{\left(\frac{\lambda}{m} + \frac{0.829}{m} + \left(\frac{1}{2}xm\right)\right)} \quad (5)$$

Where:
λ = score of average accident.
Ψ = probability factor = 2.576
m = score accidents in each segment.

Segment of roads with accident rate is above the UCL is defined as an accident-prone locations. Probability factor (Ψ) value is determined by the probability, which the accident rate is large enough so that this accident cannot be regarded as random events [23]. Probability factor (Ψ) value as shown in Table-2 below. The most commonly used value of Ψ is 2.576 with a probability of 0.005 (or significance 99.5%) and 1.645 with probability 0.05 (or 95% significance).

Table-2. Probability factor values.

Probability	0.005	0.0075	0.05	0.075	0.10
Ψ	2.576	1.960	1.645	1.440	1.282

METHOD

The study location

The study location is in Purbalingga Regency, Central Java Province, Indonesia. The locations of study are arterial road and collector road. Traffic accident data from Purbalingga Police atJanuary 2010 to December 2013 [24].

Analysis approach

To perform the analysis of the accident-prone points (black spot) is required historical data of accidents for four years (2010-2013). In processing, the accident data classified per segment for the next black spot area is determined based on the road. Upper Control Limit (UCL) method will be used to determine the location of the black spot. A segment will be identified as the location of the critical points of the road when the accident occurred UCL line that crosses the line.

Six steps being taken in the UCL method is as follows:

a) Make a tabulation of accidents for each road based on severity i.e. death victim or fatality, severe injury, minor injury, and property damaged only.

b) Calculate the total of weighted accident number (WAN) for each road or score accidents in each segment (m) and total of WAN for all roads.

c) Calculate the average of equivalent accident number or score of average accident (λ).

d) Calculate the value UCL for each road using equation 5 with probability factor (Ψ) is 2.576.

e) Make an Upper Control Limit (UCL) chart

UCL chart is a graph that shows the combination of charts score accidents in each segment (m) and UCL value. UCL value will be the boundary line in the identification of black spots.

f) Determination of the location of black spot

From the UCL chart has been created, it can be determined the location of the accident-prone. A segment is referred as the location of the black spot where the accident rate in this segment is over the UCL line.

RESULT AND DISCUSSIONS

Traffic accident in Purbalingga

Based on the analysis of traffic accident data from Purbalingga Police during 2010-2013 occurred 1,336 accidents with the fatality of casualties is 183 fatal (27 in 2010, 23 in 2011, 42 in 2012 and 91 in 2013). Traffic accident in Jln. Raya turut Desa Bojongsari, Purbalingga from January 2010-December 2013 is 29 with number of victims is death victims or fatality (FAT) is 5 and minor injury (MNI) is 54. Traffic accident and number of victims in 23 arterial road and collector road in Purbalingga Regency is shown in Table-3.

Table-3. Traffic accident and number of victims in Purbalingga.

No.	Name of road and location	No. of accident	No. of victims			
			FAT	SVI	MNI	PDO
1.	Jln. Raya turut Desa Bojongsari, Purbalingga	29	5	0	54	0
2.	Jln. Raya turut Desa Jetis, Kemangkon	19	7	1	43	1
3.	Jln. Raya Bayeman, Desa Tlahab Lor, Karangreja	12	4	1	47	2
4.	Jln. Raya Mayjend. Sungkono, Blater, Kalimanah	17	2	0	40	1
5.	Jln. Raya turut Desa Penaruban, Kec. Bukateja	14	5	1	19	0
6.	Jln. Raya turut Desa Kembangan, Kec. Bukateja	14	3	0	28	0
7.	Jln. Raya turut Desa Gembong, Kec. Bojongsari	15	1	0	34	0
8.	Jln. Raya turut Desa Panican, Kec. Kemangkon	11	3	0	23	0
9.	Jln. Raya turut Desa Penolih, Kec. Kaligondang	7	6	0	7	0
10.	Jln. Raya turut Desa Sinduraja, Kec. Kaligondang	9	4	1	13	0
11.	Jln. Raya turut Kel. Bojong, Purbalingga	13	3	0	19	0
12.	Jln. Raya turut Desa Karangduren, Kec. Bobotsari	9	2	0	21	0
13.	Jln. Raya turut Desa Gandasuli, Kec. Bobotsari	12	1	0	25	0
14.	Jln. Raya turut Desa Toyareka, Kec. Kemangkon	6	4	0	12	0
15.	Jln. Raya turut Desa Kalitinggar, Kec. Padamara	7	2	0	20	0
16.	Jln. Raya turut Desa Banjarsari, Kec. Bobotsari	9	3	0	14	0
17.	Jln. Raya turut Desa Selaganggeng, Kec. Mrebet	9	2	1	15	0
18.	Jln. Raya turut Desa Gumiwang, Kec. Kejobong	7	2	0	13	0
19.	Jln. Raya turut Pagutan Desa Bojongsari	5	2	0	9	0
20.	Jln. Raya turut Desa Klapasawit, Kec. Kalimanah	6	1	0	13	0
21.	Jln. Raya turut Desa Kutasari, Purbalingga	4	2	0	5	0
22.	Jln. Raya turut Desa Panunggalan, Kec. Pengadegan	2	2	0	3	0
23.	Jln. Raya turut Desa Brobot, Kec. Bojongsari	1	2	0	0	0
	Total	189	56	4	380	3

EQUIVALENT ACCIDENT NUMBER (EAN)

Weighted accident number in this study using the average value from four equivalent accident numbers in Indonesia. Equivalent accident number for death victims or fatality (FAT) is 10, a severe injury (SVI) is 4.25, a minor injury (MNI) is 2.33, and property damaged only (PDO) is 1, shown in equation 6.

$$WAN=10xFAT + 4.25xSVI + 2.33xMNI + 1xPDO \quad (6)$$

Weighted accident number is the sum of the value of the weighting of each road. An example of the calculation of weighted accident number in Jln. Raya turut Desa Bojongsari, Purbalingga with death victims is 5, serious injuries is 0 and slight injuries is 54. The weighted accident number is calculated as follows:

WAN = 10xFAT + 4.25xSVI + 2.33xMNI + 1xPDO
WAN = (10*5) + (4.25*0) + (2.33*54) + 1x0
WAN = 175.82.

The weighted accident number for Jln. Raya turut Desa Bojongsari, Purbalingga is 175.82. The weighted accident number for 23 roads in Purbalingga is shown in Table-4. After the total WAN value calculation is obtained, then be calculated to obtain the average value of the accident. Average value accident is the results of calculation of the amount of total WAN divided by the number of arterial and collector roads. The average value accident (λ) is 71.34.

Black spot analysis using UCL

Black spot analysis using upper control limit is done to determine the limits of the vulnerability of road accidents in each segment. Each road has a limit level of vulnerability of different accidents. This calculation is a reference to determine the accident-prone roads or black spot in Purbalingga regency. An example of the calculation of upper control limit value on Jln. Raya turut Desa Bojongsari, Purbalingga with the data score of average accident (λ) is 71.34, probability factor (Ψ) is 2.576, and weighted accident number (m) is 175.82. Upper control limit value in Jln. Raya turut Desa Bojongsari is 95.55. A road segment is referred as the location of the black spot where the accident rate in this segment or weighted accident number is over the UCL value. The upper control limit value for 23 roads in Purbalingga regencyis shown in Table-4 below. Chart of upper control limit and weighted accident value in 23 roads in Purbalingga is shown in Figure-1.

Table-4. Weighted accident number and upper control limit.

No.	Name of road	Weighted accident number				Total of WAN	UCL
		10*FAT	4.25*SVI	2.33*MNI	1*PDO		
1.	Jln. Raya turut Desa Bojongsari, Purbalingga	50	0	125.82	0	175.82	95.550
2.	Jln. Raya turut Desa Jetis, Kemangkon	70	4.25	100.19	1	175.44	95.524
3.	Jln. Raya Bayeman, Desa Tlahab Lor, Karangreja	40	4.25	109.51	2	155.76	94.142
4.	Jln. Raya Mayjend. Sungkono, Blater, Kalimanah	20	0	93.2	1	114.2	90.914
5.	Jln. Raya turut Desa Penaruban, Kec. Bukateja	50	4.25	44.27	0	98.52	89.555
6.	Jln. Raya turut Desa Kembangan, Kec. Bukateja	30	0	65.24	0	95.24	89.258
7.	Jln. Raya turut Desa Gembong, Kec. Bojongsari	10	0	79.22	0	89.22	88.701
8.	Jln. Raya turut Desa Panican, Kec. Kemangkon	30	0	53.59	0	83.59	88.166
9.	Jln. Raya turut Desa Penolih, Kec. Kaligondang	60	0	16.31	0	76.31	87.449
10.	Jln. Raya turut Desa Sinduraja, Kec. Kaligondang	40	4.25	30.29	0	74.54	87.270
11.	Jln. Raya turut Kel. Bojong, Purbalingga	30	0	44.27	0	74.27	87.243
12.	Jln. Raya turut Desa Karangduren, Kec. Bobotsari	20	0	48.93	0	68.93	86.692
13.	Jln. Raya turut Desa Gandasuli, Kec. Bobotsari	10	0	58.25	0	68.25	86.620
14.	Jln. Raya turut Desa Toyareka, Kec. Kemangkon	40	0	27.96	0	67.96	86.590
15.	Jln. Raya turut Desa Kalitinggar, Kec. Padamara	20	0	46.6	0	66.6	86.446
16.	Jln. Raya turut Desa Banjarsari, Kec. Bobotsari	30	0	32.62	0	62.62	86.018
17.	Jln. Raya turut Desa Selaganggeng, Kec. Mrebet	20	4.25	34.95	0	59.2	85.642
18.	Jln. Raya turut Desa Gumiwang, Kec. Kejobong	20	0	30.29	0	50.29	84.622
19.	Jln. Raya turut Pagutan Desa Bojongsari	20	0	20.97	0	40.97	83.491
20.	Jln. Raya turut Desa Klapasawit, Kec. Kalimanah	10	0	30.29	0	40.29	83.406
21.	Jln. Raya turut Desa Kutasari, Purbalingga	20	0	11.65	0	31.65	82.302
22.	Jln. Raya turut Desa Panunggalan, Kec.Pengadegan	20	0	6.99	0	26.99	81.699
23.	Jln. Raya turut Desa Brobot, Kec. Bojongsari	20	0	0	0	20	80.844
	Total	560	17	885.4	3	1640.84	

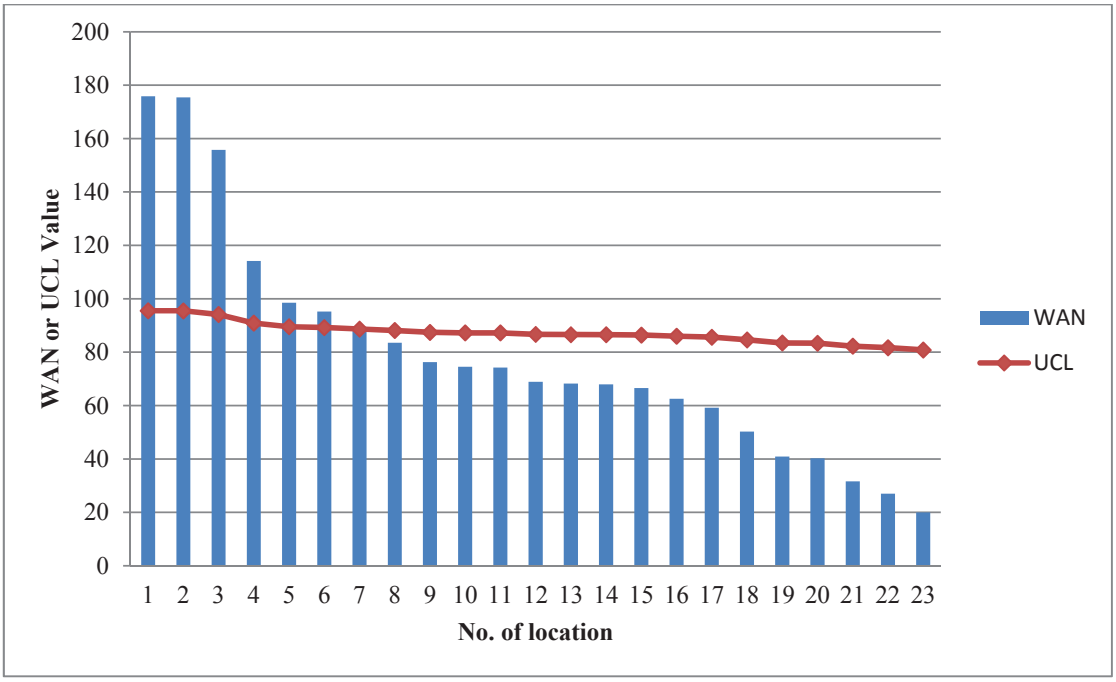

Figure-1. Chart of upper control limit and weighted accident value in 23 roads in Purbalingga.

Black spot location

From the analysis of accident data in January 2010-December 2013 to determine the accident-prone or black spot location using UCL (Upper Control Limit) method, seven roads have weighted accident number value greater than the UCL value. There are seven roads was classified as an accident-prone or black spot location.

Based on the calculations of control limits using UCL method (shown in Figure-1), seven roads in Purbalingga are classified as black spot location, as follows:

a) Jln. Raya turut Desa Bojongsari, Purbalingga, with a value of WAN at 175.82 is greater than the value of the control limit UCL 95.55.
b) Jln. Raya turut Desa Jetis, Kemangkon, with a value of WAN at 175.44 is greater than the value of the control limit UCL 95.52.
c) Jln. Raya Bayeman, Desa Tlahab Lor, Karangreja, with a value of WAN at 155.76 is greater than the value of the control limit UCL 94.14.
d) Jln. Raya Mayjend. Sungkono, Blater, Kalimanah, with a value of WAN at 114.20 is greater than the value of the control limit UCL 90.91.
e) Jln. Raya turut Desa Penaruban, Kec. Bukateja, with a value of WAN at 98.52 is greater than the value of the control limit UCL 89.55.
f) Jln. Raya turut Desa Kembangan, Kec. Bukateja, with a value of WAN at 95.24 is greater than the value of the control limit UCL 89.26.
g) Jln. Raya turut Desa Gembong, Kec. Bojongsari, with a value of WAN at 89.22 is greater than the value of the control limit UCL 88.70.

CONCLUSIONS

The identification of equivalent accident number and black spot location using upper control limit is presented in this paper. From the analysis and results, it can be concluded as follows:

a) Equivalent accident number for death victims or fatality is 10, a severe injury is 4.25, a minor injury is 2.33, and property damaged only is 1.
b) Seven roads have weighted accident number value greater than the upper control limit value.
c) Black spot location in Purbalingga Regency are Jln. Raya turut Desa Bojongsari, Jln. Raya turut Desa Jetis, Jln. Raya Bayeman, Desa Tlahab Lor; Jln. Raya Mayjend. Sungkono, Blater; Jln. Raya turut Desa Penaruban; Jln. Raya turut Desa Kembangan and Jln. Raya turut Desa Gembong.

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