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ARPN Journal of Engineering and Applied Sciences

Country	Pakistan
Subject Area and Category	Engineering Engineering (miscellaneous)
Publisher	Asian Research Publishing Network (ARPN)
Publication type	Journals
ISSN	18196608
Coverage	2011-ongoing

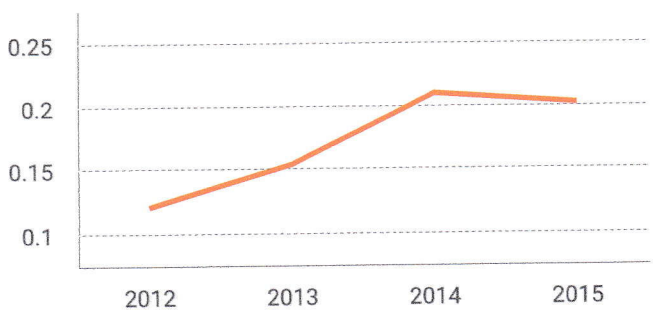
12
H Index

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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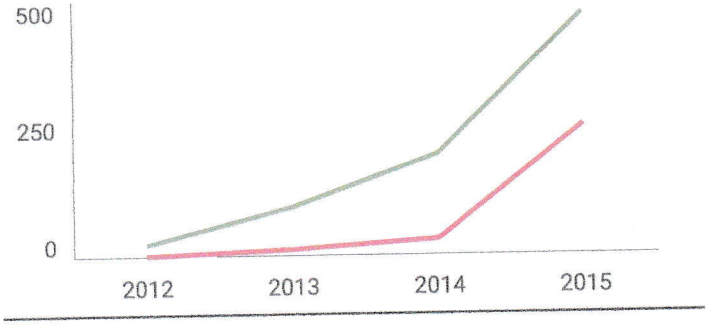

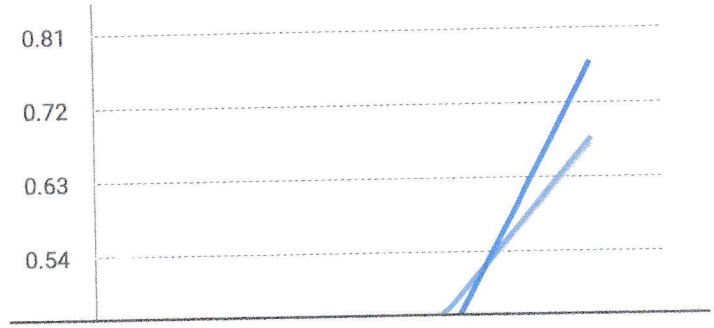

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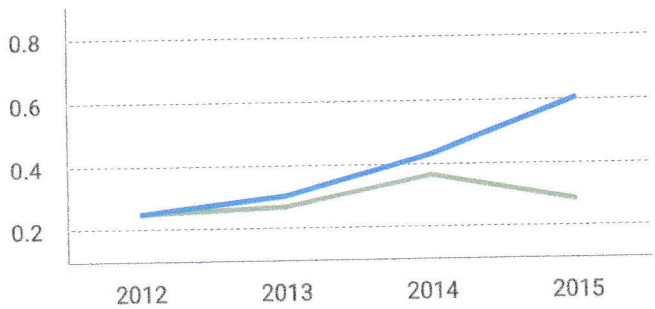
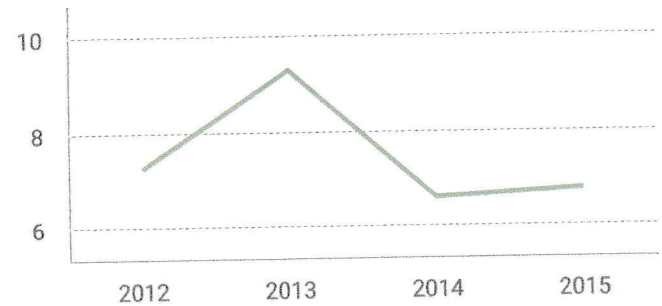


% International Collaboration



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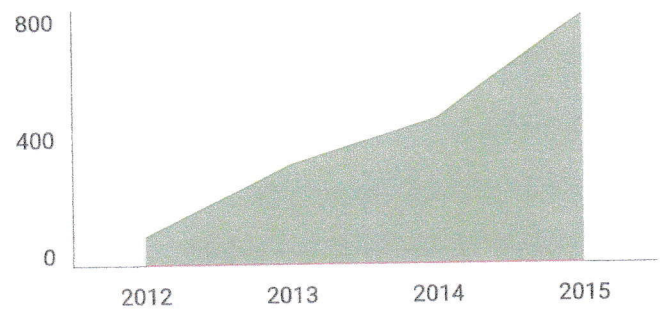

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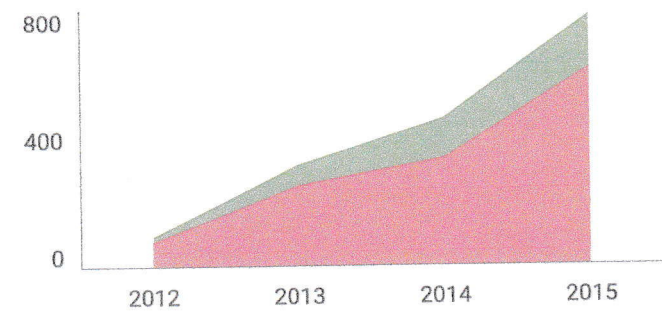

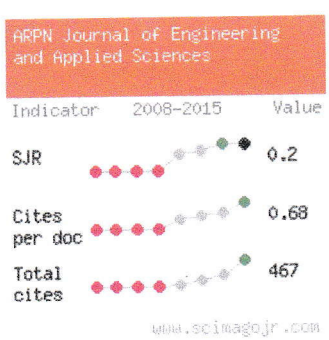

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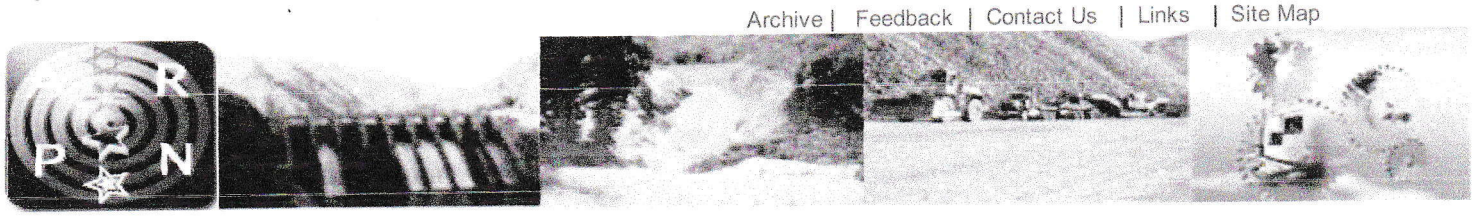

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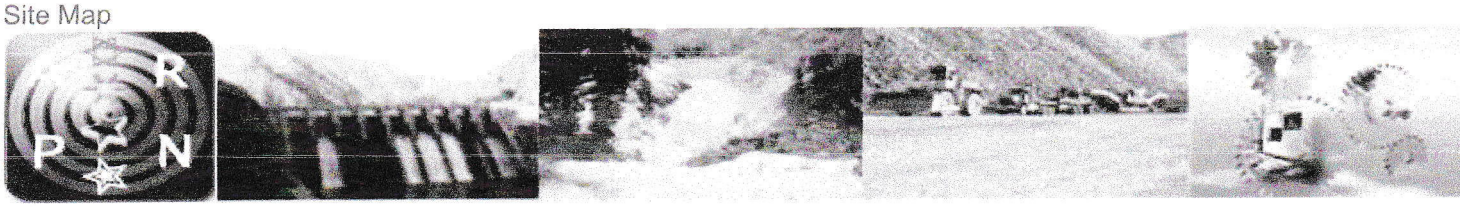

ARPN Journal of Engineering and Applied Sciences ISSN 1819-6608 (Online)

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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THE COST OF TRAFFIC ACCIDENT AND EQUIVALENT ACCIDENT NUMBER IN DEVELOPING COUNTRIES (CASE STUDY IN INDONESIA)

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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 severe injury, and 109,741 people minor injuries. There are 108,883 unitmotorcyclists that involving in traffic accidents. 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 fatal, severe injury, minor 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 fatal are IDR263,025,680.96; severe injury is IDR12,066,000; minor injury is IDR1,904,312.87, and PDO is IDR1,562,909.09. Total accident cost in Purbalingga from 2010-2012 was estimated IDR27,582,518,750 or 0.38% of the gross domestic product. Equivalent accident number using conversion accident cost fatal: severe injury: minor injury: PDO = 168:8:2:1.

Keywords:accident cost, traffic accidents, gross output method, equivalent accidents numbers.

INTRODUCTION

Many developing countries like Indonesia have a serious road accident problem. The traffic accident rate in Indonesia is still considerably high, as reported by the national police and Ministry of Transportation, in 2014 was recorded 95,906 cases that resulted in 28,297 people died, 26,840 people suffered severe injury, 109,741 people suffered minor injury. There are 108,883 motorcyclists that involving in traffic accidents [1]. Around the world, every year more than 500,000 people have died in road traffic accidents in worldwide. The majority of the victims who died, 70% of which occur in developing countries [2], 65% of the victims who died are pedestrians and 35% of the pedestrians who died were children [3]. Three factors that cause accidents are human factor, vehicle, and environment. The highest accident causal is the human error factor [4]. Rao, *et al*. states that 66% of accidents occur due to human error factor and 33% because of the interaction of a vehicle, other road users, and environmental factors [5].

Traffic accidents are basically unexpected events that could cause many types of losses, including material, physical, and human life losses. To estimate the economic impacts of accidents, the number of accident casualties and accident costs are the most needed data [6]. There are six methods that can be used to analyse the cost of accidents to estimate how much the losses caused by traffic accidents [7,8]. While Anh,*et al*. states there are seven methods to analyse the cost of accidents, namely: gross output method, human capital method, net output method, life insurance method, court award method, implicit public sector valuation, and willingness to pay [9].

Traffic accidents cause a very high cost. In Australia, the cost of accidents in 2003 approximately AUS$17 billion, this value is 2.3% of Gross National Income Australia [10]. While in Indonesia, by the Director of Land Transport Safety estimated the losses as a result of the accident in 2002 at IDR41.4 trillion [11]. Using the 2002 Indonesia nominal Gross Domestic Product (GDP) of IDR1,421 trillion, the total accident cost in Indonesia was estimated to be roughly IDR41 trillion (approximately US$4.5 billion) or 2.9% of the gross domestic product [6]. The total costs of traffic accident in Thailand for the year 2004 are estimated at 153,755 million baht (approximately US$3,460 million) [12]. In Singapore, the total cost of traffic accidents occurring in 2003 is S$610.3 million. The annual cost of traffic accidents is about 0.338% of the gross domestic product [13].

The aims of this study is to analysis the traffic accidents cost using gross output method and determining the value of an equivalent accidents number based on the amount of accidents cost.

LITERATURE REVIEW

Casualty severity and accident classification

This study classifies casualty severity based on Law 14, 1990 (Traffic and Land Transport) [14]. Road accidents are classified into three categories of severity: fatal or died, severe injury, and minor injury. These categories are defined below:

a. A fatal accident is one in which the victim dies, either on the spot or due to injuries sustained within 30 days of the accident.

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b. A severe injury is one in which the casualty suffers serious injuries and is admitted to a hospital and receives treatment for over 30 days.
c. A minor injury is one in which the casualty requires medical treatment or is admitted to a hospital and receives treatment for less than 30 days.

Based on Law 22, 2009 (Traffic and Land Transport), traffic accident is classified in three categories, fatal accidents, serious accidents, and slightly accidents [15]. A damage-only accident or property damage only (PDO) is one in which no one is injured but damage to vehicles and or property is sustained [16].

Accident cost

Traffic accidents cost and evaluation of accident prevention in developing countries, Hills and Jones-Lee identified six different methods that have been proposed for placing a cost on road accidents [7]. All of the methods outlined were applicable to non-fatal as well as to fatal accidents but for reasons of clarity and simplicity, they concentrated on describing accidents involving one fatality only [16]. The six methods are The gross output (or human capital) approach, The net output approach, The life-insurance approach, The court award approach, The implicit public sector valuation approach, and The value of risk change or willingness to pay approach. Gross output method (well suited to the objective of maximizing the wealth of a country). Willingness to pay method especially for social welfare maximization and for use in cost benefit analyses [16].

Seven methods that can be used to analyse the cost of accidents [9]:

a) **Gross output method:** the basis of the gross output method is the idea that individual could produce cumulative output through their life. The costs of accident will represent accident-related cost (vehicle damage cost, hospital costs, and administration costs) and the costs of future lost output.
b) **Human capital method:** the cost of a road accident involving one fatality is treated as the sum of real resource costs (i.e. vehicle, medical, and police costs) plus the costs reflecting pain, grief, and suffering. The value of the prevented accident is correspondingly defined as the avoided costs.
c) **Net output method:** this differs from the gross output method in that the extent that the present value of the victim's future consumption is subtracted from the gross output figure.
d) **Life insurance method:** the cost of accident is defined as the amount for which individuals are willing to insure themselves.
e) **Court award method:** the sums awarded by the courts to the surviving dependents of those killed are treated as indicative of the cost that society associates with a fatality or the value that it would have placed on its prevention. Real resource costs are then added to this figure to obtain the cost of an accident.
f) **Implicit public sector valuation method:** these attempts to determine the costs and values that are implicitly on accident prevention or on investment programs that affect road safety.
g) **Willingness to pay method:** the method is to estimate the amount of money people affected would pay to avoid an accident. Individuals have their chance of being involved in a fatal accident reduced by a small margin if a road safety improvement is introduced. Thus the value of preventing one fatality in one accident is defined as the aggregate amount that all the affected individuals in society are willing to pay for these small risk reductions.

In gross output or human capital approach the cost of a traffic accident involving a fatality can be divided into two main categories. Firstly there are the costs that are due to a loss or diversion of current resources and secondly there are the costs that are due to a loss of future output. Included in the former will be the cost of vehicle damage, medical treatment, and police/administration costs and usually there is little disagreement as to what should be included here [16].

According to the Transport Research Laboratory (TRL), traffic accidents cost components are grouped into two categories, namely direct costs and indirect costs. Indirect costs are a percentage of direct costs. Component of direct costs of traffic accidents includes property damage, administrative costs, medical costs, and loss of productivity [16].

a) Property damage

In each accident, there is some amount of damage to vehicles and property damage on a side street. The largest portion of property damage is the things that relate to damage to the vehicle [17].

b) Administrative costs

Police costs included as administrative costs, although this cost component is very small compared to other cost components. Costs incurred for the funeral for the victims' family died included in administrative costs [17].

c) Medical costs

Medical expenses for injuries is the cost since the occurrence of the accident until the time of healing, or for deaths, including the cost of first aid, ambulance, hospital costs (food, room, surgery, and medicine) and the cost of healing or rehabilitation [17].

d) The loss of productivity (lost output)

Loss of productivity is often associated with a loss of economic value to work because of an accident. The amount of working time lost for the death of the victim was the time they spent into the future if they do not die multiplied with income if an accident victim [17]. For severely injured and slightly injured lost productivity is calculated as the length of time they cannot work multiplied by the income the casualty if they works.

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METHODS

The study location

The study location is in Purbalingga Regency, Central Java Province, Indonesia. The location of study can be seen in Figure-1.

Figure-1. Location of study in Purbalingga regency [18].

Data collection and analysis

This study was conducted by analysing each component of the cost of traffic accidents by using human capital method according to Silcock and Transport Research Laboratory [17] and Asian Development Bank [6]. The traffic accident cost is analysed based on casualty cost by severity type. Component cost of accidents in this study were divided into two, namely direct costs and indirect costs. Direct costs include: costs of property damage, medical expenses, administrative expenses, and loss of productivity. The amount of direct costs based on the severity rate of casualties obtained based on interviews with 15 the casualties of PDO, 20 casualties of minor injury accidents, 20 casualties of severe injury accidents, and 15 families of casualties of fatal accidents. The total respondent is 70 peoples.

Identity data and address the casualties of traffic accidents obtained from Purbalingga Police sourced from Data Traffic Accidents in Purbalingga during 2010 to 2012 [19]. Having obtained the direct costs, the next step is to calculate the indirect costs. Indirect costs include: the cost of pain, grief, and suffering. The amount of indirect costs is the percentage of direct costs of 28% for fatal accidents, 50% of severe accidents, and 8% for the minor accidents of the total direct cost [17]. Based on the analysis results of direct costs and indirect costs then summed to determine casualty cost by the severity type.

RESULTS AND DISCUSSIONS

Traffic accident in Indonesia

Traffic injury severity is an important safety concern of the transportation system. The road traffic accident rate in Indonesia is still considerably high, as reported by national police and Ministry of Transportation, in 2014 was recorded 95,906 cases. There are 108,883 unit motorcyclists those involving in traffic accidents [1].Based on NHTSA, in the United States, there were 32,675 people killed in motor vehicle crashes in 2014, and the total economic losses are up to $836 billion [20]. Traffic accident cost is one of the externality costs which are forgotten by road users [21]. Road traffic accident in Indonesia from 2010-2014 can be seen in Table-1.

Table-1. Road traffic accident in Indonesia 2010-2014 [1].

Accident and injury	Unit	Year				
		2010	2011	2012	2013	2014
Traffic accident	cases	109,319	109,776	117,949	100,106	95,906
Motorcycles	unit	140,277	147,391	111,015	119,560	108,883
Passenger cars	unit	26,495	25,502	25,200	21,304	18,147
Trucks	unit	20,347	25,227	16,165	21,335	19,242
Bus	unit	6,099	5,272	8,375	4,893	4,808
Special vehicles	unit	2,050	3,109	2,132	1,092	1,050
Un-motorist	unit	4,000	4,200	N.A	N.A	N.A
Total vehicles involved	vehicles	199,268	210,701	162,887	168,184	152,130
Fatal/died	people	31,234	31,185	29,544	26,416	28,297
Severe injury	people	46,851	36,767	39,704	28,438	26,840
Minor injury	people	97,702	108,811	128,312	110,448	109,741
PDO	IDR billion	143.16	286.09	298.627	255.864	250

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Traffic accident in Purbalingga

Characteristics of traffic accidents in Purbalingga

Based on the analysis of traffic accident data from Purbalingga Police during 2010-2012 occurred 869 accidents with the fatality of casualties is 92 fatal (27 in 2010, 23 in 2011, and 42 in 2012), 25 severe or serious injury, and 1599 minor injury or slightly injury (169 in 2010, 573 in 2011, and 857 in 2012). Severity rate of casualties in Purbalingga from 2010-2012 as shown in Figure-2. 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 [22].

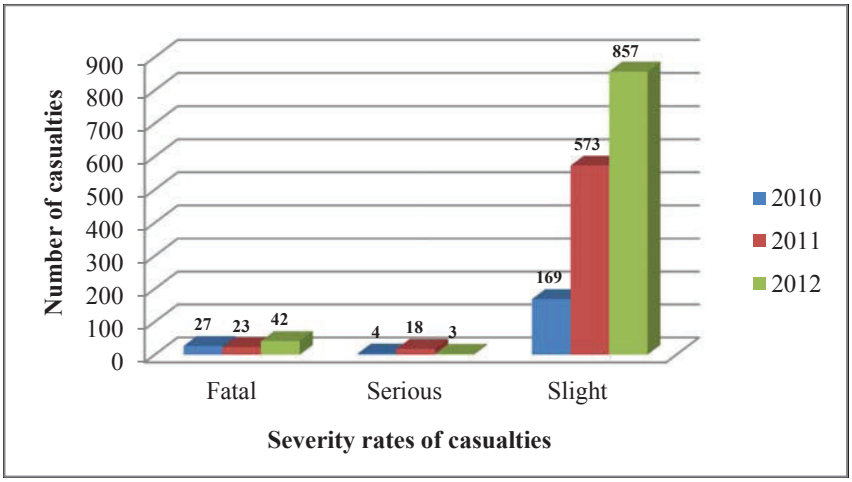

Figure-2. Severity rate of traffic accident casualties in Purbalingga [19].

Vehicles involved in traffic accident

As for the characteristics of the accident based on the types of vehicles involved in traffic accidents result 78.09% involved motorcycles; 6.19% involving passenger cars, 2.53% involve bus, 8.96% involved trucks, and only 3.41% involved un-motorized vehicles. There are 166 pedestrian that involved traffic accident in Purbalingga. Grouping types of vehicles involved in accidents by type of accident is presented in Table-2 below.

Based on Table-2 we know that number of accident in Purbalingga, Central Java, Indonesia from 2010 (93 accident) to 2012 (475 accident) is increasing by more than 410%. This condition is very different with the condition in Dhaka, Bangladesh. The number of accidents in Dhaka is reducing by more than 10% every year and 63% of the accidents took place where there was no traffic control [23]. Khorashadi, *et al.* studies the differences between accidents in rural and urban areas when trucks are involved and find significant differences for the two areas [24]. In order to increase traffic safety it is of central importanceto know the causing factors of accidents. Using data containingdetailed accident information the determinants of accident frequencyand severity can be analysed using statistical methods [22].

Table-2. Vehicle involved traffic accident year from 2010 to 2012 in Purbalingga [19].

Year	Number of accident	Vehicle involved traffic accident						Total vehicle
		Motor cycle	Car, Jeep	Bus	Truck	Un-motorist	Pedes-trian	
2010	93	103	15	18	19	6	15	161
2011	301	422	43	8	48	17	63	538
2012	475	712	40	14	75	31	88	872
Total	869	1237	98	40	142	54	166	1584

Accident cost using gross output method

a. Accident cost component

Traffic accidents cost components are grouped into two, namely direct costs and indirect costs. Indirect costs are a percentage of direct costs. Component of direct costs of traffic accidents includes property damage, administrative costs, medical costs, and loss of productivity [16].

b. Direct cost

Direct costs include: costs of property damage, medical costs or medical care, administrative costs, and

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loss of productivity (lost output). The amount of direct costs based on the level of fatality rate of casualties obtained based on interviews with 15 casualties of PDO, 20 casualties of minor injury accidents, 20 casualties of severe injury accidents, and 15 families of casualties of fatal accidents. The loss of productivity is the result of an accident victim's loss of income is calculated based on the income the victim and the victim productive age. In the analysis of the victim's income is expected to rise by 5% per year [25]. For injuries, long lost productivity is calculated based on long concerned cannot work because of a traffic accident. For the casualties is died, long ago lost productivity is calculated based on the amount of productive age expectations set 60 (sixty) years. Results of the analysis of the direct costs of casualties based on fatality rates are shown in Table-3.

c. Indirect cost

Indirect costs are costs incurred by the family or relatives of the victims and the cost of pain, grief, and suffering or human cost. Human cost fee is a percentage of direct costs. According to Silcock and TRL [17] the amount of indirect costs is 28% for fatal, 50% for severe injury, and 8% for minor injury. In Indonesia, the percentage of human cost according to Pd.T-02-2005-B is 38% for fatal, 100% for severe injury, and 8% for minor injury [26]. The results of the analysis of indirect costs according to Silcock-TRL and Pd.T-02-2005-B are shown in Table-4.

Casualty cost by severity type

Casualty cost by severity type of accident is obtained by summing the cost of direct and indirect costs according to Silcock and TRL. Casualty accident costs by severity type: fatal (died) is IDR263,025,680.96; severe injury is IDR12,066,000; minor injury is IDR 1,904,312.87, and property damage only is IDR1,562,909.09. Result of the analysis of casualty cost by the severity type is presented in Table-5.

The result of this study is similar with research of Sugiyanto in Banyumas Regency, Central Java Province, Indonesia, the casualty cost by severity type for severe injury is IDR12,221,903.78, and for minor injury is IDR877,574.13. The value of casualty cost for fatal or died in Banyumas is smaller than in Purbalingga. The casualty cost for fatality in Banyumas Regency, Central Java is IDR89,873,969.68 [4, 27]. With the value of human cost according to Silcock and TRL [17], the casualty cost by severity type in Banyumas is IDR83,366,218.25 for fatal (died) and IDR9,492,999.33 for severe injury [27].

Table-3. Direct costs based on the fatality rate of casualties (IDR).

Component of accident cost	Severity rates of casualties			
	Fatal (died)	Severe injury	Minor injury	PDO
Property damage	1,478,313.25	875,000.00	827,127.66	1,390,909.09
Administrative cost	1,120,500.00	318,750.00	172,000.00	172,000.00
Medical care	2,625,000.00	5,765,750.00	387,250.00	0.00
Lost output	200,265,000.00	1,084,500.00	376,875.00	0.00
Total cost unit	205,488,813.25	8,044,000.00	1,763,252.66	1,562,909.09

Table-4. Indirect costs or human cost (IDR).

Human cost	Severity rates of casualties		
	Fatal (died)	Severe injury	Minor injury
Silcock and TRL	57,536,867.71	4,022,000.00	141,060.21
Pd.T-02-2005-B	78,085,749.04	8,044,000.00	141,060.21

Table-5. Casualty cost by severity type (IDR).

Cost component	Fatality rates of casualties			
	Fatal (died)	Severe injury	Minor injury	PDO
Direct cost	205,488,813.25	8,044,000.00	1,763,252.66	1,562,909.09
Indirect cost	57,536,867.71	4,022,000.00	141,060.21	0.00
Total cost unit	263,025,680.96	12,066,000.00	1,904,312.87	1,562,909.09

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Accident cost by severity

a. Ratio of vehicles involved in traffic accident

To calculate the accident costs by severity type, it must first be calculated ratio of the vehicle involved in the traffic accident. Ratio of vehicles involved in traffic accident is classified by the accident type: fatal (1.952), severe (1.867), minor (1.807), and property damage only (1.333). The ratio of vehicles involved in traffic accident is presented in Table-6.

b. Average of casualties per cases and severity

In addition to the vehicle and accident ratios, to calculate the cost per accident or accident cost by severity type of the accident must be calculated the average casualties of a traffic accident. On any kind of accident casualties are separated according to the severity of the casualties, then the number of casualties based on the severity of accidents divided by the number of accidents based on accident severity rates. Total of fatal accident is 83 accidents, severe injury accident is 16 accidents, minor injury accident is 752 accidents, and property damage only is 18 accidents. Number of casualties in fatal accident is 92 fatal, 7 severe injury, and 92 minor injury. Number of casualties in severe accident is 18 severe injuries and 13 minor injuries. Results of the average calculation of traffic accidents casualties indicated by type of accident are shown in Table-7.

c. Direct cost, indirect cost, and accident cost

Calculation of the accidents cost per cases is done by calculating the direct costs and indirect costs. A result of calculation for the direct costs is shown in Table-8, while for the indirect costs per accident shown in Table-9.

Accident cost by severity type of accident is obtained by summing the direct cost and indirect costs according to Silcock and TRL [17]. Accident costs by severity type: fatal (died) is IDR 294,916,596.65; severe injury is IDR 15,723,214.18; minor injury is IDR 3,783,302.44, and property damage only is IDR 1,562,909.09. Result of the analysis of accident cost by severity type is presented in Table-10.

Table-6. Ratio of vehicles involved in traffic accident (per accident) in Purbalingga 2010-2012.

Accident type	Total accident	Total vehicles	Ratio of vehicles involved in traffic accident
Fatal (died)	83	158	1.903
Severe injury	16	30	1.875
Minor injury	752	1359	1.807
PDO	18	24	1.333
Total	869		

Table-7. Number and average of casualties' per-accident.

Accident type	Total accident	Number of casualties (people)			Average casualties/accident		
		Fatal	Severe	Minor	Fatal	Severe	Minor
Fatal (died)	83	92	7	92	1,108	0,084	1,108
Severe injury	16	-	18	13	-	1,125	0,812
Minor injury	752	-	-	1494	-	-	1,987
PDO	18	-	-	-	-	-	-
Total	869	92	25	1599			

Table-8. Direct costs per accidents (IDR).

Component of accident cost	Accident type			
	Fatal	Severe	Minor	PDO
Property damage	2,629,223.66	1,656,416.22	1,643,256.28	1,390,909.09
Administrative cost	1,459,533.13	498,343.75	341,712.77	172,000.00
Medical care	3,825,147.59	6,801,109.38	769,350.40	0.00
Lost output	222,489,686.75	1,526,273.44	748,738.36	0.00
Total cost unit	230,403,591.13	10,482,142.79	3,503,057.81	1,562,909.09

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Table-9. Indirect costs per accident (IDR).

Human cost method	Accident severity type		
	Fatal (died)	Severe injury	Minor injury
Silcock and TRL	64,513,005.52	5,241,071.39	280,244.62
Pd.T-02-2005-B	87,553,364.63	10,482,142.79	280,244.62

Table-10. Accidents cost per cases (IDR).

Component cost	Accident cost by severity type per accident			
	Fatal	Severe	Minor	PDO
Direct cost	230,403,591.13	10,482,142.79	3,503,057.81	1,562,909.09
Indirect cost	64,513,005.52	5,241,071.39	280,244.62	0.00
Total cost unit	294,916,596.65	15,723,214.18	3,783,302.44	1,562,909.09

Purbalingga regency accident cost

The Purbalingga regency accident cost is obtained by multiplying the number of casualties and unit cost for each level of severity. Table-11 illustrates the total annual regency economic loss due to road accidents. Using the 2013 Purbalingga Regency nominal Gross Domestic Product IDR 7,298,610.75 million [28], the total accident cost in Purbalingga was estimated to be roughly IDR 27,582,518,750 or 0.38% of the gross domestic product. In Italy, in 2007 social costs due to road accidents were estimated at about 30.4 billion euros, corresponding to 2% of Italian GDP in the same year [29]. If using the GDP in 2015, the total accident cost in Purbalingga from 2010-2015 was estimated to be roughly IDR 236,517,103,652 or 1.27% of the gross domestic product [30].

One of the alternatives to reduce the accident cost is identification of black spots [31]. The determination of traffic accident location using weighted method: equivalent accident number [31] and Pd.T-09-2004-B [32]. Accident costs can be reduced by reducing accident frequency and reducing injury severity. Primary safety measures reduce accident frequency e.g. improved road geometry, relocation of poles, etc. Secondary safety measures reduce injury severity e.g. seat belts, energy-absorption systems [33].

Given the importance of roadway safety and the substantial economic losses caused by motor vehicle crashes, there has been increasing interest in developing crash prediction models to estimate motor vehicle crash counts, identify crash contributing factors, and implement effective safety strategies and countermeasures to improve traffic safety [34].

Table-11. Accident cost in Purbalingga regency, Central Java, Indonesia.

Severity	Number of casualties	Cost unit (IDR)	Total cost (IDR)
Fatal or died	92	263,025,680.96	24,198,362,649
Severe injury	25	12,066,000.00	301,650,000
Minor injury	1,599	1,904,312.87	3,044,996,283
Property Damage Only (PDO)	24	1,562,909.09	37,509,818
Total	1,740		27,582,518,750
Gross Domestic Product (GDP)	IDR 7,298,610.75 million [28]		
Percent of GDP	0.38%		

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 [32]. The ranking by weighting the accident rates using a conversion cost of accidents.

1. Using a comparison of the monetary value of the costs of accidents are:
   M: B: R: K = M/K: B/K: R/K: 1
   With:
   M is *meninggal dunia* or fatal (died).
   B is *luka berat* or severe injury.
   R is luka ringan or minor injury.
   K is *kerugian materi* or property damage only

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2. 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 [32].

In this study, the equivalent accident number using a conversion from accident cost. Casualty accident costs by severity type: fatal or died is IDR 263,025,680.96; severe injury is IDR 12,066,000; minor injury is IDR 1,904,312.87, and property damage only is IDR 1,562,909.09. Giving the value M: B: R: K = 168: 8: 2: 1.

CONCLUSIONS

Based on the results, the following conclusion can be drawn:

a) Casualty accident costs by severity type: fatal (died) is IDR 263,025,680.96; severe injury is IDR 12,066,000; minor injury is IDR 1,904,312.87, and property damage only is IDR 1,562,909.09.
b) Road traffic accidents cost in Purbalingga by severity type: fatal (died) is IDR 294,916,596.65; severe injury is IDR15,723,214.18; minor injury is IDR 3,783,302.44, and property damage only is IDR 1,562,909.09.
c) The total accident cost in Purbalingga was estimated to be roughly IDR 27,582,518,750 or 0.38% of the gross domestic product.
d) Equivalent accident number using a conversion accident cost M: B: R: K = 168: 8: 2: 1.

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