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EXPERTISE-BASED EXPERTS IMPORTANCE WEIGHTS IN ADVERSE JUDGMENT

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ABSTRACT

The objective of this research was to propose the use of expertise levels of experts to determine the experts' importance weights since there has been no research that determines the 'importance weight' using the expertise level as a whole. The significance of this research was the integration of three concepts, namely: the *expert's expertise level*, FPR's *Additive Consistency* and *the Induced-OWA operator* to obtain the expert's importance weight in adverse judgment situation. The Expertise level of an expert in adverse judgment situation is determined by his/her own assessment on a set of alternatives and defined as 'the ability to differentiate consistently' and expressed as the ratio between Discrimination and Inconsistency. The experts provided their preferences using FPR (Fuzzy Preference Relations) since FPR has Additive Consistency property to replicate each element of FPR matrix. Experts were sorted according to their expertise level and the experts' importance weights followed the OWA (Ordered Weighted Averaging) operator's weights which were determined by parameterization using Basic Unit-Interval Increasing Monotonic functions. The experts' importance weights model illustrated by a numerical example, and it concluded that the higher the expert's expertise level, the higher his/her importance weight.

Keywords: additive consistency, expertise, fuzzy preference relations, importance weight, induced OWA operator.

INTRODUCTION

The expertise level of decision maker greatly affects the quality of the resulting decision [1]. The decision quality made by the experts presumed better than decision quality made by the non-experts as an expert have the ability to think differently [1-3]. This is because the inherent ability of the experts enables them to understand problems in more detail and depth so that the experts can distinguish the various aspects of the situation that is usually overlooked by the non-expert [4].

Related to decision that requires the Decision Maker (DM) expertise in Group Decision Making (Decision Making with more than one DM), the DM individual assessment needs to be explored and group decision is taken based on the integration of individual assessments into the group assessment, by performing aggregation of DM assessments mathematically [5]. One important factor that must be considered in the aggregation process is the importance weight of each DM. The magnitude of the DM's importance weight influence decisions. If a DM assessing an alternative with a high score and this DM gets a high importance weight, then this alternative would get a high total score and most likely has a high opportunity to be selected as the best alternative. Therefore, to improve the decision quality, the DMs' importance weights should be determined based on their expertise level.

Some researchers defined the expertise level as "the ability to differentiate consistently" through the evaluation of his/her assessment level on alternatives [6-7]. The level assessment on alternatives is called *the adverse judgment* [8]. Shanteau (2002) stated the experts as those who can differentiate between similar but not exactly the same, cases and repeat their assessments

consistently. They formulated the expertise level as the ratio between Discrimination ability and Inconsistency [6-7]. The drawback of this formulation found in the Inconsistency measurement [9]. Measuring Inconsistency required repetition; consequently the experts need to assess the same cases more than once. Assessing the same cases more than once is very difficult to do independently without being influenced by previous assessments. This is the reason of the need for adjustment to the formula implementation in determining the expertise level.

A number of researches have been proposed in determining the DMs importance weights and can be categorized into 2 groups: direct evaluation to DMs and evaluation to the DMs' assessment level. The DMs' importance weights determination through direct evaluation to DMs consists of a 'supra DM' who assessed the DM then gave weight to each DM [10-12] and 'a group of DM' who assessed each member in the DM group [13-15]. The direct evaluation methods could potentially lead to decision bias due to the assessors' subjectivity, the assessors' difficulty in assessing other DM and popularity effect (a person who has been recognized by peers usually assumed more expert; but it is possible that the 'assumed less expert' would be the creator of new knowledge [6]). While the determination of the DMs' importance weight through evaluation of their assessment on a set of alternatives can be classified into the determination of importance weights based on maximum consensus that could be achieved in the group [16-18], minimum deviation of DM individual opinion to the group opinion [19-21], minimum distance from the DM individual opinion to group opinion [22-27] and consistency of DM assessment on alternatives [8, 28-30]. In general, the methods of determining the DM importance weights in the

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adverse judgment situation are more objective than direct evaluation to the DMs. These methods had certain property: the closer the DM's individual opinion on group average opinion, the greater his/her importance weight regardless of his/her expertise level. In particular, there were methods of importance weight determination based on the DM's consistency evaluation in pairwise comparison FPR (Fuzzy Preference Relation). These methods assumed that the more consistent the DM preferences, the more relevant the DM opinion and resulting the higher the DM importance weight. These consistency-based methods are more objective compared with the other methods, but these methods have not considered the expertise level as a whole.

In this paper, the DM importance weight is determined based on the expertise level as a whole as the ability to differentiate consistently and expressed by the ratio between Discrimination and Inconsistency and the difficulty in repetition is replaced by estimation using Additive Consistency (AC) of FPR. The DM provides preference in the form of pairwise comparisons FPR where FPR has the Additive Consistency (AC) properties that used to estimate repetition. The experts then sorted by their expertise level and the experts' importance weights are associated with the OWA (Ordered Weighted Averaging) operator's weights which are determined by parameterization using Basic Unit-Interval Increasing Monotonic functions (BUM).

To do this, this paper is organised as follows. Following the first Section, it is discussed the concepts used to obtain the DM's Importance weight, namely the expertise level of expert, the AC property of FPR and the Induced OWA Operator. Next, the methodology to obtain the *expertise-based experts importance weights* is discussed and followed by the applicability test of the methodology using a numerical example. Finally, in the last Section we drew our conclusions.

LITERATURE REVIEWS

There are three important concepts used in this research to obtain the DM's Importance weight, namely the experts' expertise level, the AC property of FPR and the Induced OWA Operator.

The Expertise Level of Experts

An expert usually has some backgrounds in certain fields and recognized by his/her peers [31]. Shanteau *et al.* (2002) determine the expertise level of an expert based on his/her assessment level (adverse judgment). They argued that only people who can differentiate between similar but not exactly the same, cases and repeat their judgment consistently, considered as an expert [6]. Therefore there are two requirements necessary for determining the expertise level, namely the Discrimination ability and the Inconsistency and expressed in CWS - Index as shown in eqn (1), (2) and (3):

$$\text{CWS - Index} = \frac{\text{Discrimination}}{\text{Inconsistensy}}$$

$$= \frac{\text{standard deviation of different alternatives' values}}{\text{standard deviation of the same alternative's values}} \quad (1)$$

$$\text{Discrimination} = \sqrt{\frac{\sum_{j=1}^{n} r(M_j - GM)^2}{n-1}} \quad (2)$$

$$\text{Inconsistency} = \sqrt{\frac{\sum_{j=1}^{n}\sum_{i=1}^{r}(M_{ij} - M_j)^2}{n(r-1)}} \quad (3)$$

Where

r	:	The number of replications
M_j	:	The average of individual values for case-j
GM	:	Grand mean of all individual values
n	:	The number of different cases
M_{ij}	:	The individual value for replication-i case-j

In order to measure the expertise level of the experts, the evaluated experts were asked to elicitate their evaluation more than once. Only those who have a high level of Discrimination ability and low level of Inconsistency can be clasified as expert and obtain a high value of CWS-Index. Unfortunately, this method required repetition and this repetition are very hard to do independently without being affected by previous evaluation.

The Additive Consistency of FPR

The Decision Makers could use a variety of evaluation formats, among others, is FPR. FPR is one of the most widely used evaluation format to provide evaluation in Group Decision Making (GDM) [16, 32-33] since FPR can be used as tools on aggregating individual opinions into a group opinion [34].

Suppose that a group of Decision Makers $E = \{e_1, e_2, ...e_m\}$, $m \geq 2$ evaluate a finite set of alternatives $X = \{x_1, x_2, ...x_n\}$, $n \geq 2$ by using pairwise comparisons FPR $P \subset XxX$ having a membership function $\mu_p : XxX \rightarrow [0,1]$ and represented by means of the n x n matrix $P = (p_{ij})$ [35]. p_{ij} is the preference degree of alternative x_i over x_j. $p_{ij} = \frac{1}{2}$ means indifference between x_i and x_j, $p_{ij} > \frac{1}{2}$ means x_i is preferred to x_j.

AC property of FPR among three alternatives x_i, x_j and x_k [36] are as follows:

$$(p_{ij} - 0,5) + (p_{jk} - 0,5) = (p_{ik} - 0,5) \quad \forall \ i,j,k = 1,2,...,n \quad (4)$$

$$p_{ij} + p_{jk} + p_{ki} = \frac{3}{2} \quad \forall \ i,j,k = 1,2,...,n \quad (5)$$

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The AC property yields a relationship between the preferences and we can obtain estimated values by using 3 different formulas as follows [28]:

$$\varepsilon p_{ik}^{j1} = p_{ij} + p_{jk} - \tfrac{1}{2}, \; j \neq i,k \qquad (6)$$

$$\varepsilon p_{ik}^{j2} = p_{jk} - p_{ji} + \tfrac{1}{2}, \; j \neq i,k \qquad (7)$$

$$\varepsilon p_{ik}^{j3} = p_{ij} - p_{kj} + \tfrac{1}{2}, \; j \neq i,k \qquad (8)$$

in which:

εp_{ik}^{j1} : Estimation of p_{ik} using the first formula

εp_{ik}^{j2} : Estimation of p_{ik} using the second formula

εp_{ik}^{j3} : Estimation of p_{ik} using the third formula

For every element of the matrix FPR p_{ij}, these formulas produce as many as 3x (n-2) replications (since there are 3 formulas and $j \neq i,k$). These replications allow AC property be used to complete the incomplete FPR [28-29, 37-41] and measure someone's consistency level in providing assessment [28-29, 34, 39-40, 42] in which the consistency level then be used to determine the importance weight of each expert. The drawbacks are previous studies only considered the Consistency level, but not the Discrimination, thus have not covered the whole concept of expertise level as proposed by Shanteau *et al*., (2002).

The Induced OWA Operator

The OWA operator is an aggregation operator proposed by Yager (1988) in which the order of the arguments have primary role in the aggregation process [43]. An n-dimensional OWA Operator is a mapping $F: I^n \to I$ defined as $F_w(a_1, a_2,..., a_n) = \sum_{j=1}^{n} w_j b_j$ where b_j is the *j*th largest element in the set of input arguments $(a_1, a_2,..., a_n)$ and w_j is the order weights satisfy $w_j \geq 0$ and $\sum_{j=1}^{n} w_j = 1$ [43]. In this case the input arguments are ordered according to their own values.

In the Induced OWA Operator, the ordering of the input arguments are based upon the order inducing variable [44]. An n dimensional Induced OWA Operator Is a mapping $F: I^n \to I$ defined as $F_w(\langle u_1, a_1 \rangle, \langle u_2, a_2 \rangle,..., \langle u_n, a_n \rangle) = \sum_{j=1}^{n} w_j b_j$ where u_i is called the order inducing variable and a_i is called input argument, w_j is the order weights and $w_j \geq 0$ and $\sum_{j=1}^{n} w_j = 1$ and b_j is the input argument value of the pair having the *j*-th largest value for the order inducing variable. An important issue in using the OWA operator or the Induced OWA operators in aggregation process is the

issue of obtaining the OWA weights. Yager (1996) proposed that the OWA weights can be parameterized by BUM $Q:[0,1] \to [0,1]$ having the properties:

$Q(0) = 0; Q(1) = 1; Q(x) \geq Q(y) \; if \; x \geq y$ and the OWA weights w_j are as follows [45-46]:

$$w_j = Q(R_j) - Q(R_{j-1}) \qquad (9)$$

where $R_j > R_{j-1}$, and the obtained weights satisfy $w_j \geq 0$ and $\sum_{j=1}^{n} w_j = 1$. The BUM is associated with the accumulation of DM importance weight. Since BUM is an increasing Monotonic Function as illustrated in Figure-1, then the individual DM importance weight can't be negative or $w_j \geq 0$.

Another important property of this function is the maximum value of BUM is one, so the accumulation of the total DM importance weights also 1. Yager (1988) proposed a particular form of BUM Function as $Q(R) = R^\alpha$, α positive parameter [43].
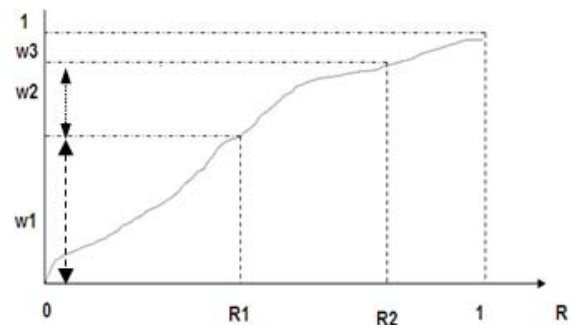

Figure-1. The OWA Weights from Basic Unit Interval Increasing Monotonic Function.

THE PROPOSED METHOD

This research uses expertise level as 'the ability to differentiate consistently' and expressed as ratio between Discrimination and Inconsistency and the experts provide evaluation using pairwise comparison FPR. AC property of FPR enables us to get the replications without asking the DMs to repeat their evaluation and the result of this step is CWS-Index. Based on this Index, we obtain the rank of the DMs based on their assessment level [9, 47]. The next step is obtaining the DMs importance weights based on the Induced OWA weights and BUM function as illustrated in Figure-2.

The expertise-level expressed by the CWS-Index in logarithmic function and used as the order inducing variable. The expertise-level are used as the R-variable in determined the importance weights.
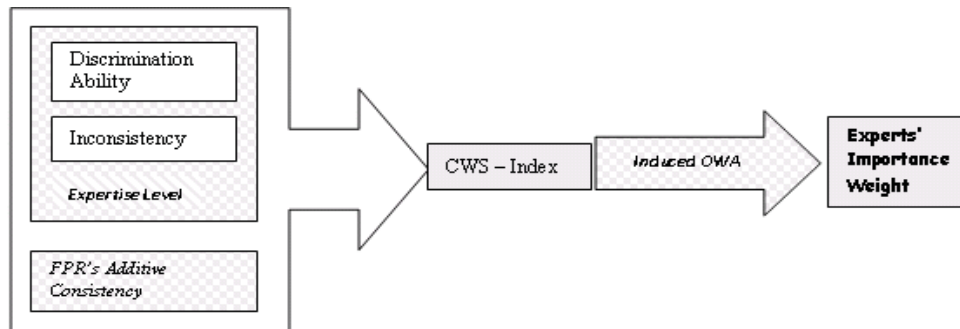
NUMERICAL EXAMPLE

In order to show the applicability of the proposed methods, we provide a numerical example to illustrate

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Expertise-based experts' importance weight. Suppose there are 5 experts expressed in $E = \{e_1, e_2, e_3, e_4, e_5\}$ and asked to provide assessment on a set of 4 alternatives $X = \{x_1, x_2, x_3, x_4\}$.

The data of experts' assessment are as follows [47]:

Figure-2. The Proposed Method.

$$P_1 = \begin{bmatrix} 0.5 & 0.4 & 0.4 & 0.4 \\ 0.6 & 0.5 & 0.4 & 0.7 \\ 0.6 & 0.6 & 0.5 & 0.7 \\ 0.6 & 0.3 & 0.3 & 0.5 \end{bmatrix}, \quad P_2 = \begin{bmatrix} 0.5 & 0.3 & 0.4 & 0.45 \\ 0.7 & 0.5 & 0.65 & 0.6 \\ 0.6 & 0.35 & 0.5 & 0.45 \\ 0.55 & 0.4 & 0.55 & 0.5 \end{bmatrix},$$

$$P_3 = \begin{bmatrix} 0.5 & 0.9 & 0.6 & 0.7 \\ 0.1 & 0.5 & 0.3 & 0.4 \\ 0.4 & 0.7 & 0.5 & 0.6 \\ 0.3 & 0.6 & 0.4 & 0.5 \end{bmatrix}, \quad P_4 = \begin{bmatrix} 0.5 & 0.43 & 0.64 & 0.71 \\ 0.57 & 0.5 & 0.43 & 0.36 \\ 0.36 & 0.57 & 0.5 & 0.21 \\ 0.29 & 0.64 & 0.79 & 0.5 \end{bmatrix},$$

$$P_5 = \begin{bmatrix} 0.5 & 0.7 & 0.8 & 0.6 \\ 0.3 & 0.5 & 0.65 & 0.55 \\ 0.2 & 0.35 & 0.5 & 0.4 \\ 0.4 & 0.45 & 0.6 & 0.5 \end{bmatrix}$$

The estimation of each matrix element by using formula 1, 2 and 3 will generate 6 estimated values. For example the estimated value of all matrix P_4 elements is presented in Table-1. For each element of the matrix P_4 there are 7 values (r = 7), i.e. 6 estimated values and 1 real value and we can calculate Discrimination and Inconsistency value.

$$\text{Discrimination} = \sqrt{\frac{\sum_{j=1}^{n} r(M_j - GM)^2}{n-1}} = \sqrt{\frac{1.54057}{(12-1)}} = 0.3742 .$$

$$\text{Inconsistency} = \sqrt{\frac{\sum_{j=1}^{n} \sum_{i=1}^{r} (M_{ij} - M_j)^2}{n(r-1)}} = \sqrt{\frac{3.80029}{12x(7-1)}} = 0.2297$$

$$\text{CWS-Index for Expert} - 4 = \frac{0.3742}{0.2297} = 1.629$$

The CWS-index for all experts are represented in Table-2. CWS-Index for Expert-1, Expert-2, Expert-3, Expert-4 and Expert-5 subsequently is 3.580, 8.237, 12.610, 1.629 and 7.612. Based on these CWS-Indexes, the Expertise-based Experts ranking obtained is [47]: Expert 3 - 2 - 5 - 1 - 4.

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Table-1. The CWS-Index calculation for Expert-4.

Element Matrix	Original data	Formula-1		Formula-2		Formula-3		M_j	$r(M_j - GM)^2$	$\sum_{i=1}^{r}(M_{ij} - M_j)^2$
p_{12}	0.43	0.714	0.857	0.714	0.857	0.714	0.857	0.724	0.32655	0.13703
p_{13}	0.64	0.357	1	0.357	1	0.357	1	0.633	0.10789	0.72886
p_{14}	0.71	0.286	0.357	0.286	0.357	0.286	0.357	0.357	0.16037	0.16327
p_{21}	0.57	0.286	0.143	0.286	0.143	0.286	0.143	0.296	0.31635	0.16764
p_{23}	0.43	0.714	0.643	0.714	0.643	0.714	0.643	0.643	0.12636	0.11224
p_{24}	0.36	0.786	0.143	0.786	0.143	0.786	0.143	0.439	0.03403	0.77988
p_{31}	0.36	0.643	0	0.643	0	0.643	0	0.388	0.10206	0.68222
p_{32}	0.57	0.286	0.357	0.286	0.357	0.286	0.357	0.367	0.13948	0.05539
p_{34}	0.21	0.571	0.429	0.571	0.429	0.571	0.429	0.480	0.00585	0.11953
p_{41}	0.29	0.714	0.643	0.714	0.643	0.714	0.643	0.673	0.19050	0.13120
p_{42}	0.64	0.214	0.143	0.214	0.143	0.214	0.143	0.571	0.02772	0.63265
p_{43}	0.79	0.429	0.571	0.429	0.571	0.429	0.571	0.531	0.00342	0.09038
Total									1.54057	3.80029

Table-2. Discrimination, Inconsistency, CWS-Index and Experts Ranking.

	e_1	e_2	e_3	e_4	e_5
Discrimination	0.3703	0.3302	0.5835	0.3742	0.4662
Inconsistency	0.1035	0.0401	0.0463	0.2297	0.0612
CWS-Index	3.580	8.237	12.610	1.629	7.612
Rank	4	2	1	5	3

Table-3. The Importance Weights Calculation Using BUM $Q(R) = R^\alpha$.

	e_3	e_2	e_5	e_1	e_4
CWS- Index	12,6100	8,2370	7,6120	3,5800	1,6290
Log(CWS-Index)	1,1007	0,9158	0,8815	0,5539	0,2119
Accumulated(Log(CWS-Index))	1,1007	2,0165	2,8980	3,4519	3,6638
R=Normalized(Accumulated(Log(CWS-Index)))	0,3004	0,5504	0,7910	0,9422	1,0000
$Q(R) = R^\alpha = R^{0.25}$	0,7403	0,8613	0,9431	0,9852	1,0000
Importance Weights for $\alpha = 0.25$ (in %)	74,03	12,10	8,17	4,22	1,48
$Q(R) = R^\alpha = R^{0.5}$	0,5481	0,7419	0,8894	0,9706	1,0000
Importance Weights for $\alpha = 0.5$ (in %)	54,81	19,38	14,75	8,13	2,94
$Q(R) = R^\alpha = R$	0,3004	0,5504	0,7910	0,9422	1,0000
Importance Weights for $\alpha = 1$ (in %)	30,04	25,00	24,06	15,12	5,78
$Q(R) = R^\alpha = R^2$	0,0903	0,3029	0,6256	0,8877	1,0000
Importance Weights for $\alpha = 2$ (in %)	9,03	21,27	32,27	26,20	11,23

Table-3 shows the importance weights calculation using BUM $Q(R) = R^\alpha$. After obtaining the rank, the experts are sorted by their expertise level. Expert-3 (e_3) is an expert with the highest rank and placed on the first order. Expert-2 (e_3) is in the second order. Then we calculate the logarithm of the CWS-Index and the accumulation of the logarithm of the CWS-Index. After normalized the accumulation of the logarithm of the CWS-Index, the maximum value of these logarithm is 1 in accordance with the BUM function which has a maximum value of 1 and the experts total Importance weights are 1. In Table-3, the BUM function will be determined by

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several values of the parameter α. For example, for the parameters $\alpha = 0.25$, $\alpha = 0.5$, $\alpha = 1$, $\alpha = 2$.

Suppose, we want to determine the importance weight of DMs for parameter $\alpha = 0.25$.

The CWS-Index for e_3 is 12,610

For e_3, Log(CWS-Index)=log(12,610) = 1,1007

For e_2, Log(CWS-Index)=log(8,2370 = 0,9158

For e_3, Acc((Log(CWS-Index)) =1,1007

For e_2, Acc((Log(CWS-Index)) =1,1007+0,9158=2,0165

For e_3, R=Norm(Acc(Log(CWS-Index)))=1,1007/3,6638= 0,3004

For e_2, R=Acc((Log(CWS-index))=2,0165/3,6638   = 0,5504

If parameter $\alpha = 0,25$, $Q(R) = R^{\alpha} = R^{0.25}$

For e_3, $Q(0,3004) = 0,3004^{0.25} = 0,7405$

For e_2, $Q(0,3004) = 0,5504^{0.25} = 0,8613$

The Importance weight for e_3 is 74, 05 %.

The Importance weight for e_2 is 86, 13% - 74, 05 % = 12, 10 %

If parameter $\alpha = 2$, mismatches occur since the expert with higher expertise level gained smaller importance weight, for example Expert-3 (e_3) as the expert with the highest expertise level, gets the smallest importance weight. If the parameter $\alpha = 1$, expert with higher level of expertise gained greater importance weight but not significantly. If the parameter $\alpha = 0.5$, expert with higher level of expertise gained greater importance weight significantly. Thus the parameter α should be less than 1 to obtain the expected result, the higher the expert's expertise level, the higher his/her importance weight.

CONCLUSIONS

An *expertise-based experts importance weight* method is proposed in order to develop the experts importance weight in adverse judgment situation in which every expert provides his/her judgment in pairwise comparisons FPR.

This model consists of 2 stages. The first stage, we obtain the experts' ranking by combining the experts' expertise level and Additive Consistency of FPR. In the second stage, we develop the experts' importance weight by using Basic Unit-Interval Increasing Monotonic Functions $Q(R) = R^{\alpha}$, $\alpha < 1$ to get the expected results, the higher the expert's expertise level, the higher his/her importance weight.

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Publication Fee

Title:　　Towards computer-generated Mnemonic phrases: Experiments with genetic algorithms and n-grams

Author (s):　James Mountstephens

Abstract:　Mnemonic phrases have the potential to help people commit information to memory and may be a valuable aid to education. However, their widespread application is currently limited by the effort and creativity required to generate them manually. This paper describes a method for the automatic generation of effective mnemonics by computer, framing the task as an optimisation problem to be solved by Genetic Algorithms using parser output and n-gram frequencies to evaluate fitness. Grammatical constraints and lexical familiarity are parameters tested for their ability to produce more memorable sentences. The method has been implemented using custom code and existing libraries, and tested, showing promising results on list data of increasing difficulty.

Full Text

Title:　　Experimental study of biomass stove portable with and without fin which briquettes fuel from corncob

Author (s):　Syamsuri and Suheni

Abstract:　The increase in energy demand caused by population growth and resource depletion of oil reserves as well as the problems of emissions from fossil fuels put pressure on every country, especially Indonesia. Briquettes of corncob were one of the alternatives. In addition replaced the firewood, they also did not potentially damage the ecology of the forest and could replace fossil fuel reserves that were running low. Water boiling test was used to determine the performance of a portable stove with and without fin. Inside the stove there were 3 pots: pot 1 contained egg, pot 2 contained of rice, and pot 3 was vegetables. This study was obtained for the power of furnace for different diameter of briquette 3/4 ", 1" and 1.5" without fins was equal to 0.87 kW, 1.12 kW and 1.57 kW, respectively. Efficiency 17.58%, 19.7%, and 23.15%. While the furnace with diameter briquette 3/4 ", 1" and 1.5" using fins obtained the power 0.98 kW, 1.32 kW and 1.96 KW. Efficiency 14.84%, 20.91% and 25.27%. The fastest cooking time was gained for the finned pan with diameter of briquettes 1.5" over 20 minutes.

Full Text

Title:　　Measuring the net benefit of an e-commerce for a university: A case study of the university of Surabaya's e-commerce

Author (s):　Jimmy

Abstract:　E-commerce is the use of telecommunication network, the internet in particular, to conduct business activities such as purchasing, sales of goods and services, after sales services and many other kinds of business processes. Although e-commerce could deliver dramatic positive impacts for an organization, an e-commerce implementation require a considerable amount of investment and the result of that large investment is hard to measure. The objective of this study is to measure the net benefit of an e-commerce for a university using a case study of the University of Surabaya's e-commerce. To measure the net benefits, this paper will use the updated Delone and McLean Information System Success Model due to the popularity of their model among I.S. researchers. Although, this study is unable to quantify the net benefits in term of money of an e-commerce implementation, this study reveals how an e-commerce can be used by a university to generate various significant positive impacts towards its customers, to its staffs, to the organization itself and also to the environment.

Full Text

Title:　　Application of improved multistage vehicle routing problem with time window

Author (s):　Dian Retno Sari Dewi, Dini Endah Setyo Rahaju and Lisa Anjani

Abstract:　This paper presented an application of improved multistage vehicle routing problem with time window. By using this improved method, we can solve a multistage vehicle routing problem issue. We applied this model for two layers multistage. First layer consist of only one depot which distribute items among the distributors, second layer consist of several distributors which distribute items among several retailers. Adaptation to Larsen model was for second layer, which consist of several distributors which distribute to several retailers. Meanwhile Larsen model only worked on one depot which distribute among several distributors. In this model, we worked on two steps. First step is to solve second layer problems. We must determine the delivery area of retailers among the distributors by combine all possible path to minimize distance within capacity vehicle constraint and time window constraint. Next step was to solve first layer problem. We worked with Larsen model for solving the first layer. Using this improved multistage vehicle routing problem with time window helped to solve multistage vehicle routing problem as well as minimize distance.

Full Text

Title:　A study on ERP assimilation and benefit realisation based on diffusion of innovation theory

Author (s):　Rajesri Govindaraju and Rizka Aisha Rahmi Hariadi

Abstract:　Along with the development of information technology, lots of companies implement Enterprise Resource Planning (ERP) systems because ERP systems promise a lot of benefits. Although many companies have successfully implemented ERP systems, not all companies get the benefits of ERP system since ERP systems have not been able to diffuse in the routine of organization. This study examined the influence of organisational factor on enterprise resource planning (ERP) benefits realisation through ERP assimilation process. A conceptual model was developed based on the diffusion of innovation (DOI) theory. The developed model was tested using empirical data gathered from a questionnaire survey. Data processing was done using structural equation modeling (SEM) with the support of Lisrell 8.7 statistical software. The result of hypotheses testing shows that ERP assimilation significantly influences overall ERP benefit. Further, this study found that outcome orientation and communication process influence ERP assimilation process significantly.

Full Text

Title:　Determination of emission factors for soil borne dustfall and suspended particulate in ambient air

Author (s):　Arief Sabdo Yuwono, Lia Amaliah, Nur Riana Rochimawati, Allen Kurniawan and Budi Mulyanto

Abstract:　Two important factors contributing air quality deterioration, i.e. dustfall and suspended particulate, are obligatory parameters necessary to describe air quality. The research objectives were to measure the generated dustfall and suspended particulate in ambient air over a model area constructed of Oxisol as well as Ultisol soil and to determine the emission factors of dustfall and suspended particulate generation as affected by wind speed and soil moisture content over an area covered by both soil classes. The measurement of dustfall and suspended particulate was conducted in a laboratory scale tunnel where the land surface was covered by Oxisol and subsequently changed by Ultisol soil. The instruments used during the experiments were dustfall canister, blower, anemometer, moisture tester, tunnel, analytical balance, Petri dish, filter paper 10μ and universal oven. Result of the measurements showed that the average generated dustfall from Oxisol and Ultisol soil surface were 9 and 15 ton/km^2·month, respectively. The generated suspended particulate from Oxisol covered area was 150 μg/Nm^3 and for Ultisol area was 102 μg/Nm^3. The developed emission factor equations as affected by wind speed and soil moisture content are at this point ready for field implementation to predict the dustfall and suspended particulate generation over land covered by both soil types.

Full Text

Title:　Characteristic of vortex in a mixing layer formed at nozzle PitzDaily using OpenFOAM

Author (s):　Suheni and Syamsuri

Abstract:　PitzDaily nozzle was the most substantial component in a gas turbine. This nozzle was used to mix air with propane. In the application value of turbulence and vortex center was very important for this type of nozzle. Reynolds number was a parameter used to see its effect on the value of turbulence and vortex center. The method applied was a numerical simulation by using OpenFOAM. This simulation was performed to determine the distribution of pressure, streamline, turbulence, and vortex center. The study was conducted by varying Reynolds numbers 12210, 50000, and 100000. Grid independent test was made to validate with the results of previous research. By this simulation results indicated that this method was feasible and the solver was highly accurate. The results showed that the higher the value of Reynolds number, the further away of vortex center rear nozzle. The mark of turbulence and vortex length were also increased. In addition to that the larger the value of this then the mixture of air and propane formed a fine grained, so it became more perfect combustion.

Full Text

Title:　Expertise-based experts importance weights in adverse judgment

Author (s):　Evy Herowati, Udisubakti Ciptomulyono, Joniarto Parung and Suparno

Abstract:　The objective of this research was to propose the use of expertise levels of experts to determine the experts' importance weights since there has been no research that determines the 'importance weight' using the expertise level as a whole. The significance of this research was the integration of three concepts, namely: the *expert's expertise level*, FPR's *Additive Consistency* and *the Induced-OWA operator* to obtain the expert's importance weight in adverse judgment situation. The Expertise level of an expert in adverse judgment situation is determined by his/her own assessment on a set of alternatives and defined as 'the ability to differentiate consistently' and expressed as the ratio between Discrimination and Inconsistency. The experts provided their preferences using FPR (Fuzzy Preference Relations) since FPR has Additive Consistency property to replicate each element of FPR matrix. Experts were sorted according to their expertise level and the experts' importance weights followed the OWA (Ordered Weighted Averaging) operator's weights which were determined by parameterization using Basic Unit-Interval Increasing Monotonic functions. The experts' importance weights model illustrated by a numerical example, and it concluded that the higher the expert's expertise level, the higher his/her importance weight.

Full Text

Title:　Analysis of temperature dependence on solar energy radiation pattern at different wavelengths

Author (s):　M. A. Humayun, M. A. Rashid, F. Malek and Syafruddin Hasan

Abstract:　This paper presents a theoretical analysis of the effect of atmospheric temperature and the light emission wavelength from the Sun on the solar energy radiation pattern. In this study, we have investigated extensively the radiant emittance phenomena of the solar radiation by using Planck's law of radiation and the Stephan-Boltzmann's law. Wavelength dependence of radiant emittance has been analyzed at three different temperatures. We have considered the three different temperatures such as room temperature i.e. 300K as temperature below room temperature and 325K as the temperature above room temperature. The three different temperatures considered in this present analysis are chosen very close to each other to investigate exactly the effect of wavelength on the radiation pattern of the emitted energy from the Sun due to the small change in temperature. Further the effect of temperature on radiant emittance has also been investigated at three different wavelengths. The three wave lengths considered in our research work are 1.55μm, 1.3μm and 0.89μm respectively. The range of wavelength has been considered within the limit of 0.89μm - 1.55 μm because this range of wavelength corresponds to the energy bandgap of the semiconductor materials from 0.8 eVto 1.4 eV, which are widely used for solar cell fabrication. The investigation of the temperature dependence with maximum wavelength of the radiated energy was carried out up to the black body temperature. Numerical results obtained have been analyzed. It is revealed from the numerical analysis that not only the atmospheric temperature but also the wavelength of the emitted light from the Sun affects the radiation pattern significantly.

Full Text

Title: A comparative study of conceptual graph and concept map

Author (s): Ruziana Binti Mohamad Rasli, Faudziah Ahmad and Siti Sakira Kamaruddin

Abstract: The purpose of this paper is to compare two types of graphical models that are widely being used nowadays. The models are called conceptual graph and concept map. Although the names of these models are similar, however, the characteristics of each model are different. A number of 18 papers are compared and important elements for these models are discussed in these papers. This paper is divided into eight sub-topics. The output of this paper is the comparison of characteristics and usage of these two graphical models. In the last part of this paper, a conclusion of the models is made to give better view of it.

Full Text

Title: The effect of zinc dialkyldithiophosphate addition to corn oil in suppression of oxidation as enhancement for bio lubricants: A review

Author (s): Muhamad Azwar Azhari, Quratul Nadia Suffian and Nur Rashid Mat Nuri

Abstract: The needs of having a substitute for petroleum based lubricant are being studied by researchers since the last decades. Vegetable oil which is known to be biodegradable, renewable and have the similar properties of lubrication as petroleum based oil is seen to be a candidate for the substitution. However, the high content of unsaturated fatty acids in vegetable oils causes the oil to be less cooperative in stabilizing oxidation. The purpose of this paper is to discuss the effect of zinc dialkyldithiophosphate (ZDDP) addition as antioxidation agent in commercialized corn oil process as a barrier to commercialized corn oil. The introduction of ZDDP into the corn oil could resolve the oxidation problem since ZDDP is an effective antioxidant. The capability of ZDDP exhibits both primary and secondary antioxidant is desirable in biolubricant oil in order to suppress the oxidation process.

Full Text

Title: Methods of tumor detection using microwave technology: A review

Author (s): Myzatul Diana Daud, Mohd Azlishah Othman, Mohd Fairuz Iskandar Othman

Abstract: The present study, which is a part of a series of comparative studies, aims to find out the type of techniques for tumor detection. The tumor detection usually used is mammography, where is it being quite sensitive to the lesions in the breast by compressing the breast on X-ray image. But it still due to exposure to ionizing radiation with the way of diagnoses method by breast compression and furthermore mammography is not sensitivity for early-stage tumor detection but only for the best and effective medical treatment. So the engineers and scientists are motivated to make improvement in alternative or complementary technologies for breast imaging techniques which technique is can promise the procedure is safe, simple to perform, reasonable cost, existing convenience, sensitive to the tumors and methods of screening for breast cancer has been established namely, ultrasound, mammography and magnetic resonance imaging (MRI). More important is comfortable to patients. The result of analysis from the engineers and scientists found and propose microwave imaging is the best method for breast cancer detection and they had proven their experiment. In addition, their upgrade this method to become more sensitive which is can detect early-stage breast cancer namely microwave imaging via space-time (MIST) beam forming. To optimize measurement moderate endogenous dielectric contrast between normal and malignant tissues and increase the spatial resolution at microwave frequencies is more challenging.

Full Text

Title: Mobile learning application based on augmented reality for science subject: iSains

Author (s): Nazatul Aini Abd Majid and Nooraidah Kamarudin Husain

Abstract: The use of technology in education is no longer foreign. Various forms of technologies have been applied in order to attract and increase students' attention in the learning process. Therefore, the development of an application based on science education which includes Augmented Reality technology and Thinking Map concept are considered desirable. The development of this application is mainly due to the identification of several shortcomings by the lack of students' involvement during the teaching and learning process, less mobile aid learning approach, and lack of existing mobile application for science subject for primary schools. The main objective of this research is to design and develop a new mobile application that can be an additional tool in learning science. This application called iSains was developed based on Rapid Application Development methodology for two topics which are the day and night, and moon phases. This research has contributed to the development of mobile application of science subject for primary school in Malaysia by integrating a new emerging technology in education which is Augmented Reality that allows students to view 3D model of moon phases through their text book. Thinking map concept has also been implemented in the application in order to improve the organization of the learning content. This mobile application is expected to assist primary students in Malaysia to learn about the day and night, and moon phases, effectively.

Full Text

Title: Ontology-based knowledge acquisition for Thai ingredient substitution

Author (s): Pimsupa Saengsupawat, Thara Angskun and Jitimon Angskun

Abstract: Cooking is an important activity because food is one of the basic necessities of life. However, some ingredients are difficult to find in some seasons or some regions, therefore ingredient substitution is needed for real taste. This article presents a knowledge acquisition model for ingredient substitution by applying Thai cuisine recipe for a case study. The main purpose of this research is to substitute rare Thai ingredients using existing ingredients. The proposed model is applying the concept of domain ontology to design the entities and relations among these entities which are related to ingredient substitution in Thai cuisine recipe. In addition, a set of rule bases by Semantic Web Rule Language (SWRL) is designed and embedded into the ontology to apply for discovering the existing ingredients that can substitute the rare Thai ingredients.

Full Text

Title: Self-organization feature map based on VQ components to solve image coding problem

Author (s): Sahdi M. S. Hilles and Maidanuk V.P.

Abstract: This paper present image coding which is gained many researchers attention in order to improve the quality of image after the compression process. Since this is expended most computing resources and research which is related not only to search for a mathematical transformation, but also to study the characteristics of visual perception of the image features and fail-safe transmission of images via communication channels. There are many methods of image coding with neural networks of 2D SOFM kohonen map have been suggested and investigated. The coding schemes are proposed methods vector quantization as the original image, and the spatial frequency image component derived from the adaptive to the contours of the two-dimensional analysis and synthesis. The calculation of the computational cost in compression based on Kohonen maps. The methods are characterized by a high level of adaptation due to the introduction of educational stage that provides for the increase of multiplication ratio and high quality of image restarting after coding. The modified method of image multiplexing based on characteristic feature of the given method is vector digitizing of image components. This paper considers the coding problem of photo realistic images, presented in a digital form. The characteristic feature of the method is the application of pair exchange, this increases processing speed and sorting of data arrays. However the result of proposed method is shown the image quality after compression processor. Using this approach the differences or lost pixels between the image after and before compression processor are considered. The propose method may useful for image representation and image coding researcher and such related field.

Full Text

Title: Modified Direct-ZBR method PSO power flow development for weakly meshed active unbalanced distribution systems

Author (s): Suyanto, Indri Suryawati, Ontoseno Penangsang, Adi Soeprijanto, Rony Seto Wibowo and DF Uman Putra

Abstract: Electrical distribution system is a part of electrical system that is directly connected to the customers. Reliability and power quality of electrical distribution system must be maintained so that they can use electricity continuously. Many methods can be done to improve them of electrical distribution system, such as penetration of Distributed Generations (DG's) and weakly meshed distribution network reconfiguration. These methods will change a passive distribution network to an active one with weakly meshed configuration. Due to the special characteristics of distribution systems, this paper introduces a three phase power flow method that can handle passive/active and radial/weakly meshed distribution networks. The Modified direct-Z_{BR} method is developed in this proposed method and combined with Particle Swarm Optimization (PSO). The proposed method is applied to 20 kV distribution network in Surabaya city, East Jawa, Indonesia. Three simulation cases are studied for the test system. The computational speed of three simulation cases shows the number of iterations for these cases are increased but the apparent losses decrease. It means that the proposed method is robust and suitable for weakly meshed reconfiguration. The results show that the proposed power flow method can handle the active unbalanced distribution system with weakly meshed configuration.

Full Text

Title: An energy efficiency mobile clustering system for wireless sensor networks

Author (s): M. Zen Samsono Hadi, Aries Pratiarso and Hideyuki Uehara

Abstract: In recent years, research on wireless sensor networks has increased significantly because it offers the advantage of monitoring a wide variety of environments to detect physical phenomena. Wireless sensor networks consist of many sensor nodes where each sensor node has ability to send, receive and detect phonemena. On the other hand, sensor nodes have limited capabilities such as memory capacity, bandwidth and energy consumption. In this research, we focus on energy consumption in supporting clustering protocol and evaluate it in mobile networks. We use the reference of protocol i.e. LEACH to evaluate our protocol i.e. MN-LEACH. The proposed protocol add feature of LEACH to support mobile nodes as well as to get energy efficiency in each round of the network resource. The performance of MN-LEACH outperforms LEACH because it supports hand-off mechanism.

Full Text

Title: Sustainable long-term electricity supply-demand: Bottom-up models review and overview of the proposed framework

Author (s): Yusak Tanoto and Ekadewi A. Handoyo

Abstract: Long-term electricity supply-demand can be generally represented into bottom-up models in order to perform optimization with regard to available energy resources and demanded power. The main objective of such models is usually to minimize energy system cost as well as sectoral cost. The aim of this paper is to present a brief review of the commonly used bottom-up energy models and the overview of the proposed framework which describes a sustainable long-term electricity supply-demand. The framework is mainly developed using Long-range Energy Alternatives Planning System (LEAP). In the proposed framework, Demand Side Management is considered as one of system's scenario in the demand side whereas utilization of locally available renewable energy resources is taken into account in the supply side.

Full Text

Title: Application of hot air tray drying in small scale traditional home roof tiles manufacture cluster in Ngunut Sub-district East Java Indonesia

Author (s): Puguh Setyopratomo

Abstract: Home roof tiles cluster located in Ngunut Sub-district, East Java Indonesia has been developed since 1970. In such traditional tiles manufacturing business sun drying is still used and the main problem is the long drying time and its dependency on the season. This work intends to solve the main problem by implementing hot air tray drying instead of the sun drying. Hot air drying at air temperature range 50 - 90 °C and air velocity ranging from 0.4 m/s to -0.6 m/s resulted in moisture diffusivity within wet tile range 2.46x10-4 - 4.20x10-4 m^2/s and drying rate range 25 - 35 gr H$_2$O/(m^2.mnt). Application of hot air tray drying instead of sun drying result in reduction of total drying time from 5 days to one day, then production capacity significantly increases. Furthermore, another major advantage of the application of hot air tray drying is its independency on the seasons, since hot air drying will running well in both dry and rainy season.

Full Text

Title: Fourier series semiparametric regression models (case study: the production of lowland rice irrigation in Central Java)

Author (s): Luh Juni Asrini and I Nyoman Budiantara

Abstract: Semiparametric regression model is a regression model where the shape of regression curve consists of a known pattern of parametric components and a smooth (smooth, flawless, slippery) nonparametric component which the pattern is unknown. The approach that used in estimating the nonparametric regression curves, one of which is, the Fourier series estimator. Fourier series estimator is commonly used when a data investigated patterns are not known and there is a tendency of repeating patterns. In the Fourier series estimator, the shape of nonparametric regression curve is assumed unknown and is contained in the space of continuous functions $C(0, n)$. This study aimed to analyze the shape of the estimator of the Fourier series semiparametric regression curve and applying it's to the data production of lowland rice irrigation in Central Java. Case studies are used to model the production of lowland rice irrigation in Central Java with predictor variables harvest area, the use of fertilizers, pesticides, seed, and the use of labor. Modeling aimed to determine the magnitude influence of the predictor variables on the response variable that is the number of production of lowland rice irrigation in Central Java. Modeling the production of lowland rice irrigation in Central Java with Fourier series semiparametric regression produced the coefficient value of determination $R^2 = 0.92$. It means that the magnitude influence of the predictor variables on the response variable is 92%. The performance of Fourier series semiparametric regression model was quite good in modeling the production of lowland rice irrigation in Central Java.

Full Text

Title: Study the use of additional materials to improve quality concrete using the sand with high levels sludge

Author (s): Dewi Pertiwi, Eka Susanti and Theresia Maria C.A.

Abstract: With the increasing use of concrete in the construction industry, the more effort to make it. According to ISO, the sand used for the concrete mix should not contain levels of sludge, which is more than 5%. In reality, however, the field-level implementation sludge contained in the sand for the concrete mix is often overlooked, because to achieve a level of mud that is less than 5% sand, must be washed first. For washing the sand in large quantities will require plenty of water and quite a long time. Previous researchers conducted a study on the effect of aggregate mud content; the quality of the concrete, the results obtained from these studies that the mud content of 7% to 20% decreased the compressive strength of concrete is not too significant to normal, with the percentage decrease of 0.432%, 0.996 %, 2.847%, 4.858%. Based on the findings above, this time researchers will conduct experiments with the manufacture of concrete mixtures in the laboratory using additional materials such as cement and fly ash with a percentage based on the excess mud contained levels on a sand. The test specimen used in the form of the cylinder size 150mm x 300mm, used sand containing mud content of 18% and 20%, in which the experiment makes 5 Variations specimen, variation 1 by adding 13% of cement by weight of cement to the sand with 18% mud content, variation 2 by adding 15% cement, 20% for mud levels. Variation 3 adds the fly Ash 13%, while variation 4 adding 15% fly ash. For variety of 5, use sand containing mud with content of 3.6% as a comparison for Normal Concrete. The result showed an average compressive strength of concrete for variation 1 is 22,45Mpa the medium compressive strength of concrete for variation 2 is equal to 21.90 MPa. Then the mean compressive strength of concrete of variation of 3 is equal to 25.14 MPa. Next the mean compressive strength of concrete is equal to 28.20 MPa for variation 4. Finally, the compressive strength of concrete for variation of 5 is equal to 21.94 MPa. Thus variation 1 has increased the compressive strength of concrete by 2.32%. Variation 2 decreased by 0.18%. Variation 3 an increase of 14.58%. Variation 4 an increase of 28.53% against the normal concrete (Variation 5).

Full Text

Title: Optimal design of wind turbine blades equipped with flaps

Author (s): I. Kade Wiratama and Alireza Maheri

Abstract: As a result of the significant growth of wind turbines in size, blade load control has become the main challenge for large wind turbines. Many advanced techniques have been investigated aiming at developing control devices to ease blade loading. Amongst them, trailing edge flaps have been proven as effective devices for load alleviation. The present study aims at investigating the potential benefits of flaps in enhancing the energy capture capabilities rather than blade load alleviation. A software tool is especially developed for the aerodynamic simulation of wind turbines utilising blades equipped with flaps. As part of the aerodynamic simulation of these wind turbines, the control system must be also simulated. The simulation of the control system is carried out via solving an optimisation problem which gives the best value for the controlling parameter at each wind turbine run condition. Developing a genetic algorithm optimisation tool which is especially designed for wind turbine blades and integrating it with the aerodynamic performance evaluator, a design optimisation tool for blades equipped with flaps is constructed. The design optimisation tool is employed to carry out design case studies. The results of design case studies on wind turbine AWT-27 (Aerodynamic Wind Turbine-27) reveal that, as expected, the location of flap is a key parameter influencing the amount of improvement in the power extraction. The best location for placing a flap is at about 70% of the blade span from the root of the blade. The size of the flap has also significant effect on the amount of enhancement in the average power. This effect, however, reduces dramatically as the size increases. For constant speed rotors, adding flaps without re-designing the topology of the blade can improve the power extraction capability as high as of about 5%. However, with re-designing the blade pretwist the overall improvement can be reached as high as 12%.

Full Text

Title: Extraction of phenolic compounds from green tea using ethanol

Author (s): Puguh Setyopratomo

Abstract: Ethanol was used as a solvent to extract phenolic compounds from dried fresh tea leaves (Camellia sinensis L. Kuntze). The extraction was performed at temperature of 40, 50, and 60 ºC which was maintained using a water bath. Folin-Ciocalteu's reagent was used to determine the total phenolic content spectrophotometrically and gallic acid was used as the calibrant. The highest yield, which was 0.3347 g extract/g dry tea leaves, was obtained at extraction temperature 60 °C and extraction time 240 minutes. While the lowest yield, which was 0.2807 g extract/g dry tea, leaves, was obtained at temperature 40 ºC and 15 minutes extraction time. The value of total phenolic content obtained in this work is between 0.21 - 0.25 mg GAE/mg extract. The study also demonstrated that the extraction of tea leaves with ethanol at relatively low temperature exhibit considerable efficient method to obtain extract with relatively high total phenolic content.

Full Text

Title: Bayesian approach on parameter estimation in hidden Markov model

Author (s): Dwi Agustin N.S, Septiadi Padmadisastra and Sudartianto

Abstract: This paper presents study about the parameter estimation in hidden markov model. The approach is taken from a Bayesian method, there will be two sources of information, there are information from the likelihood function and the prior function. This approach will be applied to daily rainfall data in Darajat, Garut. The numbers of hidden states are used in this paper based on Schmidth and Fergusson's climate classification which are suitable to the local conditions. This classification was obtained three types of

division in the period of one year where the condition called wet months when monthly rainfall > 100 mm per month, moist months when monthly rainfall between 100 - 60 mm and the dry months when monthly rainfall <60 mm per month. The process estimation of hidden markov parameters is using Gibbs Sampler algorithm.

Full Text

Title: Development of a modular system for drilling aid for the installation of dental implants

Author (s): Eugenio Pezzuti, Pier Paolo Valentini, Luca Piancastelli and Leonardo Frizziero

Abstract: In oral implantology, proper execution of the holes for the installation of dental implants is directly related to the correct functioning and durability of the system itself. For this reason, the procedure discussed here, which was once performed freehand in all its phases, is now being implemented through aids with more precision. Masks currently in use are created in resin ad hoc; surgical stents are inserted into the holes that will then be used as a guide. These aids are fixed into the jaw by means of micro bone screws in order to prevent movement during surgery. Despite this, we still use the guides as they are, centered properly with the help of drilling jigs. The same technique is also used in partially edentulous cases through smaller jig fixed on teeth near to the implant zone. In this article, we propose a guidance system for milling cutters used in partially edentulous cases involving from one to three adjacent installations. The purpose of the study was to realize a modular model adaptable to most dental implants, as well as efficient, quick, and low cost by pouring the resin into a plaster mold of the teeth, and then drilling the masks into position in the plants at the required angle.

Full Text

Title: Enhanced ultrawideband (UWB) micro-strip on-body wearable antenna

Author (s): Ajmal Hussain Shah, Suriyya Begum, Veeraiyah Thangasamy and Noor Ain Kamsani

Abstract: This paper presents an ultra-wideband micro-strip patch On-Body wearable antenna for medical applications using WiMAX. The antenna uses thick indigo blue jeans as substrate. The antenna is designed at the resonant frequency of 3.5 GHz. The dimensions of the antenna and the slit have been modified to achieve wide bandwidth. By doing so, not only the bandwidth of 15 GHz has been achieved but the antenna size is reduced by 13.4% as well. The proposed antenna simulation results including gain, directivity and radiation pattern are reported. The results show that the antenna not only provides satisfactory results for the WiMAX applications but also provides extremely good results including the VSWR of 1.12, the gain of 5.8 dB and the directivity of 6.8 dB at 20 GHz. The proposed antenna achieves a remarkable bandwidth as well as a significant size reduction. Hence, the proposed antenna can be used for medical applications using WiMAX as well as the applications operating up to at 20 GHz.

Full Text

Title: Aquifer size determination from material balance for gas reservoirs

Author (s): Freddy Humberto Escobar, Jorge-Andrés Tovar and Victor-Alfonso Andrade

Abstract: During decades, reservoir engineers have used the material balance equation, MBE, for estimating reserves, gas cap size and amount of water influx of oil and gas reservoirs. It has also been used as a tool for prediction the behavior and ultimate recovery of a given hydrocarbon reservoir and, since then, many modifications have been introduced to the MBE. In this work, a reservoir simulation study is conducted for a non-volumetric gas reservoir with different aquifer sizes so a correlation was developed for estimating the size of an underlying aquifer from material balance. The developed expression was successfully tested with field and simulated examples.

Full Text

Title: Design and implementation of fuzzy logic control based speed control of industrial conveyor

Author (s): B. Srikar Sudarsan, M. Sarath Kumar, Sudha Ramasamy and Prabhu Ramanathan

Abstract: This article presents a methodology and verification for implementation of a rule-based fuzzy logic controller applied to a closed loop DC motor speed control. The designed Fuzzy Logic Controller's performance is compared against with that of a PI controller. The importances of the Fuzzy Logic Controllers (FLCs) over the conventional controllers are: They are economically advantageous to develop and implement, a wider range of operating conditions can be covered using FLCs, They are easier to adapt in terms of natural language. For Voltage / Speed control of the conveyor, a reference speed has been used and the control architecture includes rules. These rules portray a nonchalant relationship between two inputs and an output, all of which are nothing but normalized voltages.

Full Text

Title: Graphical user interface for wireless patient monitoring system using zigbee communication

Author (s): N. M. Z. Hashim, M. R. Anuar, A. Jaafar, M. Z. A. A. Aziz, A. Salleh, A. S. Ja'afar

Abstract: Nowadays, heart related diseases are on the rise situation. In Malaysia, the proportion of patients is increasing day by day but the number of doctor and nurse slightly different situation. For this reason, the new propose graphical user interface for wireless patient monitoring system is proposed in order to help doctors and nurses to monitor their patient wirelessly for 24 hours by using a designated proposed device. This system runs as prototype to minimize the costing issue in the hospital. This system consists of software and hardware. Visual Basic Net 2010 software is used to design the graphical user interface (GUI) and Peripheral Interface Controller (PIC) 16F877A microcontroller is used as the hardware to implement the whole proposed system. This system is can be divided into three parts. There are three stages that involved in completing the system. The first is developing a program for the microcontroller, the second is transmitting the data from microcontroller to the personal computer (PC) using XBee module and the third is designing the GUI. In conclusion, the proposed GUI for wireless patient monitoring system facilitated the doctor and nurse in monitoring the patient and increased the efficiency of patient monitoring. For the future recommendation, additional sensor and alarm buzzer shall be added to the system as triggering the observer of the system.

Full Text

Title: Studies undertaken to incorporate marble and granite wastes in green concrete production

Author (s): Garas G. L., Allam M. E. and Bakhoum E. S.

Abstract: In the last 15 years marble, granite and natural stones wastes were estimated in Egypt as 100 million ton. These wastes were accumulated in wide areas that have a potential for new quarries thus hinder the sustainable development in the quarry areas. This study presents efforts undertaken in Egypt as well as other stone producing countries with an aim to adopt new ideas of re-using these wastes in the production of green concrete. Several attempts concluded the advantage of substituting these wastes to sand and cement in the concrete mix. Wastes improved the physical and mechanical properties of concrete due to its high fineness which provided good cohesiveness of concrete. Many tests revealed that 10% substitution of sand by the marble waste in the presence of a super-plasticizing admixture provided maximum compressive strength at the same workability level, comparable to that of the reference mixture after 28 days of curing. Regarding higher contents of stone slurry (substitution of more than 20% of sand), the decrease of compressive strength values was significant. Concrete mixes containing 30% red granite dust showed comparable compressive strength using natural or recycled aggregates, good workability, and excellent reddish colored surface finish. In general, the use of marble dust as sand replacement has more significant effect on the mechanical properties of concrete compared with using it as cement replacement.

Full Text

Title: Review on finite element analysis of sheet metal stretch flanging process

Author (s):   Yogesh Dewang, M.S. Hora and S.K. Panthi

Abstract: This paper presents a review of finite element analysis of stretch flanging process and its finite element simulation, finite element formulation and finite element method (FEM) based parametric studies and their results. Stretch flanging process is secondary sheet metal forming process which is widely used in conjunction with other sheet metal forming process in sheet metal forming industry. It is used for making of automotive components and complex panels. In past researchers had worked on the area of finite element analysis of stretch flanging process in terms of development of FEM based computer programs and by using different commercial FEM software packages. It is observed that majority of finite element simulation for stretch flanging processes have employed explicit dynamic FEM approach. It is also found from FEM based parametric studies that geometrical parameters have greater influence upon the formability of stretch flanging process as compared to material parameters. Besides this, it is also observed that for manufacturing of stretch flange parts and components ferrous alloys were used in past, whereas aluminum alloys being used commonly in present scenario for obtaining corrosion free and lightweight with increased strength parts. Hence, it is found that analysis based on finite element method is a powerful, accurate and efficient technique for better designing of stretch flanging process.

Full Text

Title: A study on the development of a deodorization unit for the toilet bidet

Author (s):   I. S. Hwang and Y. L. Lee

Abstract: Odorous toilet emissions are not convenient in modern, air-tight buildings. Thus, various deodorization methods are used but they do not provide a fundamental solution to the problem. In this paper, a novel deodorization method for bidet-attached toilets is proposed to enhance the deodorization performance of toilets. For this, experiments were conducted to evaluate the performance by attaching various fans and filters as well as passages to the bidet.

Full Text

Title: Energy analysis of a wheat processing plant in Nigeria

Author (s):   O.S. Olaoye, A.A. Adefajo and S.O. Ekundayo

Abstract: Energy study was conducted in a wheat processing plant in Nigeria, to determine the energy consumption pattern for the production of flour. Process analysis method of energy was adopted to evaluate the energy requirement for each of the operations involved in the processing of wheat. The analysis revealed that eight defined unit operations were required for the production of wheat flour. The types of energy used in the processing of wheat flour were electrical and manual with the respective proportions of 99.87 and 0.13% of the total energy. Average energy intensity was estimated to be 0.101 MJ/Kg for the production of wheat flour. The most energy intensive operation was identified as the milling unit with energy intensity of 0.073 MJ/kg (72.20%) followed by the packaging unit using 0.015 MJ/kg (14.39%). Optimization of the milling process is suggested to make the system energy efficient.

Full Text

Title: Production of glues from animal bones

Author (s):   Akpa Jackson Gunorubon and Uku Misel

Abstract: The environmental and health risks associated with improper handling of waste bones will be greatly reduced if bone wastes generated from the abattoirs are converted to useful products. Waste cattle bones have been successfully used in the production of glue. The quality of the produced glue was ascertained by testing for quality indicators such as moisture content, pH, density, ash content and viscosity. The values of these quality indicators were greatly improved on investigation of the effects of water quantity and ratio of glue volume to polyvinyl volume used. The values of these quality indicators for the final glue produced with the new raw materials mix compared favorably with values of standard glue with maximum deviation of 0.20 for the ash content.

Full Text

Title: An essence of software maintenance prediction using the fuzzy model for aspect oriented software

Author (s):   Pradeep Kumar Singh, Om Prakash Sangwan and Abhishek Srivastava

Abstract: Software maintenance is generally used to refer the changes that are made to software after its initial release, installation and operation. In several research it has proven that maintenance involve more than 40 percent of the total cost of the software. External quality factors assessments were always in light from the beginning of the software engineering research and related to internal quality attributes. Several research papers used the internal attributes to derive the external attributes and their relationship have been discussed and validated in several quality models related research papers. This paper considered the major factors that affect software maintenance for Aspect Oriented Software's and divide them into four categories: Separation of Concern, Cohesion, Coupling and Size. Based on the identified factors, a fuzzy model to predict the software maintenance have been proposed and validated for aspect oriented software. Automated software maintainability examination to guide software related decision's was

always in great demand and has been applied from procedural, object oriented to component based software engineering. In this paper a model to predict the maintainability has been proposed and validated using the fuzzy logic for automation of maintainability prediction for AO software.

Full Text

Title: On fabrication and testing of Glare

Author (s): Sunil Bhat and S. Narayanan

Abstract: Various aspects related to fabrication and testing of fiber metal laminate (Glare) comprising 2014-T6 aerospace aluminum alloy sheets alternately bonded with, epoxy resin impregnated, E-glass fiber based composite prepregs are discussed in the paper. Procedures adopted in processing of laminate ingredients and in fabrication of the laminate are elucidated. Experimental techniques for measurement of mechanical properties of Glare *viz.* tensile, flexural and shear strengths and interlaminar fracture toughness are reviewed. Pertinent results are presented. Energy dispersive X-ray spectroscopy of aluminum alloy and optical microscopy and residual stress measurement in aluminum layer of the fabricated laminate are touched upon. Viability of laminate fabrication method is proved by theoretically checking the quality of interfaces between un-identical material layers of the laminate.

Full Text

Title: Anisotropic Bianchi type-I cosmological model for viscous fluid in a modified Brans-Dicke cosmology

Author (s): Mohammed Ashraful Islam, G. M. Wali Ullah and Md. Sayeed Iftekhar Yousuf

Abstract:

We present a new Cosmological solution for a Bianchi type-I Cosmological model filled with viscous fluid in a modified Brans-Dicke theory in which the variable cosmological term is an explicit function of a scalar field. The physical and geometrical properties of this model have been discussed. Finally, this model has been transform to the original form (1961) of Brans-Dicke theory.

Full Text

Title: Car stability controlled by fuzzy algorithm

Author (s): Eugenio Pezzutia and Giampiero Donnicib

Abstract: This paper introduces an improved Electronic Stability Program for cars that can deal with the sudden burst of a tyre. The Improved Electronic Stability Program (IESP) is based on a fuzzy logic algorithm. The IESP collects data from the same sensors of a standard ESP and acts on brakes/throttle with the same actuators. The IESP reads the driver steering angle and the dynamic condition of the car and selectively acts on throttle and brakes in order to put the car on the required direction even during a tyre burst.

Full Text

Title: New model for elliptical flow regime in hydraulically-fractured vertical wells in homogeneous and naturally-fractured systems

Author (s): Freddy Humberto Escobar, Alfredo Ghisays-Ruiz and Luis Fernando Bonilla

Abstract: Pressure tests in infinite-conductivity hydraulically-fractured vertical wells allow for the estimation of the actual half-fracture length. If only elliptical flow is observed then the knowledge of the drainage area is required for the analysis which could lead to have a longer test for observing late psudosteady-state regime. Sometimes, it is unpractical to do so, then a new elliptical model excluding the reservoir area for the half-fracture length estimation is presented in this work for both homogeneous and naturally-fractured occurding hydrocarbon formations. *TDS* technique and conventional analysis were implemented for characterizing this flow regime. The resulting equations were successfully tested with synthetic pressure tests.

Full Text

Title: Design optimization of centrifugal fan of travelling cleaner

Author (s): C. N. Jayapragasan, Sumedh J. Suryawanshi and K. Janardhan Reddy

Abstract: Centrifugal fans play an important role in the proper functioning of any travelling cleaner. This study presents a design methodology to examine the performance of the fan using computational fluid dynamics approach. The effect of fan geometry, fan speed and fillet radius at the inlet on performance of the fan have been assessed. Number of blades and the volute dimensions has been kept constant. Total discharge and fan total efficiency are the output parameters calculated. In order to reduce the number of trails, Taguchi method is used. The fan is modeled using Solid Works 2012 and after simplification the modeled fan is meshed in ICEM CFD. The solution is obtained using FLUENT V6. The post processing is carried out using CFD POST and the results are presented and discussed in detail. Finally the using Minitab 16.0 the responses of parameters have been plotted and the optimum values of the parameters are obtained. These obtained values need to be implemented into the design for better performance of the fan.

Full Text

Title: Effect of plaster type and loading orientation on compression behavior of straw bales for construction

Author (s): Larisa Brojan and Peggi L. Clouston

Abstract: Plastered straw bales are composite building materials used as load bearing walls in sustainable structures worldwide. Structural testing of the composite is necessary to establish mechanical properties for practitioner use and for building code acceptance. This study investigates the compressive behavior of individual two-string rye straw bales when plastered using the most commonly used plasters in temperate climate zones, specifically: lime, lime-cement, and clay. A total of forty-eight specimens were tested to failure under compressive loading in two orientations: on-edge and flat. It was found that results vary not only according to plaster type but also according to bale orientation: on edge bales tended to fail due to buckling of the plastered skins while flat oriented bales failed primarily due to plaster crushing. Importantly, all cases exceeded the maximum load capacity proposed for the 2015 International Residential Code with the lowest factor of safety being 1.8 for on-edge oriented clay plastered bales. Flat-oriented bales plastered in lime-cement were found to have the highest compression capacity, with a factor of safety of

10.7.

Title: Child in car alarm system using various sensors

Author (s): N. M. Z. Hashim, H. H. Basri, A. Jaafar, M. Z. A. A. Aziz, A. Salleh and A. S. Ja'afar

Abstract: The network service system is increasingly extended as the demand from various of usage is growing. Although many products had been invented, there are still the incidents that involve to death of children which been left in cars often occur. The system is designed in order to overcome this unwanted incident from happening. The proposed system is designed to detect sound or voice and any movement made by the children that had been left behind in a vehicle. The main target of the system is to create a complete system which uses Global System for Mobile Communication (GSM) that can communicate with human. GSM modem is the medium to interact and communicate with the module. It is used to send and receive Short Messaging System (SMS) based on which appropriate actions taken by the user. PIC microcontroller performs as heart of whole controlling system. The system at the final stage can be used to detect the sound that had been produced by a human at optimum strength. In addition, it was also able to detect motion that performed by a person and can detect any sounds that produced from inside the car. The system that has generated is expected to continue to expand with concomitant change in time with the developed and equipped with a great technology. It is envisaged that the system is able to overcome the problem of accidents involving children that often left in the car.

Title: Tuning of PID controller for a synchronous machine connected to a non-linear load

Author (s): Gowrishankar Kasilingam and Jagadeesh Pasupuleti

Abstract: This paper proposes a method of determining the optimal proportional integral derivative (PID) controller parameters using the particle swarm optimization (PSO) technique. The stability of the power system is an important factor in the operation of any electric system. A PID controller with a power system stabilizer (PSS) has been developed to maintain the stability and enhance the performance of the power system. Optimization of PID parameters is an important problem in control engineering. A PSO algorithm has been proposed to tune the parameters of the PID controller. The effectiveness of the PID-based PSS has been tested on a single-machine infinite-bus (SMIB) system having a three-phase thyristor-based non-linear load with different kinds of faults. Analysis shows that the dynamic performance with the proposed method is better compared with the conventional trial-and-error method. The speed deviation, rotor angle deviation and load angle were compared in a Simulink-based MATLAB environment. The simulations show that the proposed method damps optimally and suppresses errors to a minimum.

Title: The survey of optimal decision technique for solving computational problems: The applications of Einstein's general theory of relativity

Author (s): G. M. Wali Ullah

Abstract: The paper surveys computational procedures for the optimal decision problem. Advantages of Ying. et all's proposed concept, are illustrated. The proposed algorithm is encouraged by a simulation of several asteroids shifting within a universe to search for the body with heaviest mass. By referring to the Einstein's general theory of relativity, an algorithm is designed to obtain optimal point.

Title: Fem analysis for critical components in engines systems

Author (s): Eugenio Pezzuti and Giampiero Donnici

Abstract: This paper introduces a method to simplify a nonlinear problem in order to use linear finite element analysis. This approach improves calculation time by two orders of magnitude. It is then possible to optimize the geometry of the components even without supercomputers. In this paper the method is applied to a very critical component: the aluminium alloy piston of a modern common rail diesel engine. The method consists in the subdivision of the component, in this case the piston, in several volumes, that have approximately a constant temperature. These volumes are then assembled through congruence constraints. To each volume a proper material is then assigned. It is assumed that material behaviour depends on average temperature, load magnitude and load gradient. This assumption is valid since temperatures varies slowly when compared to pressure (load). In fact pressures propagate with the speed of sound. The method is validated by direct comparison with nonlinear simulation of the same component, the piston, taken as an example. In general, experimental tests have confirmed the cost-effectiveness of this approach.

Title: Identifying recent developments in knee prostheses through a patent analysis

Author (s): Marisela Rodriguez and Alejandro Palacios

Abstract: Artificial knees represent an important issue for a global technology trends analysis. On average, the growth rate of knee replacement surgeries increased by nearly 50% over the past decade in Organisation for Economic Cooperation and Development (OECD) countries. This study focuses on a patent analysis as a part of a Competitive Technical Intelligence methodology. The aim is to provide organizations in this industry with insights on knee prostheses research, particularly to determine the most active patenting entities as well as their focus of research. The topmost in each category: inventors, organisations, technology classifications, advanced materials and top keywords were determined.

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D **Dahlan Sitompul** 3 weeks ago

I have a paper published in this journal in April 2018. Could somebody please help me to describe or explain it to me the different quartiles of a journal has on Scopus (Q3) and On Scimago (Q2) in the same year (2018).

reply

Melanie Ortiz 3 weeks ago   SCImago Team

Dear Dahlan, Thank you for contacting us.
As you probably already know, our data come from Scopus, they annually send us an update of the data. This update is sent to us around April / May every year.
The calculation of the indicators is performed with the copy of the Scopus database provided to us annually. However, the methodology used concerning the distribution of Quartiles by Scopus is different from the one used by SCImago.
For every journal, the annual value of the SJR is integrated into the distribution of SJR values of all the subject categories to which the journal belongs. There are more than 300 subject categories. The position of each journal is different in any category and depends on the performance of the category, in general, and the journal, in particular. The distribution by Quartiles cannot be considered over the journals' total amount within a Category. In the case of SCImago, the distribution has to be considered with the formula Highest-SJR minus Lowest-SJR divided into four.
Best Regards,
SCImago Team

D **Dahlan Sitompul** 3 weeks ago

I have a paper published in this Journal in April 2018 with the following link:http://www.arpnjournals.org/jeas/research_papers/rp_2018/jeas_0418_7024.pdf). It was put on Q2 on Scimago; please have a look by following the link: ARPN Journal of Engineering and Applied Sciences but on the Indonesia Minister of Education website it is put on Q3 (https://sinta.kemdikbud.go.id/authors/detail?id=6696555

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