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- Real Estate

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- Telecommunication Science
- Applied Statistics
- Technology Management

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Abstracts of Scientific Papers

Presented by the Staff of

Assumption University

at

International Scientific Meetings

From July 2011 to June 2012

Prepared and published by

Office of the AU Journal of Technology

Assumption University

Bangkok, Thailand

July 2012
About this publication:

Title: AU ABSTRACTS – 2012

Extended Title: Abstracts of Scientific Papers Presented by the Staff of Assumption University at International Scientific Meetings from July 2011 to June 2012

Prepared by: Narong Chomchalow, Editor, AU Journal of Technology, Office of the President, Assumption University

Editor: Narong Chomchalow, Ph.D.

Deputy Editor: Dobri Atanassov Batovski, Ph.D.

Publisher: Assumption University, Bangkok, Thailand

Date Published: July 2012

For copies write to:

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Ram Khamhaeng Road, Soi 24
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Fax +66 (0) 2300-4511, 2300-4563
Preface

Being an institute of higher learning, and the first international university in Thailand, Assumption University has a definite policy to provide quality instruction to the students, both undergraduates and graduates, and both Thai and foreign nationals. An equally important function of the University is to conduct research in all fields.

Assumption University is one of the leading universities in the field of science and technology. During the past year, several of our faculty members participated in various international meetings held in Thailand and abroad; many have also presented their papers at these meetings. The management of Assumption University is proud of their performance and achievements.

To display and maintain a record of their endeavors and achievements, and to encourage other faculty members to make similar contributions, all abstracts of scientific papers presented at the international scientific meetings during this one-year period from July 2011 to June 2012, have been compiled and published for distribution to interested individuals and institutions. The present publication is the fourteenth issue of the series of the AU Abstracts, published annually. The first one, 'AU Abstracts - 1999' was published in September 1999, covering the presentation period from May 1998 to June 1999. Subsequent publications of the series were published in July covering a period from July of the previous year to June of the next year.

Originally, the Office of the AU Journal of Technology who initiated this publication, was charged with the responsibility to cover the activities of five ‘technology-based’ faculties and schools, namely: Montfort del Rosario School of Architecture and Design, Faculty of Biotechnology, Faculty of Engineering, Faculty of Nursing Science, and Faculty of Science and Technology. As the Office of the President also presented ‘technology-related’ papers, they are included in this publication as well.

It is hoped that this small publication would be of some benefit to our readers and that it will serve a dual purpose, relaying information, as well as an encouragement to all the faculty members of the ‘technology based’ faculties and schools. It is our desire to continue to present this particular series and publication every year.

On behalf of Assumption University, I wish to express my sincere thanks to Dr. Narong Chomchalow, Editor of the AU Journal of Technology, for his initiative, as well as hard work in compiling, overseeing, and preparing the manuscripts of the AU Abstracts - 2012. I also wish to thank Dr. Dobri Atanassov Batovski, Deputy Editor of the AU Journal of Technology, who assisted in verifying the abstracts of this publication.

Rev. Bro. Dr. Bancha Saenghiran, FSG
Rector Magnificus, Assumption University
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Montfort del Rosario
School of
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Kandinsky’s Effect: Reflections on Synesthetic Lesson in Abstraction

Chutarat Laomanacharoen

Department of Interior Architecture,
Montfort del Rosario School of Architecture and Design

When Wassily Kandinsky introduced his art composition treatise in the book Point and Line to Plane in 1926, the method of abstraction was perceived as objective and universal resulting in a learned language for art and design believed to be able to communicate universally. Concurrently, as pertinent literatures asserted that Kandinsky’s art was influenced by his involuntary synesthesia experience, the method can also be viewed as subjective. Therefore, objective teaching and critique of abstraction often raises controversies due to the perceived universal quality.

In this light, this paper proposes a quasi-experimental study based on a small cross-modal experiment conducted by Kandinsky in order to gain insight understanding in abstraction lesson design. In this study, 30 students are randomly divided into two groups: one with a single-modal method of learning, another with a synesthetic or cross-modal method of learning, based on Kandinsky’s synesthetic paintings. In the single-modal method, students compose 3 dimensional models based on their interpretations of assigned paintings while in the cross-modal method; students immerse themselves into the paintings by creating sound samples from percussion instruments, which are then blindly assigned to other students in the same group to compose three dimensional models that best depict the sound samples. Based on Amabile’s CAT (Consensual Assessment Technique), models from both groups are rated by 5 experts and findings are presented in amalgamations of data in order to provide an understanding in advantages and disadvantages of single-modal method (objective-based lesson) and cross-modal method (subjective-based, synesthetic lesson) in abstraction.

Keywords: Cross-modality, abstraction, Wassily Kandinsky, synesthetic lesson in abstraction, artificial synesthetic experience.


Full paper requisition: <chutaratNch@au.edu>.

Note: This abstract has not been published in the previous AU Abstracts – 2011 and is included in the AU Abstracts – 2012 for completeness.
Faculty of Biotechnology
Faculty of Biotechnology

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Application of Biotechnology in Fermented Foods

Churdchai Cheowtirakul

Dean, Faculty of Biotechnology

Today’s fermentation food and beverage manufacturers are facing increasing demand for quality products with fewer additives and preservatives produced at high ethical standards. Biotechnology offers attractive possibilities for supporting these trends. By maximizing their resources and continuously enhancing the quality of their products, fermentation food and beverage manufacturers are improving the choices enjoyed by consumers, producers, and societies around the world. Biotechnology plays an essential role in bringing more nutritious and appealing fermentation food and beverage products to the modern world, and they offer significant benefits beyond the scope of traditional alternatives. Biotechnology R & D is enabling manufacturers to develop superior products that boast unique features and quality claims. At the same time, biotechnology helps the manufacturers to make the most of their resources and optimize their processes, saving time and money while reducing their impact on the environment. The food industries normally involve the using of biotechnology fermentation applications are: Baking, Brewing, Dairy, Distilling, Flavor enhancing, Food specialties, Health and nutrition, juices, Meat processing, Oils & fats, Starch, Wine, etc.

Keywords: Food biotechnology, industrial fermentation, fermented food, fermentation process, enzyme in fermentation food, innovation in food fermentation, fermentation, applications of biotechnology.

Presented at: The National Student Conference on Food Science & Technology “Exploring Food Biotechnology Roles: From Farm to Table”, Department of Food Technology, Faculty of Agricultural Technology, Soegijapranata Catholic University, Semarang, Indonesia, 8 December 2011.

Published in: -

Full paper requisition: <churdchaiChw@au.edu>.
The Study of Natural Antibiotics Effect of Thai Curry Paste in Thai Coconut Milk Based Curry on *Salmonella enterica*

Chuchod Sapabguy and Patchanee Yasurin

Department of Food Technology, Faculty of Biotechnology

The salmonellosis, a disease caused by *Salmonella* spp., is a food safety issue that is a world-wide concern at present. In 2011, there were a lot of reports about the outbreaks of *Salmonella* spp. Thai curry paste is an ingredient in the Thai kitchen, which is composed of many herbs and spices. These are *Capsicum annuum* (chili), *Citrus hystrix* (kaffir lime), *Cuminum cyminum* (cumin), *Allium ascalonicum* (shallot), *Allium sativum* (garlic), *Cymbopogon citratus* (lemongrass), and *Alpinia galangal* (galangal). They have been investigated for their antibiotic effect in many independent laboratories. As such, they are good candidates for natural antibiotic food. Therefore, this project aims to investigate the antibiotic effect of Thai curry paste in coconut milk base on *S. enterica*. The curry was prepared according to Thai traditional home cooking, and inoculated with 1% of culture. Moreover, the control was performed in the same manner into the NB medium. To investigate the effect, cell count serial dilution method was used on the *Salmonella - Shigella* agar every hour for 6 hrs at room temperature. The statistical analysis was done by SAS and it was found that the *S. enterica* level was significantly reduced (*P* < 0.05) in curry compared with control: at 4th hr, 5.72±0.06 and 5.84±0.01; at 5th hr, 5.80±0.04 and 5.91±0.03; and at 6th hr, 5.85±0.04 and 5.96±0.01 log CFU/ml, respectively. It was revealed that Thai curry paste has antibiotic property as it can inactivate the growth of *S. enterica* from the 4th to the 6th hour. This indicates that Thai curry paste is a good candidate as natural antibiotic food.

**Keywords:** Natural antibiotic food, Thai curry paste, herbs, *Salmonella enterica*.

**Presented at:** The International Conference on Food and Applied Bioscience: Creation for Better Life and 20th Anniversary of the Faculty of Agro-Industry, Chiang Mai University (The 3rd Agro-Industry Conference, Chiang Mai University), held concurrently with the 2nd Joint Symposium between the Faculty of Agro-Industry, Chiang Mai University, and Gangneung-Wonju National University, Gangneung, Korea, Faculty of Agro-Industry, Chiang Mai University, Kantary Hills Hotel, Chiang Mai, Thailand, 6-7 February 2012, Poster P-63.

**Published in:** -

**Full paper requisition:** <chuchod.sap@gmail.com; patchaneeYsr@au.edu>.
Study of Liquid-solid and Solid-liquid Behavior of Mixed Vegetable Oils Using Oscillation Tests

Tatsawan Tipvarakarnkoon¹, Rungnaphar Pongsawatmanit², Bernard Senge³, Christiana Sigit⁴ and Amelia Triastuti⁴

¹ Department of Food Technology, Faculty of Biotechnology

Phase change behaviors (liquid-solid and solid-liquid behavior) and their structural changes of refined vegetable oils and their binary blends have been investigated using oscillation tests. Refined coconut oil (CO), palm oil (PO), soybean oil (SBO) and their blends (CO/SBO, PO/SBO with mixing ratio = 50:50) were prepared for temperature sweep tests at the same cooling and heating rate of 0.5°C/min. As results, CO showed distinctive narrow temperature range and at higher crystallization (20 to 16°C) and melting (24 to 30°C) than those of PO (5 to -5°C) and SBO (-9 to -19°C). For binary blends, the crystallization temperatures of CO/SBO (17 to 9°C) and PO/SBO (-2 to -7°C) were observed. The binary blends, therefore, exhibited lower the crystallization temperatures than those of sole CO and PO. The results suggest that the phase changes of refined oils and binary blends depend on the oil type and fatty acid composition in the system.

Keywords: Vegetable oil, oscillation test, co-crystallization, melting, phase change.

Presented at: The International Congress on Food Engineering and Technology (IFET 2012), Bangkok, Thailand, 28-30 March 2012.

Published in: Proceedings of the International Congress on Food Engineering and Technology (IFET 2012), pp. 113-117.

Full paper requisition: <tatsawanChn@au.edu>.

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³ Department of Food Rheology, Technical University (TU) of Berlin, Berlin, Germany. E-mail: <B.Senge@LB.TU-Berlin.de>.
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Natural Antibacterial Activity of Thai Curry Paste in Thai Red Curry-Water Base Model (Kaeng Pa) on Salmonella enterica

Supawan Rattanakom and Patchanee Yasurin

Department of Food Technology, Faculty of Biotechnology

Natural antibacterial activity is now a very interesting food safety trend. The investigation on the food having antibacterial activity itself, as functional food, becomes more dynamic. Salmonella sp. is a food pathogen which has been reported frequently for its outbreaks in a variety of foods. Thai red curry (Kaeng Pa) is a Thai cultural dish and is becoming a menu well-known worldwide. The main ingredients of the Thai curry paste in the Thai red curry are composed of many herbs/spices including Capsicum annuum (red chili), Cymbopogon citratus (lemongrass), Alpinia galanga (galangal), Allium ascalonicum (shallot), Allium sativum (garlic), Citrus hystrix (kaffir lime), and Cuminum cyminum (Cumin). This study aimed to investigate the potential of Thai curry paste in Thai red curry-water base model as a natural antibacterial agent on S. enterica 4, 5, 12: i: - (human) US clone (gift of S. Chaturongakul, MU). Thai curry paste in-vitro antibacterial activity was evaluated by cell count serial dilution method on SS media every hour for 6 hrs at 30°C. The Thai red curry was prepared by a Thai homemade authentic cooking method, as it has been served in the Thai cuisine. The result showed that the S. enterica level in Thai red curry was significantly lower than in nutrient broth, as a positive control, \( P < 0.05 \) during 2\(^{nd}\) - 6\(^{th}\) hours: 2\(^{nd}\) hr, 5.14±0.06 and 5.44±0.17; 3\(^{rd}\) hr, 5.86±0.19 and 6.76±0.28; 4\(^{th}\) hr, 5.85±0.16 and 6.97±0.6; 5\(^{th}\) hr, 5.92±0.22 and 6.26±0.27; and 6\(^{th}\) hr, 6.88±0.04 and 7.51±0.20 log CFU/ml, respectively. The \( t \)-test has been done by using SAS on log CFU/ml with \( P < 0.05 \). The Thai curry paste in Thai red curry showed promising antibacterial activity against food-borne pathogenic bacteria, Salmonella enterica. This makes the Thai red curry become a functional food.

**Keywords:** Natural antibiotics, Thai red curry paste, Kaeng Pa, Salmonella enterica.

**Presented at:** The Food Innovation Asia Conference (FIAC 2012) “Green and Sustainable Food Technology for All”, BITEC, Bangkok, Thailand, 14-16 June 2012, Poster PC 14.

**Published in:** -

**Full paper requisition:** <patchaneeYsr@au.edu>.
Comparison Antibacterial Activity of Thai Red Curry Paste Ingredients between Using Kaeng Pa Model (Aqueous Extraction) and Kaeng Kathi Model (Oil/Aqueous Extraction) on *Salmonella enterica* Typhimurium U302 (DT104b)

Treuktongjai Saenghiruna¹, Irayudi Lazuardi² and Patchanee Yasurin¹

¹Department of Food Technology, Faculty of Biotechnology

Thai red curry becomes popular worldwide and it is important as cultural food. The authentic Thai red curries are Kaeng Pa (aqueous base) and Kaeng Kathi (coconut milk base). The Thai red curry paste consists of herbs/spices which are having a potential natural antibacterial activity. *Salmonella* sp. has been reported recently in outbreaks in a variety of different foods. Therefore, seven herbs/spices in the Thai curry paste: *Capsicum annuum* (chilli), *Citrus hystrix* (kaffir lime), *Cuminum cyminum* L. (Cumin), *Allium ascalonicum* L. (Shallot), *Allium sativum* (garlic), *Cymbopogon citratus* (lemongrass), and *Alpinia galangal* (galangal), were investigated for their own individual antibacterial activity on *Salmonella enterica* Typhimurium U302 (DT104b) by agar diffusion method on SS agar under 3 different food models: Kang-Pa model (aqueous extraction), Kaeng Kathi using UHT coconut milk model (oil/aqueous extraction), and Kaeng Kathi using fresh coconut milk model (oil/aqueous extraction) by using a Thai homemade authentic cooking method. Among three extractions, it was shown that Kaeng Kathi using fresh coconut milk has the highest antibacterial activity in all herbs/spices, followed by Kaeng Kathi using UHT coconut milk, and Kaeng Pa. In coconut milk, active compounds were extracted in both oil and water phases. Fresh coconut milk contains approximately 35% free-fat and 50% free-water substances while UHT coconut milk contains lower percentage in both. This might make fresh coconut milk extraction have the highest antibacterial activity in all herbs/spices. However, this hypothesis needs a further investigation. The result of *in vitro* antibacterial screening showed that *C. cyminum* L. (cumin) and *C. citratus* (lemongrass) crude extracted in Kaeng Kathi using fresh coconut milk have the highest antibacterial activity, 1.6±0.22cm and 1.4±0.24cm, respectively. The minimum inhibitory concentrations of *C. cyminum* (cumin) and *C. citratus* (lemongrass), using broth dilution method, showed 100μl/ml for both. The minimum bactericidal concentrations of *C. cyminum* (cumin) and *C. citratus* (lemongrass), using broth dilution method, showed 150μl/ml and >150μl/ml, respectively. The Thai red curry paste ingredients showed a significantly promising antibacterial activity against food-borne pathogen, *S. enterica* Typhimurium U302 (DT104b).

**Keywords:** Natural antibacterial activity, Thai red curry paste, Kaeng Pa, Kaeng Kathi, *Salmonella enterica* Typhimurium.

**Presented at:** The Food Innovation Asia Conference (FIAC 2012) “Green and Sustainable Food Technology for All”, BITEC, Bangkok, Thailand, 14-16 June 2012, Poster PC 15.

**Published in:** -

**Full paper requisition:** <patchaneeYsr@au.edu>.

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Natural Antibacterial Activity of Thai Curry Paste in Thai Red Curry-Coconut Milk Base (Kaeng Kathi) Model on Salmonella sp. and Listeria monocytogenes

Chuchod Sapabguy and Patchanee Yasurin

Department of Food Technology, Faculty of Biotechnology

For the past 5 years, Salmonella sp. and Listeria monocytogenes outbreaks occurred frequently in a variety of food products. Some foods, being natural antibiotics, might be an alternative choice for food safety. Thai red curry is a cultural dish that becomes a popular dish worldwide. It has a Thai curry paste as a main ingredient, which is composed of a variety of herbs including chili (Capsicum annuum), kaffir lime (Citrus hystrix), cumin (Cuminum cyminum), shallot (Allium ascalonicum), garlic (Allium sativum), lemongrass (Cymbopogon citratus), and galangal (Alpinia galanga). Therefore, the objective of this study was to investigate the antibacterial activity of Thai curry paste in Thai red curry-coconut milk base (Kaeng Kathi) model on both food-borne pathogenic bacteria (S. enterica Enteritidis and L. monocytogenes 10403S). A count of Salmonella using serial dilution method on Salmonella-Shigella (SS) agar was done to evaluate the antibacterial activity of Thai curry paste in vitro at every hour for 6 hrs after incubation at room temperature. Kaeng Kathi was prepared by a Thai homemade authentic cooking method using ultra-high-temperature (UHT) coconut milk, as it has been served in the Thai cuisine. The result showed that the S. enterica Enteritidis level in Kaeng-Kathi was significantly lower than in nutrient broth (NB) (positive control) at the 3rd hour after incubation, 5.53±0.027 and 5.65±0.019 log CFU/ml, respectively, compared to 5.62±0.07 and 5.80±0.03 log CFU/ml, respectively, at the 4th hour after incubation. The L. monocytogenes level in Kang-Kati was significantly lower than in brain-heart-infusion broth (BHI) (positive control) at the 3rd hour after incubation, 5.49±0.01 and 5.61±0.02 log CFU/ml respectively, compared to 5.63±0.02 and 5.70±0.04 log CFU/ml, respectively, at the 4th hour after incubation. The Thai curry paste in the Thai red curry-coconut milk base (Kaeng Kathi) model showed promising results as a natural antibacterial food against both food-borne pathogens and acts as a functional food.

Keywords: Natural antibacterial food, Thai red curry paste, Kaeng Kathi, Salmonella sp., Listeria monocytogenes.


Published in: -

Full paper requisition: <chuchod.sap@gmail.com; patchaneeYsr@au.edu>.
Comparison of Individual Antibacterial Activity of Thai Red Curry Paste’s Ingredients between Using Kaeng Pa Model (Aqueous Extraction) and Kaeng Kathi Model (Oil/Aqueous Extraction) on *Salmonella enterica* Enteritidis (Human)

Treuktongjai Saenghiruna and Patchanee Yasurin
Department of Food Technology, Faculty of Biotechnology

The authentic Thai red curries are Kaeng Pa (aqueous base) and Kaeng Kathi (coconut milk base). The main ingredients of the Thai curry paste in the Thai red curry consist of herbs which have the potential to demonstrate natural antibacterial activity. Therefore, seven herbs/spices of the Thai curry paste: chilli (*Capsicum annuum*), kaffir lime (*Citrus hystrix*), cumin (*Cuminum cyminum*), shallot (*Allium ascalonicum*), garlic (*Allium sativum*), lemongrass (*Cymbopogon citrat*us), and galangal (*Alpinia galangal*) were investigated for their individual antibacterial activity on *Salmonella enterica* Enteritidis (human) by agar diffusion method on *Salmonella Shigella* Agar (SS) under three extractions using a homemade authentic cooking method, as it has been served in the Thai cuisine: Kaeng Pa (aqueous extraction), and Kaeng Kathi (ultra-high-temperature, UHT; fresh coconut milk extraction). The results from *in vitro* antibacterial screening showed that among the three extraction models, Kang-Kati using fresh coconut milk showed the highest potential in inhibiting *S. enterica* Enteritidis (human) in all herbs and the highest antibacterial activity was found in lemon grass, 0.93±0.10cm, while in Kaeng Kathi using UHT coconut milk, kaffir lime peel showed the highest antibacterial activity, 0.9±0.11cm. Kang-Pa gave the lowest antibacterial activity in all herbs/spices. The minimum inhibitory concentrations (MICs), using broth dilution method, of lemon grass were >160µl/ml in Kang-Kati using fresh coconut milk. In Kaeng Kathi using UHT coconut milk, the MIC of kaffir lime peel was 160µl/ml. The minimum bactericidal concentrations (MBCs) of all herbs under three extraction models, using broth dilution method, were >160µl/ml. The Thai red curry paste ingredients showed a significantly promising antibacterial activity against a food-borne pathogen, *S. enterica* Enteritidis (human). It can be suggested that the Thai red curry is a functional food.

**Keywords:** Thai red curry paste, Kaeng Kathi, Kaeng Pa, natural antibacterial activity, *Salmonella enterica* Enteritidis.

**Presented at:** The Food Innovation Asia Conference (FIAC 2012) “Green and Sustainable Food Technology for All”, BITEC, Bangkok, Thailand, 14-16 June 2012, Poster PC 180.

**Published in:** -

**Full paper requisition:** <patchaneeYsr@au.edu>.
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The International Journal of Arts & Sciences’ (IJAS) American Canadian Conference for Academic Disciplines
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Engineering Students’ Academic Performance and Their Perception on Innovative Method of Teaching in Basic Science’s Subjects at Assumption University of Thailand

Kyi Kyi Tin¹ and Aung Aung Kyi²

¹Department of Basic Science, Faculty of Engineering
²Faculty of Nursing Science

As part of an ongoing research to expand the students’ enrollment in engineering faculty at the Assumption University, the Department of Basic Science has undertaken a study to examine the Engineering students’ academic performance and their perception on innovative method of teaching particularly in Basic Science’s subjects starting from academic year 2005. The purpose of this study is to determine the effect of new innovative teaching method (activity-based workshop session) on students’ academic performance and their perception on the innovative method that support previous studies (Kyi Kyi Tin and Min Aung, 2007; Kyi Kyi Tin and Aung Aung Kyi, 2010); to improve students’ learning techniques; to be aware of various teaching method conducted by lecturers; to lessen students dropout due to encountering difficulties in following lectures. In conjunction with the students’ academic performance, the students were given questionnaire on activity-based workshop session (innovative method) that used to evaluate their perception of the basic science’s subjects. The responses were used to assess the students’ participation in learning process; effectiveness in fulfilling learning objectives; improvement in critical thinking and problem solving; to achieve more confidence in their learning skills and creating interactive learning environment. This paper discusses the survey results and investigates how the activity-based workshop alters the improvement of engineering students’ learning capabilities.

Keywords: Perception, innovative, activity-based workshop, capabilities, effectiveness.


Full paper requisition: <kyikyitin@au.edu; aungaungkyi@au.edu>.

Note: This abstract has not been published in the previous AU Abstracts – 2011 and is included in the AU Abstracts – 2012 for completeness.
Performance Evaluation of TOA Estimation for Ultra-wideband System under AWGN and IEEE 802.13a Channel Model

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This paper proposes the performance evaluation of seven Time-of-Arrival (TOA) estimation techniques in Ultra-wideband (UWB) systems. The TOA estimation schemes can be classified 2 types such as one-step and two-step TOA estimation. One-step TOA estimations include the maximum energy selection (MES) and the maximum energy selection based-on block (MES– Block). For two-step TOA estimations, we consider 3 techniques including the separated signal TOA estimations that have 3 types: 1 Cut, 2 Cut and 3 Cut, the threshold-based TOA estimation and the window-based TOA estimation. Additional, we consider three UWB pulses that have power spectral density comply with Federal Communications Commission (FCC) mask. Moreover, we consider two environment types that are Additive White Gaussian Noise (AWGN) channel and UWB channel model based-on IEEE 802.13a (CM2). We use the root mean square error (RMSE) for evaluating and comparing the performance of TOA estimation schemes. The simulation results show that the window-based TOA estimation outperforms than other methods under both channel models. The threshold-based TOA estimation is very sensitive to multipath channel because its performance rapidly decreases when these techniques are applied on UWB channel model.

Keywords: Ultra-wideband communication; two-step TOA estimation.


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A Nonlinear Myriad Filter for a Recursive Video Enhancement Using a Robust SRR Based on Stochastic Regularization

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In practical applications, a number of linear filtering theory, such as median (L1) and mean (L2), are limited to the cases of Gaussian noise, presenting serious performance degradation in the presence of non-Gaussian noise. Due to the registration error and system noise, the real noise model contaminating the observed images is unknown and usually non-Gaussian noise. Hence, SRR (Super Resolution Reconstruction) algorithms based on median and mean filter may degrade the reconstructed image sequence instead of improve its quality. Myriad filter [1] has a strong mathematical analysis and more powerful and efficient than median and mean filters. The paper proposes a recursive video enhancement using a robust multiframe SRR for applying on image sequences contaminated by any noise models at several noise powers. The proposed SRR framework is based on stochastic regularization with Myriad filter, which is used for removing outliers in the data and for measuring the difference between the projected estimating of the HR image and each LR image. For removing artifacts from the final answer and improving the rate of convergence, Tikhonov regularization is compulsively incorporated because of the SRR ill-posed condition. The performance of proposed method compared with classical SRR algorithms based on median and mean filter is demonstrated on a number of experiments under several noise models (such as Noiseless, AWGN, Poisson Noise, Salt&Pepper Noise and Speckle Noise) at different noise power. Both of the PSNR and virtual images are used to measure the quality of a reconstructed image sequence.

Keywords: Digital image reconstruction, digital image processing, SRR (super resolution reconstruction), myriad filter.


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ZMP Based Gait Generation of AIT Leg Exoskeleton - A Further Gaits Generation

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This paper is the extension of gait pattern generation of the Asian Institute of Technology’s Leg EXoskeleton (ALEX) and its wearer can walk safety with the passing criteria of Zero Moment Point (ZMP) theorem for static and dynamic considerations respectively. ALEX has 12 DOF (6 DOF for each leg: 3 at the Hip, 1 at the knee and 2 at the ankle), controlled by 12 DC motors. The CAD drawing and assembly of ALEX are exported directly to MATLAB’s Simulink-SimMechanics to obtain accurate position of center of gravity (CG) and moment of inertia of each link. The gait pattern is visually observed using 3D VRML interpreter while ZMP trajectory is monitored using MATLAB’s 2D graphics representation. The further gaits generations in this paper include walking from non-zero initial condition, climbing up the stairs and turning left motions. From previous work, the gait data from simulation has confirmed it effectiveness with the actual hardware. With this further gait generation data, ALEX can be tested to confirm its balance gait motions prior to the real implementation to avoid any undesired motions that could damages to the robot system.

**Keywords:** ALEX; exoskeleton; gait generation; zero moment point (ZMP).

**Presented at:** The International Conference on Manufacturing and Industrial Engineering (ICMIE 2012), Peninsula Excelsior Hotel, Singapore, 26-28 February 2012.


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Experimental Investigation for Practical Sparsity Number for Image Reconstruction Based on SL0 Algorithm in Discrete Frequency Domain

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Compressive Sensing (CS) is known as a new sampling theory that use small number of basis elements for constructing of signals (or images) and these basis elements (so called sparsity number) are very important parameters that approximate how sparsify the image is. Due to several characteristics of each image groups, the sparsity number could be varied and there is unfortunately very little research for this issue. This paper presents two main contributions: First, this paper proposes a practical sparsity number estimation technique using for an image reconstruction for SL0 algorithm based on Discrete Cosine Transform domain (DCT). Second the practical sparsity number of difference image groups is the experiment based on over 2000 images. The DCT is exclusively applied for a sparse representation of images because it is proven as a useful instrument for image analysis and processing. In general, images can be represented by a linear superposition of small number of wavelet elements selected from a suitable filter. The proposed models process the image with Smoothed norm algorithm. This algorithm stated that if signal or image is sufficiently sparse, we can reconstruct it from small amount of none zero basis components. The experiment is comprehensively tested under 2000 sampling images that are categorized in 18 groups by their characteristics. Moreover this sparsity number is practically used for any CS algorithm based on DCT domain.

Keywords: Compressive sensing, SL0, sparse signal reconstruction, image reconstruction, DCT transform.

Presented at: The 26th International Conference on Advanced Information Networking and Applications Workshops (WAINA 2012), Fukuoka Institute of Technology, Fukuoka, Japan, 26-29 March 2012.


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An Alternative Robust SL0 Based on Recursive Huber Stochastic Estimation Technique in Frequency Domain

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\textsuperscript{3/} Department of Telecommunications Science, Faculty of Science and Technology

In this paper, we propose a novel robust algorithm based on Huber norm estimation to recover the signal under several noise models by using only a few components. The proposed algorithm is used with a matrix that the number of row is obviously fewer than the column. It is stated that if the signal or the image is sufficiently sparse, we can recover it from a small number of linear measurements by solving a convex program of the measurement vector. For most of the image, the signal information tends to be concentrated in the low frequency components of the frequency domain. The performance of the proposed algorithm is compared with other classical algorithms such as L1 and SL0 norm estimations. Finally, the experimental results are presented on both synthesis and real image under various kinds of noises (AWGN, Salt & Pepper Noise and Speckle Noise) with different powers. The effects of different noise models are compared in order to show the improvement of Huber over SL0 Norm estimation.

Keywords: Compressive sensing, Huber norm, SL0 norm, l1 norm, l2 norm, image reconstruction, DCT domain.

Presented at: The 26\textsuperscript{th} International Conference on Advanced Information Networking and Applications Workshops (WAINA 2012), Fukuoka Institute of Technology, Fukuoka, Japan, 26-29 March 2012.


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The Novel Frequency Domain Tikhonov Regularization for an Image Reconstruction Based on Compressive Sensing with SL0 Algorithm

Pham Hong Ha $^{1/}$, Wilaiporn Lee $^{2/}$ and Vorapoj Patanavijit $^{1/}$

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In this recent year, an image reconstruction based on small number of measured components is a useful application of Compressive Sensing (CS). In the field of CS, SL0 algorithm is known as one of the fastest and most accurate algorithm but this algorithm is very unreliable under the noisy environment. Unfortunately, there are no researches for solving this SL0 ill-posed condition therefore the SL0 algorithm can only apply on limited applications. To solve the SL0 ill-posed condition, this paper proposes a novel regularization technique for the image reconstruction algorithm based on the SL0 technique to estimate the reconstructed image in the frequency domain for CS implementations. The novel frequency domain Tikhonov regularization technique is cooperated in this SL0 algorithm for reducing and constraining the space of possible reconstructed image due to this ill-posed problem. By cooperating the proposed regularization technique, the solution of the image reconstruction algorithm has better performance and more stable under the noise which contaminates the properties of the image. The experimental result shows that the proposed Tikhonov regularization technique can be well effectively applied on noisy images such as Lena, Resolution_Chat and Cameraman under both Gaussian and Non-Gaussian noise models (such as AWGN, Poisson noise, Salt & Pepper noise and Speckle noise) at different noise powers.

**Keywords:** Compressive sensing (CS), digital image reconstruction, SL0 algorithm, frequency domain Tikhonov regularization.

**Presented at:** The 9th International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology (ECTI-CON 2012), Hua Hin, Thailand, 16-18 May 2012.

**Published in:** Proceedings of ECTI-CON 2012, Institute of Electrical and Electronics Engineers (IEEE), Piscataway, NJ, USA. Available: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6254165>.

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A Performance Comparison of Two WS Filters for Image Reconstruction Technique under Different Image Types

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In this paper, we compare two weighted sum (WS) linear filters for image reconstruction technique under several image types. Two WS filters include hard partition-based weighted sum (HPWS) filter and subspace hard partition-based weighted sum (S-HPWS) filter. Four image types are considered including aerial image, face image, text image and sequence image. The simulation results show that the S-HPWS filter has PSNR more than the HPWS filter for face image type. For aerial image and sequence image, the S-HPWS filter has PSNR less than the HPWS filter at high noise level. However, simulation time of the S-HPWS filter is lower than the HPWS filter for all cases. On the other hand, when we compare both techniques under different image types, we found that aerial image is most appropriate to reconstruct by the HPWS filter. For face image is most appropriate to reconstruct by the S-HPWS filter. For text image get poor performance from both types of filter.

Keywords: WS filter, HPWS, S-HPWS.


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Constructing Transition Matrices for Routing BPC Permutations on Shuffle-Exchange Recirculating Networks

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²/ Broadband Telecommunication Laboratory
Faculty of Engineering

This paper introduces an approach that is intended for assigning extra bits in a transition matrix when routing a BPC (bit-permute-complement) permutation on a shuffle-exchange recirculating network with the required number of passes through the network greater than \( \log_2 N \). The approach can be applied to electronic shuffle-exchange networks and to their optical implementations as well. It is supposed that before constructing the transition matrix, minimal number of passes through the recirculating network necessary for admissibility of a given permutation, should be determined, using any of the known methods, what allows to reduce the transmission delay in the network on average and simplify constructing the transition matrix.

Keywords: Shuffle-exchange network, BPC permutation, transition matrix, permutation routing.


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The International Journal of Arts & Sciences’ (IJAS) American Canadian Conference for Academic Disciplines
International Learning Center, Ryerson University, Toronto, Canada, 21-24 May 2012

1. Internet Addiction, Stress, and Academic Outcome among Undergraduate Students of an International University in Thailand
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Internet Addiction, Stress, and Academic Outcome among Undergraduate Students of an International University in Thailand

Pinthusorn Pattayakorn
Faculty of Nursing Science

A cross-sectional descriptive study research design was employed to investigate the prevalence of Internet addiction and to explore the relationship among Internet addiction, stress and academic outcome of undergraduate students of a private international university in Thailand. Data was collected through the distribution of 400 questionnaires to undergraduate students of a private international university between January and February 2011. The set of questionnaires consisted of data including academic outcome, Self-Internet Addiction Test (SIAT), and Health Opinion Survey (HOS). Convenience sampling was used to obtain potential subjects. Finally, 341 undergraduate students participated. The results indicated a positive significant relationship of the Internet addiction and the stress \( r = 0.163, p < .001 \). However, Internet addiction and stress had non-significant relationships with the academic outcome \( r = -.082 \) and \( -.015 \) \( (p > .05) \), respectively.

Conclusion: The students who had stress tend to be addicted to the Internet. On the contrary, the students with Internet addiction had a tendency to get more stress. Fortunately, the students’ academic outcomes in this study were not correlated to both stress and the Internet addiction. However, preventive programs should be developed to reduce the problem of Internet addiction in the students with high level of the addiction.

Keywords: Internet addiction, stress, academic outcome, undergraduate students.


Published in: -

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Office of the President
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The Fifth International Conference on Vetiver (ICV-6)
Central Institute for Medicinal and Aromatic Plants (CIMAP), Lucknow, India, 28-30 October 2011

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4. Development of Multiple Male Buds in Banana
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In line with the theme of ICV-5, “Vetiver and Climate Change”, the Vetiver System promises a natural solution to mitigate the effects of climate change due to global warming caused by the release of greenhouse gases into the atmosphere. With its automobiles, factories, concrete and asphalt, air conditioners, people and their garbage, the city is a major contributor of the greenhouse gases - the cause of global warming. One low-cost solution is to employ the “Green City” philosophy, which is based on the concept that plants can bring social, economic and environmental benefits. Plants are keys to our sense of well being, our sense of belonging to a place, to being at home. The new concept of the “Green City” is to improve livability of urban surrounding and benefit the well being of citizen living there. An ideal “Green City” is more than just being green; it has to be clean, cool, safe and beautiful. Among the plants other than trees that can make a city greener is vetiver - a miracle grass.

Vetiver can make a city greener as road boundary, at roundabout and in landscaping parks and resorts. It can make a city cleaner through: (i) its pond embankment filtration and various techniques in domestic, industrial and agricultural wastewater treatments and water purification, (ii) rehabilitation of contaminated or polluted water through the treatment of eutrophicated water, removal of effluents, heavy metals and toxic substances, (iii) treatments of landfills and garbage dumps through the removal of agrochemicals and pesticides, and absorption of heavy metals, and (iv) dust reduction. It can make a city cooler through its evapo-transpiration function, heat reduction and the cooling and refreshing effects of its spreading dried roots. It can make a city safer as a windbreak and through its ability to stabilize slopes of the road, riverbank, pond, and shoreline. And lastly, being a grass with a beautiful form and aesthetic value, it can make a city more beautiful when used as an ornamental plant in landscaping resort and park, or as a decorative potted plant. Vetiver-based green city employs simple and low-cost technology, with low maintenance costs, and sustainable.

Keywords: Clean, cool, safe, beautiful, wastewater treatment, water purification, rehabilitation, stabilization.

Presented at: The Fifth International Conference on Vetiver (ICV-5) held at the Central Institute for Medicinal and Aromatic Plants (CIMAP), Lucknow, India, 28-30 October 2011.

Published in: Proc. ICV-5 (in CD Rom)

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Alzheimer’s disease (AD) is a degenerative disease of the brain that destroys memory and thinking ability. Up to the present, AD is believed to be incurable. Although the cause has not yet been documented, a few hypotheses have been postulated; viz. the destruction of acetylcholine (a neurotransmitter) by the enzyme acetylcholinesterase, the accumulation of ameloid beta plaque, and peroxidation of the brain cells.

Since the disease was unknown in the olden days, Thai Traditional Medicine does not give any therapy. This has stimulated a few Thai scientists to study a number of Thai medicinal plants to cure AD. These are: (1) coconut – Cocos nucifera – Areaceae, whose water from its young fruit contains phytoestrogen that mitigates the symptom of AD of infected mice; (2) gardenia – Gardenia augusta – Rubiaceae, whose root extract counteracts acetylcholinesterase and ameloid beta plaque formation; (3) snowflake – Wrightia antidysenterica – Apocynaceae, whose stem extract inhibits the action of acetylcholinesterase; (4) ‘Phrommi’ – Bacopa monnieri – Scrophulariaceae, whose plant extract (bacoside) prolongs the degeneration of the brain cells; (5) pepper – Piper nigrum – Piperaceae, whose black seed extract helps to recover AD of experimental animal; (6) ‘Kwao Khreu Khao’ – Pueraria mirifica – Papilionoideae, whose root extract reduces the death of brain cells; and (7) ‘Chan Chamot’ – Aglaia silvestris – Meliaceae, whose plant extract (coumarin) inhibits acetylcholinesterase.

In addition to the medicinal plants studied by the Thai scientists, there are a few others that were found by other scientists to mitigate the symptoms of AD. These are: (1) coconut – Cocos nucifera – Areaceae, oil which was found to produce ketone as an alternative source of food of the brain cells, thus mitigating the symptoms of AD; (2) turmeric – Curcuma longa – Zingiberaceae, whose rhizome extract prevents peroxidation of the brain cells as well as destroying ameloid beta plaque; (3) Chinese clubmoss – Huperzia serrata – Lycopodiaceae, whose plant extract (huperzine A) inhibits the action of acetylcholinesterase; (4) snowdrop – Galanthus nivalis – Amaryllidaceae; whose bulb extract (alkaloid – galantamine) inhibits the action of acetylcholinesterase; and (5) tea – Camellia sinensis – Theaceae, whose green leaf extract inhibits the action of acetylcholinesterase as well as destroying ameloid beta plaque.

Keywords: Acetylcholinesterase, ameloid beta, ‘Kwao Khreu Khao’, ‘Chan Chamot’, coconut, gardenia, snowflake, turmeric, pepper, Chinese clubmoss, snowdrop, tea.


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Chairman, Conservation and Development of Coconut Oil of Thailand Forum; Advisor, Department of Agriculture, Thailand; and previously Secretary-General, Asian Network on Medicinal and Aromatic Plants (FAO).
Newly Discovered Plants that Bear the Name of HRH Princess Maha Chakri Sirindhorn

Narong Chomchalow 1/

Office of the President

Six plants that are native to Thailand, many of which are endemic, were recently discovered and assigned the name of Her Royal Highness Princess Maha Chakri Sirindhorn, the Patron of Thai botanical circle. These include three groups of plants, namely: (i) three plants the bear the generic name of *Sirindhornia* (*S. mirabilis*, *S. pulchella* and *S. monophylla*), (ii) a plant the bears the newly-merged generic name of *Thepparatia* (*T. thailandica*), and (iii) two plants that bear the specific epithet of *sirindhorniae* (*Bauhinia sirindhorniae* and *Magnolia sirindhorniae*).

HRH Princess Maha Chakri Sirindhorn has planted *Magnolia sirindhorniae* at various sites in Thailand on different occasions. Being the Patron of The Vetiver Network International (TVNI), HRH has been the Chairperson of the Opening Ceremony of all International Conferences on Vetiver (ICVs). Taking the opportunity of HRH’s traveling to foreign countries that hosted ICVs to spread her glory in having many newly discovered plants named after her, the author had arranged with the authorities of the host countries for HRH to plant the plants that bear HRH’s names. Firstly, in Guangzhou, China, only *Magnolia sirindhorniae* was brought to be planted by HRH at the South China Botanical Gardens. Secondly, during ICV-4 in Caracas, Venezuela, another plant was added, namely *Bauhinia sirindhorniae*; both were planted by HRH at the Caracas Botanical Gardens. Lastly, during ICV-5 in Lucknow, India, two sets of the two plants, *Bauhinia sirindhorniae* and *Magnolia sirindhorniae* were hand-carried by the author for HRH to plant at the Central Institute for Medicinal and Aromatic Plants, and the Lucknow Botanical Gardens. This paper describes the discoveries and characteristics of each plant that bears HRH’s name, the sites and dates in which *Magnolia sirindhorniae* was planted in Thailand, and the sites and dates in three countries that hosted ICVs where *Magnolia sirindhorniae* and *Bauhinia sirindhorniae* were planted.

**Keywords:** *Sirindhornia mirabilis, S. pulchella, S. monophylla, Thepparatia thailandica, Bauhinia sirindhorniae, Magnolia sirindhorniae*, endemic.

**Presented at:** The International Symposium on Orchids and Ornamental Plants held in held in association with the Ratchaphruet Royal Flora 2011 at Imperial Mae Ping Hotel, Chiang Mai, Thailand, 9-12 January 2012.

**Published in:** Acta Horticulturae (Proc. Int. Sym. Orchids and Ornamental Plants) (in press).

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1/ Chairman, Thailand Network for the Conservation and Enhancement of Landraces of Cultivated Plants and Chairman, Continuing Committee for the 5th International Conference on Vetiver.
Development of Multiple Male Buds in Banana

Narong Chomchalow¹, Sasivimon Swangpol², Weerachai Nanakorn³ and Jamorn Somana⁴

Office of the President

Development of multiple male buds in banana is a rare phenomenon. It is caused by: (1) splitting of inflorescence axis, or (2) differentiation of male flower into male bud. Five types of splitting of inflorescence axis have been observed, viz. (i) occurs inside the pseudostem, (ii) occurs at the time inflorescence axis emerges from the pseudostem, (iii) occurs after inflorescence axis emerges from the pseudostem but before fruit development, (iv) occurs during fruit development, and (v) occurs after fruit development. Mostly, splitting is accidental development, except for that produced by 'Double Mahoi' cultivar that produces two or three bunches per plant, is inherited.

Differentiation of male flower into male bud in banana is the world's first reported case. It has been observed in four accessions of probably the same clone of Musa acuminata subsp. siamea cultivated by Hmong hill-tribe villagers living on the highlands in northern Thailand as an idol of worship to obtain prolific babies and as raw material for cooking the bud for nursing mother. After a brief female phase, with almost no fruit developed, numerous male flowers, instead of withering and dropping, develop into male buds with long rachilla. Close to a hundred small male buds may be produced on a single plant, thus the name “Kluai Roi Pli” (a hundred male buds) has been given to this clone of banana. A single, normal-sized terminal male bud continues to produce male flowers, which may or may not differentiate into male buds.

The values of multiple male buds are: (1) to satisfy curiosity, (2) as educational material, (3) as an idol for worship, (4) as ornamental plant, and (5) economic gain of increasing overall yield, number of fruits and male buds, and size and length of fruits.

Keywords: Splitting of inflorescence, differentiation of male flower, Musa acuminata subsp. siamea, Hmong hill-tribe villagers, idol for worship, 'Kluai Roi Pli'.


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Faculty of Science and Technology

The 8th International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology (ECTI-CON 2011)
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Modular Handover Decision System Based on Fuzzy Logic for Wireless Networks

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The future generation wireless networks will demand more intelligent and adaptive handover decision mechanisms to fulfill users' expectations in terms of seamless mobility over extensive area, minimum usage cost, high data rate and adequate QoS provision and so on. The use of fuzzy logic is one of the methods to enhance system intelligence. Most fuzzy logic based approaches proposed in the literature are monolithic in which the decision are made by a single decision engine. As a result, the decision engine needs a large number of fuzzy rules to reach the final decision. This computational complexity requires a significantly long execution time, which may not be acceptable for real-time applications. We are proposing a new modular handover decision algorithm based on fuzzy logic, which aims to reduce the execution time. The results show that this approach has a significant advantage over a monolithic approach.

Keywords: Modular, monolithic, fuzzy logic, handover decision, wireless networks.

Presented at: The 8th International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology (ECTI-CON 2011), Khon Kaen, Thailand, 17-19 May 2011, organized by the Institute of Electrical and Electronics Engineers (IEEE), Electrical Engineering/Electronics, Computer, Telecommunications, and Information Technology Association (ECTI-CON, Thailand), and IEEE Thailand Section.


Full paper requisition: <pratit@scitech.au.edu>.

Note: This abstract has not been published in the previous AU Abstracts – 2011 and is included in the AU Abstracts – 2012 for completeness.

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The Influence of Sale Promotion Factors on Purchase Decisions: A Case Study of Portable PCs in Thailand

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The aim of this research is to investigate the sale promotion factors that impact on consumers' purchasing decision on Portable PCs or notebooks in Thailand. This study was designed to use the survey research method and the convenience sampling technique was used in collecting the sample data. Questionnaires were distributed to qualified respondents in Commart Thailand 2011 Event at Queen Sirikit Convention Center on 17th – 20th March 2011. A total of 191 respondents were participated in this study. The data were analyzed and summarized with SPSS software and binary logistic regression analysis was used to examine which sale promotion factors that impact on consumers’ purchasing decision of Portable PC Acer and Compaq & HP. The results of this research is indicated that the sale promotion factors “Offer member card for discount”, “Extend warranty period”, “Bundled with scanner”, “Billboard, radio, leaflet, and magazine”, and “Able to pay by installments” are the important factors that impact on consumers’ purchasing decision on Portable PCs. Furthermore, the researcher found that the marketer can enhance more effectiveness of customers need, increase customer base and make more market shares in this segmentation by using sale promotion strategies about developing member card for discount, increasing the number of advertising media, warranty period conditions, setting the special premiums, and how to pay by installments. These strategies should be developed continuously.

Keywords: Sale promotion factors, binary logistic regression analysis, portable PCs, notebooks.


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An Empirical Study of Multiclass Classification with Class Imbalance Problems

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There have been many attempts to deal with class imbalance, yet many of these studies focus on binary classification. Several traditional techniques for solving imbalance in binary classification have been shown to fail, or even degrade, in multiclass cases. In this review, we first discuss techniques in learning multiclass problems and then review categories of approaches in dealing with class imbalance in multiclass classification. Advantages and disadvantages of these techniques will also be discussed.

Keywords: -

Presented at: The International Conference on Business and Information (BAI 2011), The Landmark Hotel, Bangkok, Thailand, 4-6 July 2011, Session [J3].


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Motion Vector Recovery Based Colour Information

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In this paper, motion vector (MV) recovery algorithm using the colour information of the surrounding macroblocks (MBs) on the left, top-left, top, top-right, right, bottom-right, bottom and bottom-left is proposed. The technique is based on the assumption that a group of neighbouring MBs in a small region that belongs to the same object likely to have similar colour information. Hence, the lost MVs of the corrupted MBs can be estimated using a set of corresponded MVs of the surrounding MBs that have similar colour information. The proposed algorithm has been tested on several test video sequences. The experimental results are compared with conventional error concealment methods and higher performance is achieved in both objective peak signal-to-noise ratio (PSNR) measurements and subjective visual quality.

**Keywords:** Motion vector recovery, colour information, error concealment, temporal error concealment.

**Presented at:** The 17th International Conference on Digital Signal Processing (DSP 2011), Corfu, Greece, 6-8 July 2011.

**Published in:** Proceedings of DSP 2011, Institute of Electrical and Electronics Engineers (IEEE), Piscataway, NJ, USA. Available: <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=06004946>.

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Intention to Use of Smart Phone in Bangkok Extended 
UTAUT Model by Perceived Value

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Smart phones, iPhone and Black Berry, are very popular among new generation people in Thailand. The advantages in these technologies are joining with social network such as Facebook, Twitter and etc. There are many useful applications that most users enjoy like games, camera which can be downloaded easily. Moreover, it saves money for spending calling cost when they use the free application to call each other even though they are in different country. The features of these two smart phones are trendy and fashionable. Also, the network to connect between smart phone and social network sites, supports these technologies. This study is used to interview and respondents’ questionnaire. The study also investigates the significant of Perceived Value and study the different between people who use iPhone and Blackberry. Therefore, the group of respondents is classified into two groups; iPhone users and Blackberry users. The technique to be used to analyze the result is Structural Equation Model (SEM).

**Keywords:** Smart phone, UTAUT model, perceived value, technology acceptance.

**Presented at:** The International Conference on Management (ICM 2011), Penang, Malaysia, 13-14 July 2011.


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Using Mobile Messaging Services in Education: Determinants of Students’ Attitudes

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The impressive use of mobile messaging services is spread into educational institutions. Many universities start using mobile text messages to communicate with their students. The study empirically investigates factors affecting students’ attitudes toward using the university’s mobile messaging service. It employs the survey method using a structural equation modeling technique to investigate inter-relationships among the study constructs in the anticipated model and propose the modification model. The results show that students’ attitudes toward using the university’s mobile messaging service are influenced by perceived utility, perceived control, social norm and existing knowledge about mobile communication. Privacy concern and information seeking behavior, however, do not have statistically significant effects on students’ attitudes toward the university’s mobile messaging service. The study fills the gap in literatures and assists universities to manage their mobile messaging service effectively. The paper concludes with a discussion of implications and limitations of the study.

Keywords: Electronic commerce, mobile commerce, mobile messaging, attitude, education.


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Outpost vector model synthesizes new vectors at the boundary of two classes of data in order to increase the level of accuracy of classification. This paper presents a performance evaluation of four different placements of outpost vectors in an incremental learning algorithm for Support Vector Machine (SVM) on a non-complex problem. The algorithm generates outpost vectors from selected new samples, selected prior samples, both samples, or generates no outpost vector at all. After that, they are included in the final training set, as well as new samples and prior samples, based on the specified parameters. The experiments are conducted with a 2-dimension partition problem. The distribution of training and test samples is created in a limited location of a 2-dimension donut ring. There are two classes of data which are represented as 0 and 1. The context of the problem is assumed to shift 45 degrees in counterclockwise direction. Every consecutive partition is set to have different class of data. The experimental results show that the placement of outpost vectors generated from only selected new samples yields the highest level of accuracy of classification for both new data and old data. As a result, using samples from different part of the algorithm to generate outpost vectors affects the level of accuracy of classification.

**Keywords:**

**Presented at:** The International Joint Conference on Neural Networks (IJCNN 2011), San Jose, CA, USA, 31 July - 5 August 2011.


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Performance Evaluation of Uncompressed Extra High-Definition Video Transmission over Paralleled GDSL

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This paper proposes the comparison of streaming uncompressed Extra High Definition Video of 2K and 4K over multiple channel of Gigabit Digital Subscriber Line (GDSL) using parallel processing system. The proposed system uses the new generation DSL system, it is based on multiple-input multiple-output (MIMO) transmission method and can exceed maximum theoretical speed of 1Gbps. The uncompressed bit rate of Extra HD video 4K stream can exceed 12 Gbps, which can be transmitted via parallel cores of GDSL link. This paper introduces the parallel cores to increase the bandwidth of the communication channel in order to support the transmission of HD information without any compression and decoding delay. In this paper, we simulate and evaluate the performance of the communication in terms of throughputs, utilization and drop rates.

Keywords: GDSL (gigabit digital subscriber line), paralleled data transmission, extra high-definition video, 2K, 4K digital cinema.

Presented at: The International Conference on Electrical and Control Engineering (ICECE 2011), Yichang, China, 16-18 September 2011.


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Performance Evaluation of Uncompressed High-definition Content Transmission on Paralleled Digital Subscriber Lines

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High-Definition (HD) information communication is now emerged as a very interesting topic in today's communication world. There are many ways to improve the performance of transmitting the large amount of information through the network, such as compressing the HD information, enhancing the HD encoder and decoder, or economically increasing the bandwidth of the communication channel. This paper introduces the deployment of parallel cores to increase the bandwidth of the communication channel in order to support the transmission of HD information with very less compression and decoding computational complexity. This paper also simulates the application of the paralleled Digital Subscriber Lines (DSLs) to convey the HD information, and evaluates the performance of the communication in terms of throughputs, utilization, and queue performance matrices.

Keywords: High-definition, parallel processing, DSL.

Presented at: The 5th International Conference on Convergence and Hybrid Information Technology (ICHIT 2011), Daejeon, Korea, 22-24 September 2011.


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Detecting and Eliminating Black Hole in AODV Routing

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Mobile ad hoc networks (MANETs) consist of autonomous mobile nodes which interact with other nodes. Nodes being infrastructure less and lack of central management would lead to simple selfishness or in some cases, maliciousness by black holes. Ad hoc on-demand distance vector (AODV) is one of most popular routing protocols used in MANETs. However, it is vulnerable to black hole nodes. The simulation results show by using individual reputation system, alert on finding a black hole node and exchanging neighbor information messages on meeting a new neighbor will help detecting and eliminating malicious or black hole nodes from the networks.

Keywords: Ad hoc networks, routing protocols, AODV, black holes.


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Personality’s Segmentation on the Facebook User in Thailand

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Nowadays social network such as Facebook, has become very popular online communities. These social networks are focus on sharing people’s interests and activities. There are many impacted factors on the use of social network. Furthermore, not only the impacted factors that make the differences on use of it but also the user personality traits play as a significance role of shaping their behavior of usage. While many studies concentrate on comparing between Introversion and Extraversion, in fact people have combined more than one personality in themselves. They may have the lead of personality but more likely to share between each personality. This research intends to find out the segmentation in term of usage behavior of Facebook which based on Big-Five personality traits. Therefore factor analysis is used, following by cluster analysis and testing the hypothesis by Chi-square test. Judgmental sampling technique will be used for data collection process.

Keywords: Big-five personality traits, social network, cluster analysis, Facebook.


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Undergraduate Student’s Satisfaction Toward the New Education System in Thailand

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Since 1997, Thai government had announced the new policy to reduce the funding in education system by changing the main structures from public university to autonomous university. In 2007, there are 14 public universities had implemented the new education systems. Consequently of funding decrease, universities need to open more programs to compete each other in order to survive and match up to the business or student need. Nevertheless, new education system can affect spread out to many private universities. This lead to be question marked on the quality of education system. Therefore, this research is focus on the perception of undergraduate students toward the quality of university in Thailand. In this research, will be used the quota sampling to collect the data from autonomous universities in Thailand. The Structural Equation Modeling is the recommend statistical techniques for this research.

Keywords: Education system, student satisfaction, SEM, autonomous university.


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Classification of the Student Learning Ability Using Discriminant Analysis:  
A Case Study of Administration and Management College,  
King Mongkut's Institute of Technology Ladkrabang,  
Thailand

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The purpose of this study was to find important factors that could classify the group membership of second year to fourth year undergraduate students in the Administration and Management College, King Mongkut's Institute of Technology Ladkrabang, Thailand in terms of learning ability. The factors predicted and used to classify the group members learning ability were student's hometown, high school GPA, high school program, and mode of admission. Group membership classification was based on the students' cumulative GPA as of June 2011. Students who obtained a cumulative GPA of less than 2.75 were classified in low to moderate learning ability group, whereas students who obtained a cumulative GPA of 2.77 and above were classified in the high learning ability group. Questionnaires were used to collect data from 222 undergraduate students by using stratified sampling. Discriminant analysis was employed to obtain the essential factors. Results showed that student's hometown, high school GPA, high school program, and mode of admission were the essential factors that could classify the group membership of these undergraduate students. Seventy point seven percent (70.7%) of group membership was predicted correctly. Thus, the Administration and Management College can utilize the findings of this study to predict which students in the next academic year enrolment belong to low to moderate learning ability group so that the administrators of the Administration and Management College can arrange intensive courses or tutorial classes for these students.

Keywords: Admission system, quota system, student learning ability, classification, discriminant analysis.


Published in: Proceedings of ACE 2011, pp. 478-483, International Academic Forum (IAFOR), Nagoya, Aichi, Japan. Available:  

Full paper requisition: <titida@scitech.au.edu>.

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Classifying Disorders of Prostate Using Master-Slave Configuration of Backpropagation Neural Networks

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This paper classifies disorders of prostate into Benign Prostatic Hyperplasia (BPH), prostate cancer (PC) and other inflammations using master-slave configuration of two Back propagation Neural Networks (BPNNs). Symptoms from elderly men including urinary dribbling, urinary hesitancy, feeling of non-empty bladder, burning urination, hematuria, testosterone level and others are given as the attributes of the master BPNN. The slave BPNN has the following attributes: output of the master BPNN (symptom level), free prostate specific antigen (PSA) level, insulin-like growth factor-1 (IGF-1), CAG (DNA glutamate) repeat, heredity, PCA3 urine level, JM-27 blood level and others. The slave BPNN classifies prostate disorders into PC, BPH and other inflammations. Data from Gleason score is used to detect PC stages. The simulation shows that the proposed procedure could be effective in classifying disorders of the prostate gland in men.

Keywords: Backpropagation neural network, benign prostatic hyperplasia, prostate cancer, prostate-specific antigen, Gleason score, symptom level, prostate value.

Presented at: The 6th IASTED International Conference on Computational Intelligence and Bioinformatics (CIB 2011), Pittsburgh, PA, USA, 7-9 November 2011.

Published in: Proceedings of CIB 2011, pp. 39-46, International Association of Science and Technology for Development (IASTED), Alberta, Canada.

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QoS Routing for Heterogeneous Mobile Ad Hoc Networks Based on Multiple Exponents in the Definition of the Weighted Connectivity Index

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In decades, lots of QoS routing algorithms have been proposed to let each mobile node in ad hoc networks to find paths based on QoS metrics which are mainly bandwidth and delay. We also proposed to use both Connectivity Index (CI) and weighted CI, the mathematically combination of link capacity and CI, as the QoS metrics in ad hoc networks. CI is widely used topological index in chemical and mathematical applications. By considering this CI in path computation process, the returned paths are more stable which directly affect throughput and packet delivery ratio of the networks. However, this CI is computed in one dimension only where the exponent or \( \alpha \) in the definition of CI is set to \(-1/2\). CI with this \( \alpha = -1/2 \) is the most successful topological index which has received lots of attentions from chemists and mathematicians. However, the other exponents were also studied as the special case of CI. In this work, we propose to use Shortest-Highest Path algorithm to select the best feasible path in terms of the highest weighted CI and shortest delay link where multiple exponents in weighted CI are applied. We construct simulations in various scenarios to study the effects of these multiple exponents on the heterogeneous ad hoc networks which are more realistic. Since in real applications, multiple types of nodes exist and they usually have different capabilities. Thus, the QoS routings which perform well in homogeneous networks may not be much effective in heterogeneous networks. From the simulation results, it is obvious that Shortest-Highest Path algorithm with weighted CI can also improve the network performances in heterogeneous ad hoc networks.

**Keywords:** Connectivity index, QoS routing, heterogeneous, ad hoc networks.

**Presented at:** The 7\(^{th}\) International Conference on Signal-Image Technology and Internet-Based Systems (SITIS 2011), Dijon, France, 28 November 2011 - 1 December 2011.

**Published in:** Proceedings of SITIS 2011, pp. 1-8, Institute of Electrical and Electronics Engineers (IEEE), Piscataway, NJ, USA. Available: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6120622>.

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A Performance Comparison of Single Image Reconstruction Techniques under Several Noisy Environments

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Due to noise contamination on the image during the observation process, digital image reconstruction is an essential in terms of recovering the information of the contents (e.g. document and image) and utilized in many applications such as digital image forensic, medical image processing, machine vision, and etc. Therefore, this paper is concerned with the performance comparisons of single image employing various reconstruction approaches. These are Inverse filter, Wiener filter, Regularized technique, Lucy-Richardson technique, and Bayesian technique based on median, mean, myriad, and meridian filters. The experiments test on the three standard pictures (Lena, Resolution chart, and Susie (40th)) under the same noise conditions. Four types of noise models consider in this paper are AWGN, Poisson, Salt-Pepper, and Speckle noises. The performance of evaluations is done by varying parameters of individual technique. Peak-signal-to-noise-ratio (PSNR) is a key indicator on the performance comparison results.

Keywords: Digital image processing, digital image reconstruction, digital image enhancement.


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Experimental Performance Analysis of High Confidence Reliability Based on Differential Optical Flow Algorithms over AWGN Sequences with Sub-pixel Displacement

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This paper presents a performance analysis of 3 popular optical flow algorithms (2D optical flow block-based full search algorithm (BOF), Horn-Schunk algorithm (HS) and Lucas-Kanade algorithm (LK) under the noise conditions. And the confidence based optical flow algorithm for high reliability (CBOF) is applied on these 3 algorithms over different characteristic of standard sequences with several dB of Additive White Gaussian Noise (A WGN). For algorithm of HS and LK, we also applied the kernel model of Barron, Fleet, and Beauchemin (BFB) on these algorithms in our experiment. Especially in HS algorithm, we also investigate the performance on the best average smoothness weight ($\alpha$) which is prior evaluated by Darun K. and Vorapoj P. These experiment results are comprehensively tested on several standard sequences such as AKIYO, COASTGUARD, CONTAINER, and FOREMAN that have different foreground and background movement characteristic in a level of 0.5 sub-pixel displacement. Each standard sequence has 4 sets of sequence included an original (no noise), AWGN 25 dB (low noise), AWGN 20 dB, and AWGN 15 dB (high noise) respectively which concentrated on Peak Signal to Noise Ratio (PSNR) as the performance indicator in our experiment.

Keywords: -


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A Novel Robust and High Reliability Spatial Correlation Optical Flow Algorithm Based on Median Motion Estimation and Bidirectional Symmetry Flow Technique

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Changing in light condition and representative of noise in sequences cause ineffectively in most of motion estimation techniques. This paper proposes a novel robust spatial correlation optical flow algorithm based on the robust motion estimation and effective confidence technique using bidirectional symmetry of forward and backward flow. Experiment results are comprehensively tested on several standard sequences such as AKIYO, COASTGUARD, CONTAINER, and FOREMAN that have different foreground and background movement characteristic. The experiment is tested under the Additive White Gaussian Noise (A WGN) at several noise power levels (such as A WGN at 25 dB (low noise), A WGN at 20 dB, and A WGN at 15 dB (high noise) respectively) in order to demonstrate effectiveness of the proposed algorithm. Peak Signal to Noise Ratio (PSNR) is used as the performance indicator in our experiment.

Keywords:


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Empirical Study on Performance Comparisons of Block-Based Motion Estimation on Multi Sub-Pixel Displacement with Multiples Block Size

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This paper presents the impact of sub-pixel displacement and block/windows size on the motion estimation performance (3 different levels (1, 0.5, and 0.25) for sub-pixel displacement (SPD) and 2 different block/windows size (8x8/16x16 and 16x16/32x32)). Our empirical study concentrates on full search (FS), a novel four-step search algorithm (NFSS), a block-based gradient descent search algorithm (BBGDS), a new diamond search algorithm (DS) and hexagon search algorithm (HS). Peak Signal to Noise Ratio (PSNR) is referenced as the indicator on our performance comparison results. These experiment results are comprehensively tested and conclude on several standard sequences such as AKIYO, COASTGUARD, CONTAINER, and FOREMAN that have different foreground and background movement characteristic.

Keywords: Block-based motion estimation, SPD, PSNR.

Presented at: The 26th International Conference on Advanced Information Networking and Applications Workshops (WAINA 2012), Fukuoka Institute of Technology, Fukuoka, Japan, 26-29 March 2012.


Full paper requisition: <darun@scitech.au.edu; patanavijit@yahoo.com>. 
A Novel Robust and High Reliability for Lucas-Kanade Optical Flow Algorithm Using Median Filter and Confidence Based Technique

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Optical flow is an important technique for motion estimation to identify the density velocity in a level of pixel based. But in the real world, most of the sequences are interfered by many conditions that cause noises over the sequences. In order to against noise, this paper, a novel robust Lucas-Kanade optical flow algorithm based on the robust estimation and effective confidence technique using bidirectional symmetry of forward and backward flow is proposed. Comprehensive evaluations demonstrate the effectiveness results of our proposed algorithm under the Additive White Gaussian Noise (AWGN) at several noise power levels (such as AWGN at 25 dB, AWGN at 20 dB, and AWGN at 15 dB respectively) on several standard sequences such as AKIYO, COASTGUARD, CONTAINER, and FOREMAN that have differences in foreground and background movement and speed in characteristic. Peak Signal to Noise Ratio (PSNR) is used as the performance indicator in our experiment.

**Keywords:** Optical flow, robust estimation, AWGN, PSNR.

**Presented at:** The 26\(^{th}\) International Conference on Advanced Information Networking and Applications Workshops (WAINA 2012), Fukuoka Institute of Technology, Fukuoka, Japan, 26-29 March 2012.


**Full paper requisition:** <darun@scitech.au.edu; patanavijit@yahoo.com>.
Binary Classification Tree with Tuned Observation-based Clustering

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There are several approaches for handling multiclass classification. Aside from one-against-one (OAO) and one-against-all (OAA), hierarchical classification technique is also commonly used. A binary classification tree is a hierarchical classification structure that breaks down a k-class problem into binary sub-problems, each solved by a binary classifier. In each node, a set of classes is divided into two subsets. A good class partition should be able to group similar classes together. Many algorithms measure similarity in term of distance between class centroids. Classes are grouped together by a clustering algorithm when distances between their centroids are small. In this paper, we present a binary classification tree with tuned observation-based clustering (BCT-TOB) that finds a class partition by performing clustering on observations instead of class centroids. A merging step is introduced to merge any insignificant class split. The experiment shows that performance of BCT-TOB is comparable to other algorithms.

Keywords: Multiclass classification, hierarchical classification, binary classification tree, clustering, observation-based clustering.

Presented at: The International Conference on Data Mining and Knowledge Engineering (ICDMKE 2012), Venice, Italy, 11-13 April 2012.


Full paper requisition: <maytha@scitech.au.edu; l.boontarika@gmail.com>.
An Alternative Robust and High Reliability Optical Flow Based on Horn-Schunck Algorithm Using Median Filter and Confidence Based Technique

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This paper presents a performance analysis of 3 classical optical flow algorithms (Spatial Correlation-Based Optical Flow (SCOF), Horn-Schunk algorithm (HS) and Lucas-Kanade algorithm (LK)) under the noisy conditions. Moreover the Confidence Based Optical Flow Algorithm for High Reliability (CHR) and Robust Motion Estimation Methods Using Gradient Orientation Information (RGOI) are applied on these 3 algorithms over different characteristic of standard sequences with several Non-Gaussian noises such as Poisson Noise (PN), Salt & Pepper Noise (SPN), and Speckle Noise (SN). For HS algorithm, we also investigate the performance on the best average of smoothness weight (\(\alpha\)) which is an important factor for the quality of outcome. These experiment results are comprehensively tested on several standard sequences such as AKIYO, COASTGUARD, CONTAINER, and FOREMAN that have different foreground and background movement characteristic in a level of 0.5 sub-pixel displacements. Each standard sequence has 6 sets of sequence included an original (no noise), PN, SPN density (\(d\)) = 0.005, SPN \(d = 0.025\), SN variance (\(v\)) = 0.01, and SN \(v = 0.05\) respectively which concentrated on Peak Signal to Noise Ratio (PSNR) as the performance indicator in our experiment.

Keywords: -

Presented at: The 9\textsuperscript{th} International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology (ECTI-CON 2012), Hua Hin, Thailand, 16-18 May 2012.


Full paper requisition: <darunksr@gmail.com; patanavijit@yahoo.com>.
Investigation of Performance Trade Off in High Reliability and Robust Gradient Orientation on Differential Sub-Pixel Displacement Optical Flow Algorithms over Non-Gaussian Noisy Model

Darun Kesrarat 1/, Paitoon Porntrakoon 1/ and Vorapoj Patanavijit 2/

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Many classification techniques are originally designed to solve a binary problem, but practically many classification problems involve more than two classes. A multiclass problem can be decomposed into binary sub-problems, each solved by a binary classifier. Aside from using one-against-one (OAO) or one-against-all (OAA) decomposition scheme, an ensemble of binary classifiers be constructed hierarchically. In this study, we focus in multiclass classification with a binary classification tree and propose a new approach in splitting a top-down tree by grouping observations into two clusters. Unlike a traditional class-clustering approach, this observation-based algorithm allows one class to appear in two meta-classes. The experiment shows how our proposed BCT-OB performed, compared with other binary classification tree algorithms. Then advantages and disadvantages of the algorithm are discussed.

**Keywords:** Multiclass classification; support vector machine, hierarchical classification, binary classification tree, observation-based clustering.

**Presented at:** The 9th International Conference on Electrical Engineering/ Electronics, Computer, Telecommunications and Information Technology (ECTI-CON 2012), Hua Hin, Thailand, 16-18 May 2012.

**Published in:** Proceedings of ECTI-CON 2012, Institute of Electrical and Electronics Engineers (IEEE), Piscataway, NJ, USA. Available: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6254173>.

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