

Sustainable Student Workshop Year 1 at Universiti Sains Malaysia (USM)

Programming is fun?

by
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12 May 2016

Biography

Preliminaries

Research Project 1

Research Project 2

Research Project 3

Research Publication 1

Research Publication 2

Research Publication 3

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Research Publication 5

- Had more than 10-year experience in software design and development industry
- Doing Research and Development (R&D) in computational intelligence, specifically for multi-objective based optimisation and classification problems
- Working in School of Science and Technology at Wawasan Open University (WOU)
- Handling mixture courses of undergraduate and master programme: software engineering, information system, advanced manufacturing



Programming is fun?

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Do you think so?



Programming is fun?

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These are the answers from people:

- 1 Finding fulfilment and happiness in your career/study.
- 2 It requires thought, intention, action, and a willingness to change course when you've made mistakes.
- 3 Lays out a strategy for planning in software development.
- 4 Cultivating the desire to live a remarkable life.
- 5 Leading a remarkable life is something you have to discover as even being a reasonable goal.



Programming is fun?

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Question: What can the programming do
(during your study)?



Sharing on Research Project 1

Cmizer

Preliminaries

Research Project 1

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Research Publication 1

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- 1 **Cmizer:** An intelligent Circuit optimizer
- 2 **Objective:** to provide decision support for electronic engineers to design circuits with a faster and easier manner, hence contributing towards the productivity of the electronic industries
- 3 **Award:** bronze medal for CIGIF 2012 - The 3rd Cyber International Genius Inventor Fair 2012 in South Korea



Cmizer's team



Sharing on Research Project 1

Cimizer in Windows

Preliminaries

Research Project 1

Research Project 2

Research Project 3

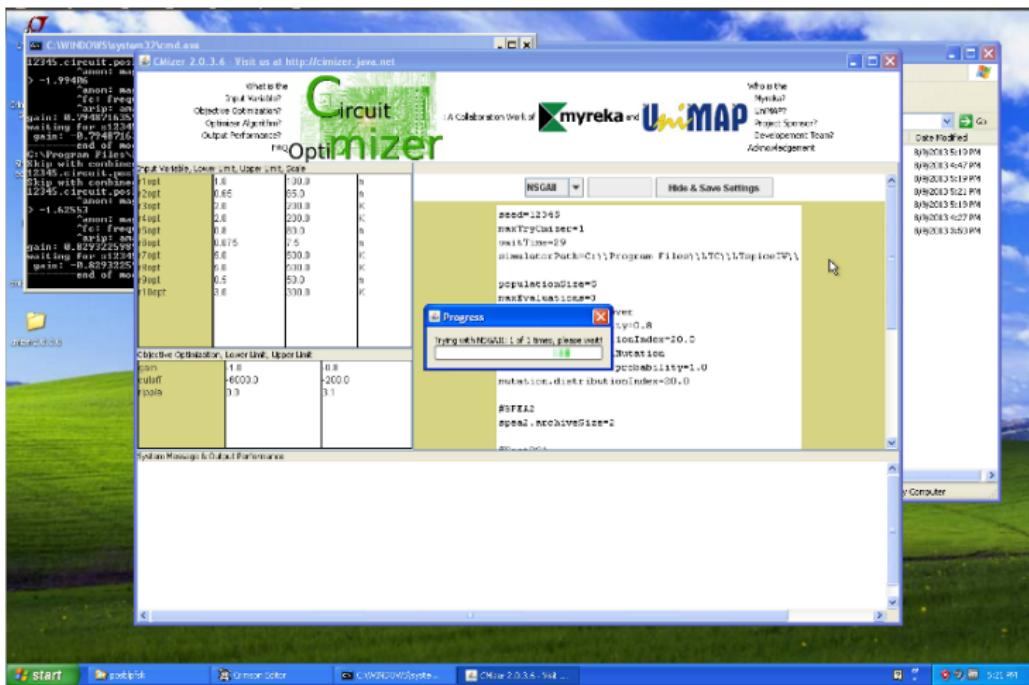
Research Publication 1

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Sharing on Research Project 1

Cimizer: in Ubuntu (Linux)

Preliminaries

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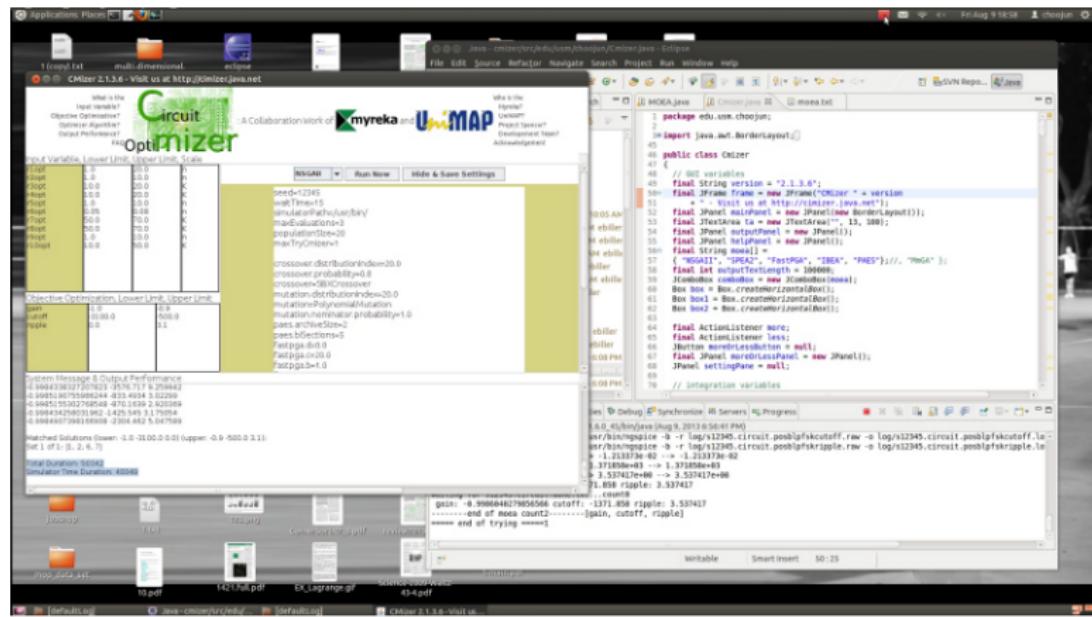
Research Publication 1

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Sharing on Research Project 1

Cimizer: in Ubuntu (Linux)

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Sharing on Research Project 2

USM Extract

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- 1 **USM Extract:** A suite of soft computing and other data-based learning algorithms for Extracting information/knowledge from complex databases
- 2 **Objective:** to contribute towards the use of OSS-based intelligent systems in the Knowledge Discovery in Databases domain
- 3 **Award:** silver prize of the 5th Open Source Software (OSS) World Challenge, 2011 in South Korea



Extract Team



Sharing on Research Project 2

USM Extract identifying flower for farmer

Preliminaries

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ChooJun USM Research - Mozilla Firefox

File Edit View History Bookmarks Tools Help

ChooJun USM Research

Intelligent Data Analysis and Decision Support Systems

The screenshot shows a software application window titled "ChooJun USM Research - Mozilla Firefox". The main title bar says "Intelligent Data Analysis and Decision Support Systems". The left sidebar has a logo of a white bird with a red beak and the word "Extract" below it, with "Setting" and "Analysis" buttons. Below this is the text "of Networks Training" and a small orange flower icon. The right side features a large logo for "USM Extract Classification Network" with "Prediction with Solo Action" and "Batch Action" buttons. Below the logo is a detailed illustration of a flower with several petals and a central cluster. At the bottom, there are tabs for "License", "Data Set", "Algorithm", and "About". The "About" tab is currently selected. A footer at the bottom of the window displays the text "USM Extract 2.0.0.201108" and a license notice about the GNU General Public License. The bottom left corner of the slide contains a Creative Commons license logo.

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Classification Problem

Clustering Problem

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Sharing on Research Project 2

USM Extract identifying flower for farmer

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ChooJun USM Research - Mozilla Firefox

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ChooJun USM Research

 Intelligent Data Analysis and Decision Support

Classification Network Prediction in Solo Action Remark.

Instructions:

- Choose your data mart. Make sure that the targeted data set has gone through the training process at least once.
- Click on a particular feature record and enter the value for prediction. Click the Keep Changes button to save the entered value. Repeat the same step for other feature records.
- Click on the network name button to perform prediction.

Proceed to Main Menu

Data Mart **IRIS**

Data mark features availability

| ID | Code | Description | Feature Value |
|-------------------|----------|-------------|---------------|
| dmvcollid3 | SEPAL_LE | SEPAL_LE | |
| dmvcollid4 | SEPAL_WD | SEPAL_WD | 3 |
| dmvcollid5 | PETAL_LE | PETAL_LE | 4 |
| dmvcollid6 | PETAL_WD | PETAL_WD | 1 |

Target Class 0.5
Target Class Description Iris-Versicolor
Confidence Level 0.7646667



Navigation icons: back, forward, search, etc.

Sharing on Research Project 2

USM Extract diagnosing diabetes for medical doctor

Preliminaries

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ChooJun USM Research - Mozilla Firefox

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ChooJun USM Research

 Intelligent Data Analysis and Decision Support

Classification Network Prediction in Solo Action Remark

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- Choose your data mart. Make sure that the targeted data set has gone through the training process at least once.
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- Click on the network name button to perform prediction.

Proceed to Main Menu

Data Mart PID

Data mark features availability

| ID | Code | Description | Feature Value |
|------------|-------------------|-------------------|---------------|
| dmvcopid10 | AGE | AGE | |
| dmvcopid3 | PREGNANT_TIME | PREGNANT_TIME | |
| dmvcopid4 | PLASMA_GLUCOSE | PLASMA_GLUCOSE | |
| dmvcopid5 | DIASTOLIC_BP | DIASTOLIC_BP | 12 |
| dmvcopid6 | TRICEPS_THICKNESS | TRICEPS_THICKNESS | 12 |
| dmvcopid7 | SERUM_INSULIN | SERUM_INSULIN | |
| dmvcopid8 | BODY_MASS_INDEX | BODY_MASS_INDEX | |
| dmvcopid9 | DIABETES_PEDIGREE | DIABETES_PEDIGREE | |

Target Class 1.0
Target Class Description Tested positive for diabetes
Confidence Level 0.6667533



Sharing on Research Project 2

USM Extract examining quality of wine for trader

Preliminaries

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Research Publication 5

ChooJun USM Research - Mozilla Firefox

File Edit View History Bookmarks Tools Help

ChooJun USM Research



Intelligent Data Analysis and Decision Support

Classification Network Prediction in Solo Action Remark

Instructions:

- Choose your data mart. Make sure that the targeted data set has gone through the training process at least once.
- Click on a particular feature record and enter the value for prediction. Click the Keep Changes button to save the entered value. Repeat the same step for other feature records.
- Click on the network name button to perform prediction.

Proceed to Main Menu

Data Mart WINE91

Data mark features availability

| ID | Code | Description | Feature Value |
|----------------|------------------------|------------------------|---------------|
| dmvcolwine9110 | NON_FLAVANOIDS_PHENOLS | NON_FLAVANOIDS_PHENOLS | |
| dmvcolwine9111 | PROANTHOCYANINS | PROANTHOCYANINS | |
| dmvcolwine9112 | COLOR_INTENSITY | COLOR_INTENSITY | 12 |
| dmvcolwine9113 | HUE | HUE | |
| dmvcolwine9114 | DILUTED_WINES | DILUTED_WINES | |
| dmvcolwine9115 | PROLINE | PROLINE | |
| dmvcolwine9116 | ALCOHOL | ALCOHOL | 56 |
| dmvcolwine9114 | MALIC_ACID | MALIC_ACID | 0.78 |
| dmvcolwine9115 | ASH | ASH | |
| dmvcolwine9116 | ALCALINITY | ALCALINITY | |
| dmvcolwine9117 | MAGNESIUM | MAGNESIUM | |
| dmvcolwine9118 | TOTAL_PHENOLS | TOTAL_PHENOLS | |
| dmvcolwine9119 | FLUORIDES | FLUORIDES | |

Target Class 1.0
Target Class Description Class3
Confidence Level 1.0


Class 3

Done

Sharing on Research Project 2

USM Extract: Award ceremony in South Korea

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Sharing on Research Project 2

USM Extract: Award ceremony in South Korea

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Sharing on Research Project 2

USM Extract: Selected winners in the award ceremony

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Sharing on Research Project 3

MDG (Mobile Desktop Grid)

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- 1 **MDG:** An one-stop solution to obtain worldwide cluster resource for computational use
- 2 **Objective:** to resolve the problem of insufficient computational resources in addressing global issues
- 3 **Awards:** Malaysia Champion, Parasoft's Code Quality Challenge Award, and Sun MicroSystems Technology Award in the Open Jive Regional Challenge at Malaysia
- 4 **Award:** Sun MicroSystems Technology Award in the Open Jive Grand Finals Challenge



Sharing on Research Project 3

MDG (Mobile Desktop Grid)

Preliminaries

Research Project 1

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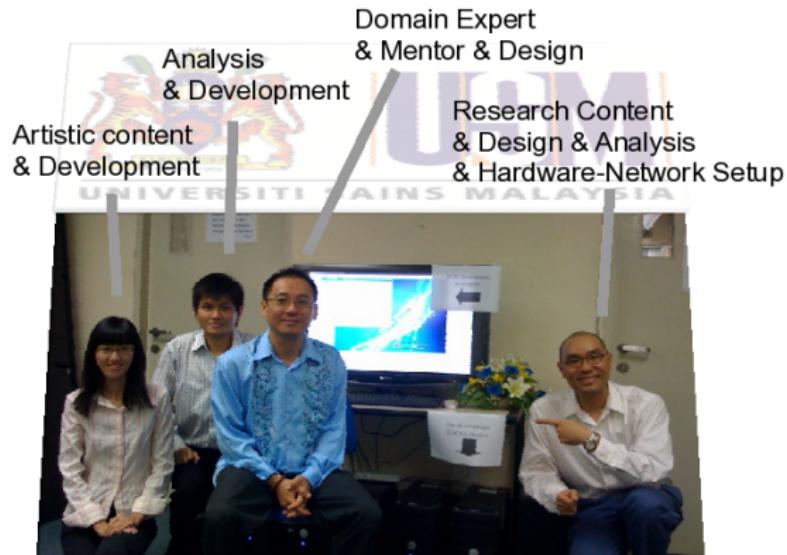
Research Publication 1

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MDG Team
Change Tomorrow



Sharing on Research Project 3

MDG client interface in a handtop

Preliminaries

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Sharing on Research Project 3

MDG matching DNA structure and previewing in 3D format

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Sharing on Research Project 3

MDG: award ceremony in Bukit Jalil, Kuala Lumpur

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Sharing on Research Project 3

MDG: demonstration booth in SunTech City, Singapore

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Sharing on Research Project 3

MDG: demonstration booth in SunTech City, Singapore

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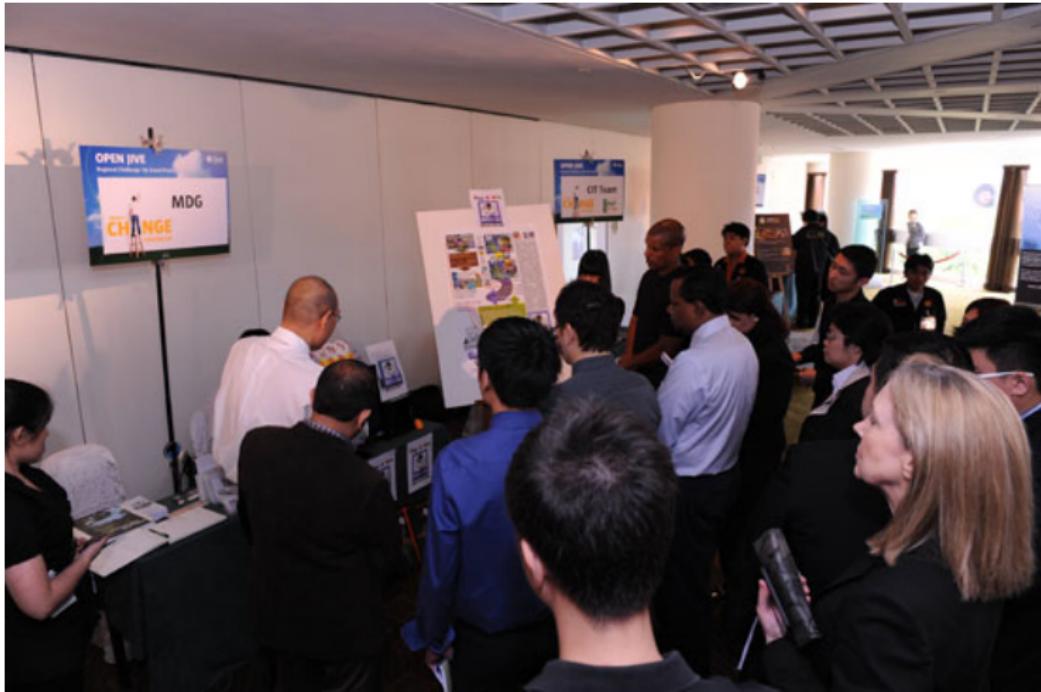
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Sharing on Research Project 3

MDG: demonstration in SunTech Conventional Centre, Singapore

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Sharing on Research Project 3

MDG: award ceremony in SunTech City, Singapore

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UNLEASH!

The tech-boundaries in you

@ Developer Days 09



Sharing on Research Project 3

MDG: selected winners in the award ceremony

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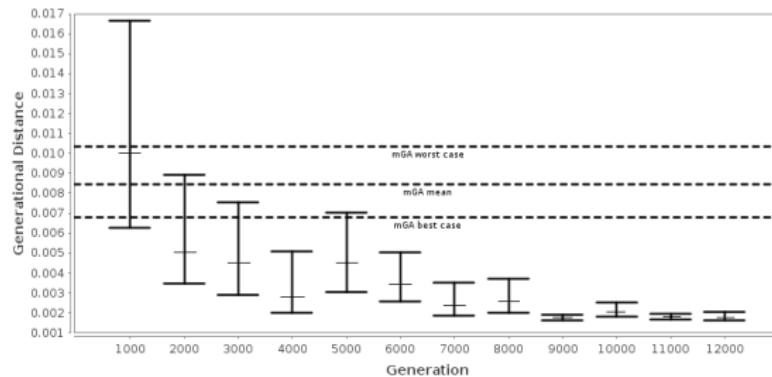
Question: What can the programming do
(for further your study)?



Sharing on Research Publication 1

MmGA model: summary of Experiments with Selected Result

Key result: It achieved fast convergence with statistically better performance (at the 95% confidence level)



A comparison between I_{gd} of mGA (i.e. dotted lines) and bootstrapped I_{gd} of MmGA. The error bars indicate the 95% confidence intervals of the mean I_{gd} results of MmGA ¹.

¹ Source: C. J. Tan, C. P. Lim, and Y.-N. Cheah, “**A modified micro genetic algorithm for undertaking multi-objective optimization problems**,” Journal of Intelligent and Fuzzy Systems, vol. 24, no. 3, pp. 483–495, 2013.

Sharing on Research Publication 2

MmGA model: a Case Study of Multi-objective Job-Shop Scheduling at Australia

Key result: The requirements are satisfied within a fraction of the time with statistical significance results.

| | Enumeration Method (worst to best) | Bootstrapped results of MmGA | | |
|-----------------|---------------------------------------|------------------------------|-------|-------------|
| | | Lower Bound | Mean | Upper Bound |
| 5 Jobs | | | | |
| Ψ (dollar) | 4.5 to 5.16 | 4.97 | 5.03 | 5.08 |
| Γ (day) | 5.0 to 0.0 | 0.87 | 0.85 | 0.83 |
| Time (ms) | > 1000 | 2.8 | 3.23 | 4.23 |
| 6 Jobs | | | | |
| Ψ (dollar) | 11.09 to 14.87 | 11.92 | 12.26 | 12.67 |
| Γ (day) | 21.0 to 12.0 | 15.08 | 14.30 | 13.77 |
| Time (ms) | > 1000 | 10.37 | 12.93 | 17.37 |
| 7 Jobs | | | | |
| Ψ (dollar) | 13.68 to 14.49 | 13.93 | 14.00 | 14.08 |
| Γ (day) | 30.0 to 17.0 | 23.67 | 22.49 | 21.46 |
| Time (ms) | > 1000 | 4.23 | 4.53 | 5.17 |
| 8 Jobs | | | | |
| Ψ (dollar) | 17.5 to 19.06 | 17.74 | 17.86 | 18.01 |
| Γ (day) | 31.0 to 20.0 | 26.62 | 25.90 | 25.26 |
| Time (ms) | > 1000 | 4.87 | 5.17 | 5.43 |
| 9 Jobs | | | | |
| Ψ (dollar) | 13.4 to 16.77 | 13.70 | 13.79 | 13.92 |
| Γ (day) | 13.0 to 0.0 | 4.57 | 4.00 | 3.40 |
| Time (ms) | > 1000 | 6.00 | 6.23 | 6.43 |
| 10 Jobs | | | | |
| Ψ (dollar) | 14.06 to 17.98 | 14.47 | 14.60 | 14.79 |
| Γ (day) | 59.0 to 45.0 | 52.32 | 51.50 | 50.85 |
| Time (ms) | > 1000 | 7.87 | 8.10 | 8.67 |

A comparison of Cost-Saving (Ψ) and Tardiness (Γ) with the enumeration method²

²Source: C. J. Tan, S. Hanoun, and C. P. Lim, "A multi-objective evolutionary algorithm-based decision support system: **A case study on job-shop scheduling in manufacturing**," in Systems Conference (SysCon), 2015 9th Annual IEEE International, April 2015, pp. 170–174.

Sharing on Research Publication 3

MmGA model: a Case Study of Optimization of Electronic Circuit Designs

Preliminaries

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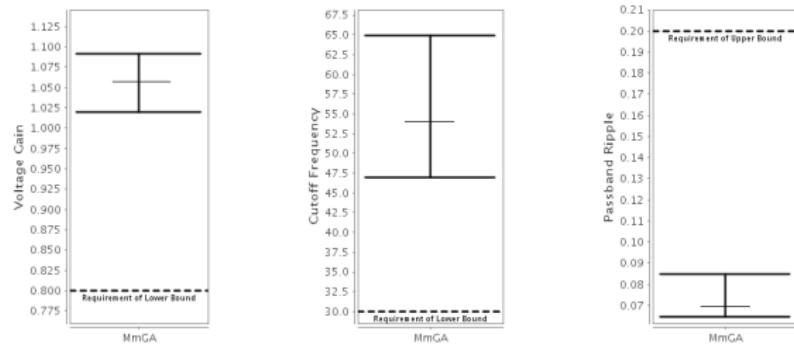
Research Publication 2

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■ **Key result:** The stability of the average results is ascertained by the estimated 95% confidence intervals, which meet the requirements of the electronic engineer.



A comparison of voltage gain, cutoff frequency and passband ripple results between the MmGA model and the baseline requirement ³

³Source: C. J. Tan and C. P. Lim, “**Optimization of Electronic Circuit Design Using Evolutionary Algorithm**,” in International Symposium on Management Engineering, 2015 (ISME 2015). Kitakyushu, Japan: International Society of Management Engineers (ISME), 2015.

Sharing on Research Publication 4

MmGA ensemble model: a Case Study of Human Motion Detection and Classification

Preliminaries

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- **Key result:** It produced statistically better accuracy rates with fewer number of features (at the 95% confidence level) .



A comparison of the Accuracy rate between the standard classifiers and the MmGA Ensemble coupled with the similar set of classifiers.⁴

⁴Source: C. J. Tan, C. P. Lim, and Y.-N. Cheah, “A multi-objective evolutionary algorithm-based ensemble optimizer for feature selection and classification with neural network models,” Neurocomputing, vol. 125, pp. 217–228, 2014.

Sharing on Research Publication 4

MmGA ensemble model: an Android-based application for data collection

Preliminaries

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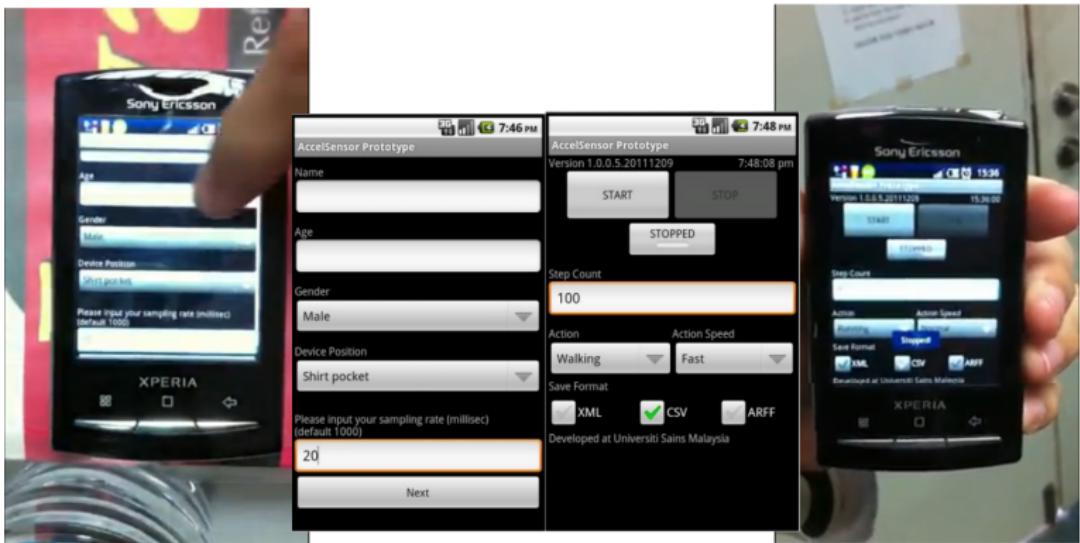
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Sharing on Research Publication 5

MmGA ensemble model: a Case Study of Text-based Amazon's Product Review Information Classification and Optimization

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- **Key result:** It produced 50% reduction in the number of features (i.e., 1560 from 3114) with 3% reduction in accuracy.

| | Accuracy (%) | No. of features |
|--|--------------|-----------------|
| Electronics to Electronics | 85.9% | 1560 |
| Kitchen Appliances to Kitchen Appliances | 88.0% | 1559 |
| Electronics to Kitchen Appliances | 82.3% | 1560 |
| Kitchen appliances to Electronics | 83.0% | 1560 |

A comparison of In-domain and cross-domain results between the SVM classifier and the MmGA Ensemble⁵

⁵Source: C. J. Tan, C. P. Lim, Y.-N. Cheah, and S. C. Tan, “Classification and optimization of product review information using soft computing models,” in International Symposium on Affective Engineering, 2013 (ISAE 2013). Kitakyushu, Japan: Japan Society of Kansei Engineering, 2013, pp. 115–120.



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Question: Does it work for you?



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Answer: We have more options and ideas from **Mr. Muhamad Rashidi A. Rahman** if they do not work for you.

Let's 'Teh tarik' together!



Thank You

Visit us at www.wou.edu.my