

CELEBRATING
COMMERCIALISATION
YEAR 2014

iiindex 2014

AN INTERNATIONAL EXPOSITION ON RESEARCH AND INNOVATION

invention
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exposition 2014

INNOVATEUR
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2014

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UNIVERSITI TEKNOLOGI MARA
MALAYSIA

*Bridging
the valley of death :
advancing the
commercialisation
of research*

RESEARCH BOOK

iiindex2014

AN INTERNATIONAL EXPOSITION ON RESEARCH AND INNOVATION

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RESEARCH INNOVATION BUSINESS UNIT
UiTM-MTDC Technopreneur Centre, Universiti Teknologi MARA
40450 Shah Alam, Selangor Darul Ehsan, MALAYSIA
Tel : +603-5544 2747/2748/2750
Fax : +603-5544 2790

Web : www.iiindex.com.my
Email : iiindexuitm@gmail.com



FOREWORD

The Honourable Minister of Science, Technology and Innovation (MOSTI) has launched 2014 as Malaysia Commercialisation Year 2014 (MCY2014) with the theme Science Technology and Innovation (STI) for Wealth Creation. In line with this theme, Invention, Innovation, Design & Exposition 2014 (iidex2014) is an annual exposition organized by UiTM and is the ultimate platform to highlight and commercialise new inventions and innovations. Researchers and inventors will exhibit their products which cater to the needs and wants of the community and the country.

The iidex2014 creates a new dimension by fusing two competitive concepts, a competition among innovative products and a competition to invite Innovateur Wannabes to perform live pitching of their products to the audience. The iidex2014 focuses on comprehensive commercialization and creating opportunities for entrepreneurs to carry out R&D as well as to provide avenue to commercialise their products. Through expositions such as iidex2014, MOSTI hopes to inculcate the culture of commercialisation of new technology designed and created by Malaysians.

I wish to congratulate all the participants of the iidex2014 and this is the opportunity for all researchers to show their ideas and exhibits their products and creativity. Apart from showcasing their products, innovators will have the opportunity to provide a window to the industry for business matching during the exposition.

Tan Sri Dato' Sri Sallehuddin Mohamed
Pro-Chancellor, Universiti Teknologi MARA

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APPLICATION OF ARTIFICIAL NEURAL NETWORK IN DISCRIMINATING THE AGARWOOD OIL QUALITY USING SIGNIFICANT CHEMICAL COMPOUNDS

Mohd Hezri Fazalul Rahiman, Nurlaila Ismail, Mohd Nasir Taib, Nor Azah Mohd Ali, Saiful Nizam Tajuddin
Faculty of Electrical Engineering, UiTM Shah Alam, Selangor.
Email: hezrif@ieee.org

Agarwood oil is well known as expensive oil extracted from the resinous of fragrant heartwood. The oil is in high demand especially in the Middle Eastern countries, China and Japan because of its unique odor. As part of on-going research in grading the agarwood oil quality, the application of Artificial Neural Network (ANN) is proposed in this study to analyze agarwood oil quality using its chemical profiles. The work involves of selected agarwood oil from low and high quality, the extraction of chemical compounds using GC-MS and Z-score to identify the significant compounds as input to the network. The ANN programming algorithm was developed and computed automatically via Matlab software version R2010a. Back-propagation training algorithm and sigmoid transfer function were used to optimise the parameters in the training network. The result obtained showed the capacity of ANN in analysing the agarwood oil quality hence beneficial for the further application such as grading and classification for agarwood oil

Objective: To apply ANN in discriminating agarwood oil quality using its significant compounds

Problem Statement: The agarwood oil has been sold in various qualities based on its physical appearances such as odour and colour. Consumer perception and high fixative properties also give marks in qualifying the agarwood oil thus affect its price in the market. However this conventional technique makes the price of agarwood oil fluctuate. A standard is needed to ensure that the agarwood oil can be qualified according to its chemical properties so that accuracy can be trusted. Therefore, as part of an on-going research in grading the agarwood oil quality, the application of ANN is proposed to analyse agarwood oil quality using its chemical profiles.

Methodology: 1. Data preparation - agarwood oil samples obtained from Forest Research Institute Malaysia (FRIM) 2. Chemical compounds extraction - using GC/MS analysis 3. Component Identification - matching them to the mass spectral library (HPCH2205.L; Wiley7/Nist0.5L; NIST0.5a.L) 4. Data Processing - ANN Application (Data pre-processing using Z-score, ANN design structure/architecture - parameter optimisation, training and testing the algorithm)

Result & Discussion: ANN parameter optimisation - final error for learning rate, momentum rate and hidden layer size ANN final design parameter - Nodes in input layer: 7, Nodes in hidden layer size: 2, Output layer size: 1, learning rate: 0.9, Momentum rate: 0.7, Error goal: 0.01, Epochs: 100 ANN prediction: high accuracy for training and testing prediction (refer to the figure in poster)

Patent & List of contributions: 1. Patent no. : LY2013001059 2. UiTM Research Grant: 600-RMI/DANA 5/3/RIF (614/2012) 3. 5 Journals, Scopus indexed: 1. Major volatile chemical compounds of agarwood oils from Malaysia based on Z-score technique - in Chemistry of Natural Compounds, Impact factor: 1.049, Scopus indexed 2. Analysis of high quality agarwood oil chemical compounds by means of SPME/GC-MS and Z-score technique - in Malaysian Journal of Analytical Sciences, Impact factor: 0.035, Scopus indexed 3. Chemometric study of selected agarwood oils by gas chromatography-mass spectrometer - in Journal of Tropical Forest Science, Impact Factor: 0.537, Scopus indexed 4. Differentiating agarwood oil quality using Artificial Neural Network, in Malaysian Journal of Analytical Sciences, Impact factor: 0.035, Scopus indexed 5. A review study of agarwood oil and its quality analysis - in Jurnal Teknologi, Impact Factor: 0.100, Scopus Indexed. 5.