UNIVERSITI TEKNOLOGI MARA | Cawangan Melaka

PUBLICATION DATE | 1 SEPTEMBER 2021

i-JaMCSIIX 2021 Exploring ideas

International Jasin Multimedia & Computer Science Invention and Innovation Exhibition

International Jasin Multimedia & Computer Science Invention and Innovation Exhibition (i-JaMCSIIX 2021)

15 FEBRUARY 2021 - 31 MARCH 2021

VIRTUAL COMPETITION • INNOVATION & INVENTION • PUBLICATION OPPORTUNITIES

EXTENDED ABSTRACT

UiTM CAWANGAN MELAKA KAMPUS JASIN

ISBN:
978-967-15337-0-3

WEBSITE | https://jamcsiix.wixsite.com/2021

i-JaMCSIIX Exploring ideas 2021

International Jasin Multimedia & Computer Science Invention and Innovation Exhibition

PUBLISHED BY:

i-JaMCSIIX

Universiti Teknologi MARA Cawangan Melaka
Kampus Jasin

77300 Merlimau, Melaka

Tel: 062645000

Email: jamcsiix@uitm.edu.my

Web: https://iamcsiix.wixsite.com/2021

ISBN: 978-967-15337-0-3

ORGANIZING COMMITTEE

PATRON	ASSOC. PROF. DR. ISMADI MD BADARUDIN
ADVISOR 1	NOR FADILAH TAHAR @ YUSOFF
ADVISOR 2	DATO' TS. DR. MOHD NOR HAJAR HASROL JONO
PROJECT LEADER	TS. NURUL NAJWA ABDUL RAHID @ ABDUL RASHID
PROJECT LEADER 2	ANIS AFIQAH SHARIP
TREASURER 1	SITI MAISARAH MD ZAIN
TREASURER 2	NURUL ZAHIRAH ABD RAHIM
SECRETARY 1	NOR AIMUNI MD RASHID
SECRETARY 2	NUR NABILAH ABU MANGSHOR
PUBLICATION	**DR. RAIHAH AMINUDDIN**
	DR. NOR AIZA MOKETAR
	DR. SITI FEIRUSZ AHMAD FESOL
JURY	**TS. RAIHANA MD SAIDI**
	DR. ELIN ELIANA ABDUL RAHIM
	NOR INTAN SHAFINI NASARUDDIN
REGISTRATION	**FADZLIN AHMADON**
	HAJAR IZZATI MOHD GHAZALLI
	SITI AISYAH ABDUL KADIR
PROMOTION	**MOHAMAD ASROL ARSHAD**
	ZUHRI ARAFAH ZULKIFLI
	FADILAH EZLINA SHAHBUDIN
MULTIMEDIA	**NORSHAHIDATUL HASANA ISHAK**
	HAZRATI ZAINI
	NUR FARAHIN MOHD JOHARI
	FAIQAH HAFIDZAH HALIM
	MOHAMMAD BAKRI CHE HARON
	MUHAMMAD HAMIZ MOHD RADZI
AWARD	**FARAH NADZIRAH JAMRUS**
	FADHLINA IZZAH SAMAN
	NURULHUDA ZAINUDDIN
	HAZWA HANIM MOHAMED HAMZAH
	MOHD HAFIFI MOHD SUPIR
	ADI HAKIM TALIB
CERTIFICATE	**NUR SYUHADA MUHAMMAT PAZIL**
	MARIATHY KARIM
	UMMU MARDHIAH ABDUL JALIL
	NOOR WAHIDA JAMIL
TECHNICAL & PROTOCOL	**DR. AHMAD FIRDAUS AHMAD FADZIL**
	ALBIN LEMUEL KUSHAN
	MOHD NABIL ZULHEMAY
SPONSOR	**TS. NURUL NAJWA ABDUL RAHID @ ABDUL RASHID**
	SHAHADAN SAAD
	FARIDAH SAPPAR
	SYAFNIDAR ABDUL HALIM
	SITI NURAMALINA JOHARI
LANGUAGE EDITOR	NUR AQILAH NORWAHI
	MOHD AMIRUL ATAN

BRONZE SPONSOR

AINON SYAZANA AB HAMID
ANITA MOHD YASIN
BUSHRA ABDUL HALIM
FARIDAH SAPPAR (Ts.)
FATIMAH HASHIM
HAZRATI ZAINI
MASTURA MANSOR
MASWATI SUFFIAN
NOORAZILAH IBRAHIM
NOR ADILA KEDIN
NOR AIZA MOKETAR (DR.)
NOR AZIDA MOHAMED NOH
NOR INTAN SHAFINI NASARUDDIN
NURUL HIDAYAH MAT ZAIN (Ts. DR.)
NURUL NAJWA ABDUL RAHID @ ABDUL RASHID (Ts.)
NURULHUDA GHAZALI (Ts.)
RAIHAH AMINUDDIN (DR.)
SALEHAH HAMZAH
SHAHITUL BADARIAH SULAIMAN
SITI AISYAH ABDUL KADIR
SITI NURAMALINA JOHARI
SITI RAMIZAH JAMA
SURYAEFIZA KARJANTO (DR.)
SYAFNIDAR ABDUL HALIM
UMMU MARDHIAH ABDUL JALIL
ZAINAB OTHMAN
ZURAH ABU

LIST OF REVIEWERS

FADILAH EZLINA SHAHBUDIN
FADZLIN AHMADON
FARAH NADZIRAH JAMRUS
HAJAR IZZATI MOHD GHAZALLI
HAZRATI ZAINI
NOR AIZA MOKETAR (DR.)
NOR INTAN SHAFINI NASARUDDIN
NURUL NAJWA ABDUL RAHID @ ABDUL RASHID (Ts.)
RAIHAH AMINUDDIN (DR.)
RAIHANA MD SAIDI (Ts.)
SHAFAF IBRAHIM (Ts. DR.)
SITI FEIRUSZ AHMAD FESOL (DR.)
SITI MAISARAH MD ZAIN
SITI NURAMALINA JOHARI
SURYAEFIZA KARJANTO (DR.)

CONTENTS

i-JaMCSIIX Exploring ideas 2021
International Jasin Multimedia & Computer Science Invention and Innovation Exhibition

Agarwood Oil Quality Classification Using One Versus All Strategies in Multiclass on SVM Model

Aqib Fawwaz Mohd Amidon[1], Noratikah Zawani Mahabob[1], Nurlaila Ismail[1], Zakiah Mohd Yusoff[*2], Mohd Nasir Taib [1,3]

[1] School of Electrical Engineering, College of Engineering, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia

[2] School of Electrical Engineering, College of Engineering, Universiti Teknologi MARA, Cawangan Johor, Kampus Pasir Gudang, 81750 Masai, Johor, Malaysia.

[3]Malaysia Institute of Transport (MITRANS), Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia.

[*]Corresponding author: zakiah9018@uitm.edu.my

Abstract— **Agarwood oil is one of the most beneficial oil to the world community with a high demand. However, there has been a lack of research on the development of agarwood oil because there is no any standard grading model of agarwood oil was implemented. With that, it is very important to come out with a standard of quality classification model for agarwood oil grading's. By continuing developing this standard, specific algorithm function has been used to make sure the ability of this model is totally not in doubt. Support vector machine (SVM) has been chosen as a main model and for the specific function algorithm was multiclass function. Then, in the function, the one versus all (OVA) strategies has been used. The analysis work has involving the data taken from the previous researcher that consists of four classes of agarwood oil quality's samples which are low, medium low, medium high and high quality. So, the output was the classification of quality between low, medium low, medium high or high quality while the input was the abundances (%) of compounds. The desk research has been conducted by using MATLAB software version r2020a for the simulation platform. The result showed that the model has pass the performance criteria standard. Based on that, the intelligent model has shown excellent performance with 100% of accuracy by producing 0.00 of error rate. The verdict in this research for sure will be valuable for the future research works of agarwood oil areas, especially quality classification part.**

Keywords—Agarwood oil, multiclass, one versus all, support vector machine.

I. INTRODUCTION

Agarwood or known as chenxiang in Chinese and call edagalloch, aloeswood, eaglewood, kanankoh, jinkoh, kalambak or gaharu in different regions, is a non-timber forest product with very highly prized for its values as herbal medicine, aromatic material, ceremonies and many more, depend on the different cultures and religious [2 – 5]. Agarwood oil, the fragrant resinous heartwood is a well-known essential oil originating from Aqualaria and several other plant species of the Thymelaeaaceae family [1]. Some countries like Malaysia, Japan and India graded agarwood using two types of grading techniques. Malaysian researchers classify agarwood by naming them as kalambak and gaharu as well as in japan grade agarwood by use kanankoh and jinkoh for high and low quality. However, India, they are using the alphabet from A to D or numbering from 1 to 4 according to color and infection level for the agarwood grading process [6]. The price, usability and others are fully depending on the quality of the agarwood oil either the quality is low, medium low, medium high or high [5]. In other word, the higher the quality of agarwood oil, the higher the price of the agarwood oil. A review from other researchers' study [2,5], it was found that grading agarwood oil process has been conducted by only using human sensory panels. But this method can spark doubt because it is

very incompetent, caused tiredness, and take time as well. With the availability of data analysis technology nowadays, there is a platform where agarwood oil quality classification can be conduct only use their chemical profiles so that essential oil can be classified according to their respective classes (low, medium low, medium high or high quality) and the accurate result can be measured. In this paper has focus on the Support Vector Machine (SVM) as the main model to classification the grading of agarwood oil into low, medium low, medium high and high quality as recommended by [7].

II. MATERIALS

A. Sample of data used.

There are 660 of sample of data were used throughout the research [1]. These data samples have four different classes which include 210 samples of data for low quality, 90 samples of data for medium low quality, 30 samples of medium high quality and 330 samples of high quality.

III. METHODS

A. Flowchart of Experimental Set – Up.

All the samples of data have been through data pre-processing stage which are normalizing data, randomizing the arrangement of data, and lastly separating into training data and testing data using 80%:20% ratio as recommended by previous researchers [1] as mentioned in Fig. 1. The simulation has used Holdout partition to separated data as recommended. After that, SVM model have been developed by using standard template that have been designed for nonlinear data. The standard template using SVM as method, classification as the type of analysis, and 'gaussian' as kernel function parameter by having the ability to analyze nonlinear data. Then, to make sure the classification successful, Multiclass classification method based on binary classifiers have been used. In the multiclass classification, OVA strategies have been chosen as multiclass method of machine learning. With that,each of the quality will be classify by comparing the quality and other qualities as Low vs All (LvsA), Medium Low vs All (MLvsA), Medium High vs All (MHvsA) and High vs All (HvsA).

Next, all 528 of training data have been involve during develop the SVM model above. But 132 of testing data have been hold first for testing the model and analyze the model by following the performance criteria as standard pass evaluation for SVM model. The result of testing has been put in result and discussion part.

The simulation of intelligent model has been conducted by using Matlab software version r2020a to classify four different quality of agarwood oil.

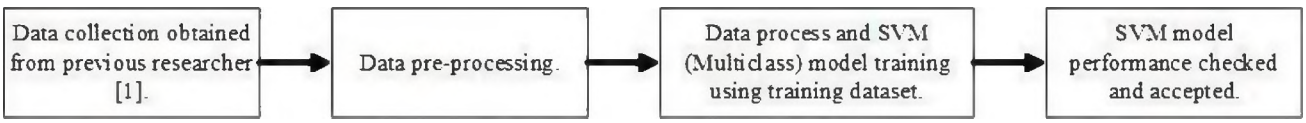

Fig. 1. Block diagram of experimental work.

IV. RESULTS AND FINDINGS

As mentioned in material part, there were 660 samples of agarwood oil compound data used in the analysis work. The data samples then were analyzed and constructed into SVM model. Next, OVA of multiclass classification function have been applied on the SVM model to classify the quality of data. As result, the outcome from the applying the OVA have formed different value of support vectors for all the different quality. For low quality was 46 values, medium low was 40 values, medium high was 22 value and high quality was 36 values. Next, the confusion matrix of SVM model between actual quality and predicted quality for four different qualities of agarwood oil by using testing data has been conducted. It shows that, there is no any misleading during predicted and actual quality. With that, error rate for confusion is 0.00 and for sure Mean – square error also has 0.00 values. Next, Table 1 shows that each of the classes have 100% of accuracy, 100% of sensitivity, 100% of specificity and 100% for precious. This performance criteria have been measure based on the testing data which is 20% (132 samples) from the total of sample data used. As researcher mention before, each of performance criteria can achieve 100% when there is no any error or misleading during confusion matrix between predicted quality and actual quality comparison.

Table 1. Performance criteria

	LvsA	MLvsA	MHvsA	HvsA	Avg Acc	Avg Sen	Avg Spec	Avg Pre
Accuracy	100%	100%	100%	100%	100%			
Sensitivity	100%	100%	100%	100%		100%		
Specificity	100%	100%	100%	100%			100%	
Precious	100%	100%	100%	100%				100%

V. CONCLUSIONS

Various studies have made an effort to show that the insufficiency of classification of quality using traditional method can affect human health. By developing of the modelling of agarwood oil classification using SVM model has successfully presented

on this paper. During SVM process by support with Multiclass classification method, the classification has been run using hyperplane separating in SVM for the result. From the data, accuracy yielded to 100% which are very significant and also reach 100% of sensitivity. With that, 0.00 of error rate the model result has been achieved. On the other hand, the SVM model in this study keep strongly proven the ability on handling the variation of input data created from the abundances of eleven significant chemical compounds and separate the nonlinearly data into training and testing data. then, measure the output of data by classify the data into four classes of quality, low, medium low, medium high, and high quality. The outcome of this study benefits other analysts on evaluating the oil quality especially agarwood oil. By developing this intelligent model, SVM and implementing OVA of multiclass function will be significant for future study especially in agarwood oil classification. In future work, it is prescribed to design the agarwood oil model to classify more than two classes of agarwood oil quality. Their result afterward canbe compared and assessed.

ACKNOWLEDGMENT

This research is funded by Institute of Research Management and Innovation (IRMI), Universiti Teknologi MARA Shah Alam, Selangor, and Universiti Teknologi MARA, Cawangan Johor, Kampus Pasir Gudang under Grant No: 600-IRMI/FRGS5/3 (224/2019). The authors would like to thank all the staff involved especially from FKE, UMP and FRIM.

REFERENCES

[1] M. H. Haron, "Agarwood Oil Quality Grading Model Using Self-Organizing Map (SOM)", PhD Dissertation, Faculty of Electrical Engineering, Universiti Teknologi MARA (UiTM), 2020.

[2] N. Ismail, "ANN Modeling for Agarwood Oil Significant Compounds for Oil Quality Discrimination", PhD Dissertation, Faculty of Electrical Engineering, Universiti Teknologi Mara (UiTM), 2015.

[3] N. S. Zubir, M. A. Abas, N. Ismail, N. A. M. Ali, M. H. F. Rahiman, N. K. Mun, M. N. Taib and S. N. Tajuddin, "Pattern Classifier of Chemical Compounds in Different Qualities of Agarwood Oil Parameter using Scale Conjugate Gradient Algorithm in MLP," 2017 IEEE 8th Control Syst. Grad. Res. Colloquium, ICSGRC 2017 - Proc., no. March, pp. 10–12, 2017.

[4] S. Wang, Z. Yu, C. Wang, C. Wu, P. Guo and J. Wei, "Chemical Constituents and Pharmacological Activity of Agarwood and Aquilaria Plants", MDPI, 2018.

[5] N. Ismail, H. Ariffin, M. H. F. Rahiman, M. N. Taib, N. A. M. Ali and S. N. Tajuddin," Statistical Learning BSVM Model to the Problem of Agarwood Oil Quality Categorization", 2018 IEEE Conference on Systems, Process and Control (ICSPC 2018), 14 – 15 December 2018, Melaka, Malaysia.

[6] R. Kalra and N. Kaushik, "A review of chemistry, quality and analysis of infected agarwood tree (Aquilaria sp.)," Phytochem. Rev., vol. 16, no. 5, pp. 1045–1079, 2017.

[7] N. Ismail, M. H. F. Rahiman, M. N. Taib, M. Ibrahim, S. Zareen, and S. N. Tajuddin, "A review on agarwood and its quality determination," Proc. - 2015 6th IEEE Control Syst. Grad. Res. Colloquium, ICSGRC 2015, pp. 103–108, 2016.