> IORA
International Conference
on Operations Research 2017

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COMPETING IN THE ERA OF ANALYTICS

Proceeding

IORA International Conference on Operations Research 2017

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UNIVERSITAS TERBUKA

Organized by: Faculty of Mathematics and Natural Sciences, Universitas Terbuka
Supported by: Indonesian Operations Research Association, Department of Mathematics Bogor Agricultural University, Department of Mathematics Universitas Padjadjaran, Department of Computer Science Universitas Pakuan, Faculty of Engineering Universitas Katolik Indonesia Atma Jaya, Department of Management Universitas Indonesia

Date: 12th October 2017 (Thursday), 08.00 – 17.00
Venue: Universitas Terbuka Convention Center (UTCC)
             Jl. Cabe Raya, Pondok Cabe, Pamulang,
             Tangerang Selatan 15418, Indonesia

In the spirit to promote decisions based analytics through OR/MS, the theme of the conference is

"*Competing in the Era of Analytics.*"

The primary objectives of the conference are:

1. to facilitate interaction between OR/MS researchers and academicians in discussing current challenges that need to be addressed as well as highlighting new developments of methods, algorithms, and tools in the field,

2. to provide OR/MS researchers, academicians and practitioners an appropriate platform for sharing experiences, communication and networking with other experts within the nation and from around the world in maximizing the contribution of OR/MS for sustainable growth, promoting of a knowledge-based economy, and utilizing the limited resources.

Conference Chair:

Dr. Agnes Puspitasari Sudarmo, *Universitas Terbuka*, *Indonesia*

It is well-known that the use of data in decisions making is not a new idea. But the field of business analytics that was born in the mid-1950s, with the advent of analytical tools that could digest a bulky quantity of information and perceive patterns in it far more quickly than the unassisted human mind ever could. Taking full advantage of big data's potential means companies must comprehend analytics into their strategic vision and utilize it to provide better and faster decisions, i.e., promote decisions based on analytics rather than instinct, while in other side, volume of data continues to double every three years as information surges in from digital platforms. Thus, analytical capability helps decision makers look beyond their own perspective in discerning real pattern and expecting opportunity.

Operation research as well as management science (OR/MS) has had an impressive contribution on improving the efficiency of numerous organizations around the world by offering a best solution. In the process, OR/MS has made a significant support to increasing the productivity of the economies of various countries. In this era of data-driven analytics, OR/MS is an ultimate tool for technical professionals who want to acquire the knowledge and skills required to incorporate analytics to solve real business problems.

This second conference, IORA International Conference on Operations Research 2017, is held in conjunction with Universitas Terbuka National Seminar on Mathematics, Sciences, and Technology 2017. The conference and seminar initiate to bring together OR/MS researchers, academicians and practitioners, whose collective work has sustained continuing OR/MS contribution to decision-making in many fields of application. It can be considered as good platforms for the OR/MS community, particularly in Indonesia, to meet each other and to exchange ideas. Thank you!

WELCOME REMARKS
IORA International Conference on Operations Research 2017

From the President
Indonesian Operations Research Association (IORA)
Prof. Sudradjat Supian

Drawn extensively from the divisions of mathematics and science, operations research (OR) applies cutting-edge statistical analysis and mathematical modeling to address a number of conflicting interests in inventory planning and scheduling, production planning, transportation, financial and revenue management and risk management as well as to improve decision-making mechanism. Yet, the importance of analytics inclusion into managerial decision making has grown significantly in the recent years. Massive amounts of data are now available for many organizations and businesses to be analyzed to support decision making process. How will big data fundamentally change what we do in OR? Analytics—the scientific process of transforming data into insight for making better decisions is now our key point.

For this conference we choose the following theme for our stand of work: "Competing in the Era of Analytics." It is our conviction that OR can make significant contribution to this emerging situation and challenging domain of research. It seems that the practice of big data analytics would fall entirely in the field of OR. By this conference we aim to promote the increase in the use of OR as a practical tool for problems in many aspects of data analysis. The ability to analyze large and complicated problems with operations research techniques is expected to suggest better decisions.

Establishment of Indonesian Operations Research Association (IORA) in 2014 is evidently intended to reinforce the above mentioned initiative. We hope IORA can be considered as good platforms for OR researchers, academicians and professionals in Indonesia to meet each other, exchange ideas and strengthen their collaboration.

Welcome to Tangerang Selatan, Indonesia, and welcome to IORA-ICOR 2017.

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Implementation of artificial neural networks in detection of vehicle registration number by region based on digital image processing

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Abstract. Pattern number plate recognition can be applied to many traffic monitoring application applications one of which is electronic toll payment. Character recognition of the success of the classification process is determined by the successful feature extraction of each character so that the various character form will increase the difficulty level in the process of introduction. Pattern recognition on vehicle number plate consists of several stages, namely detection of plate number location, number plate preprocess, choosing test data and training data, identification using ANN including JST classification model, ANN test and SJT Accuracy. Detection of the number plate location is a major component in plate pattern recognition to find environmental imagery that may have meaning and value on the number plate object. The data were taken as many as 120 consisting of 30 images of Bogor area (F), 30 images of Jakarta area (B), 30 images of Bandung (D) and 30 images of Purwakarta (T). Data from each plate type number is divided into two parts, 20 pieces for training data and 10 pieces for test data. From the experiment based on 40 training data, there were 28 undefined test data or 70% accuracy.

1. Introduction

One unique part of a motor vehicle is a police license plate. In Indonesia it has been specified in the rule that the vehicle license plate mark must meet the terms in terms of shape, size, color and location of the installation. Pattern recognition license plate can be applied to many applications of monitoring traffic activity such as payment of road tolls electronically, payment at parking area as well as detect the number of vehicles by region In character recognition success of the classification process is determined from the successful extraction of the features of each character so that the character shapes that vary will increase the difficulty level in the introduction process.

In this study the digital image will be taken preliminary object to determine whether the vehicle plate from Bogor region or not. So the future is expected to know the number of vehicles that enter into certain areas in this city of Bogor.

2. Methodology

The method used in this study is as shown in Figure 1.
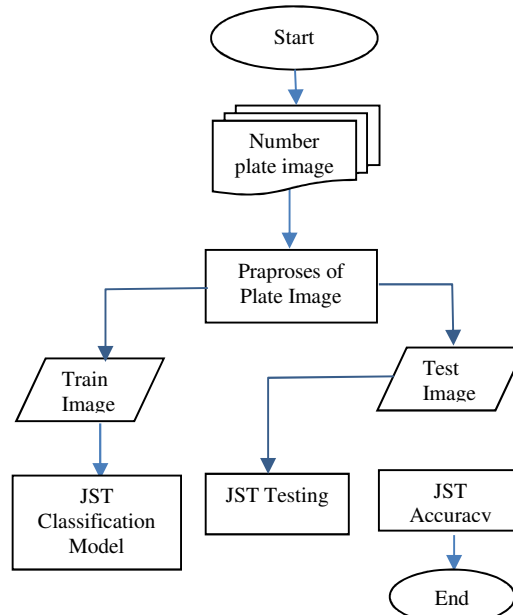
Figure 1. Research Methodology

2.1. Data collection

The data collection stage is done to facilitate the identification of vehicle license plate data number. The data collection of vehicle number plate is done by way of direct dropping to field in various area and place, among them Bogor, Jakarta, Bandung and Purwakarta as many as 30 images in each region. The overall data taken in this study is as many as 120 images. Sample data license plate shown in Figure 2.

Figure 2. Sample Car Plate Figure

2.2. Image Preview

Image preview is done by cutting the image of the vehicle number and separating it from the vehicle image background through the segmentation process. The image that has been segmented and then processed retrieval feature extraction in order to recognize a characteristic of the image using texture

analysis that is entropy, energy, contrast, homogeneity. The feature extraction aims to take the value of an image to be processed through the identification stage.

2.3. Test Data Sharing and Train Data

Vehicle license plate data in this study a total of 120 images comprising 30 image Bogor (F), 30 the image of Jakarta area (B), 30 images Bandung (D) and 30 images Purwakarta region (T). Data from each plate type number is divided into two parts, 20 pieces for training data and 10 pieces for test data.

2.4. Identification Process

The image of the feature extraction process is an input for JST. The number of outputs is 4 class areas, namely Bogor (F), Jakarta (B), Bandung (D), and Purwakarta (T). Class 1 characterizes Jakarta, Purwakarta region characterize class 2, class 3 characterizes the area of Bandung, and Bogor Grade 4 characterizes the region. The identification process using the shortest distance with the value of neighborhood 3 and 5, while the second will be used for ANN training functions backpropagation network that is trainlm and trainrp.

3.   Results and Discussion

Data of Number Plate from Region Bogor, Jakarta, Bandung and Purwakarta 30 image in each region. The overall data taken in this study is as many as 120 images. Image Segmentation Process. The image that has been segmented and then processed retrieval feature extraction in order to recognize a characteristic of the image using texture analysis that is entropy, energy, contrast, homogeneity. Application identification number plate based on region-based image using Artificial Neural Network (ANN) is structured like the flow chart presented in Figure 3.
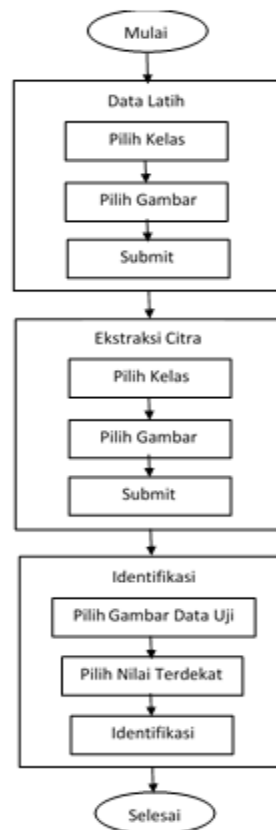
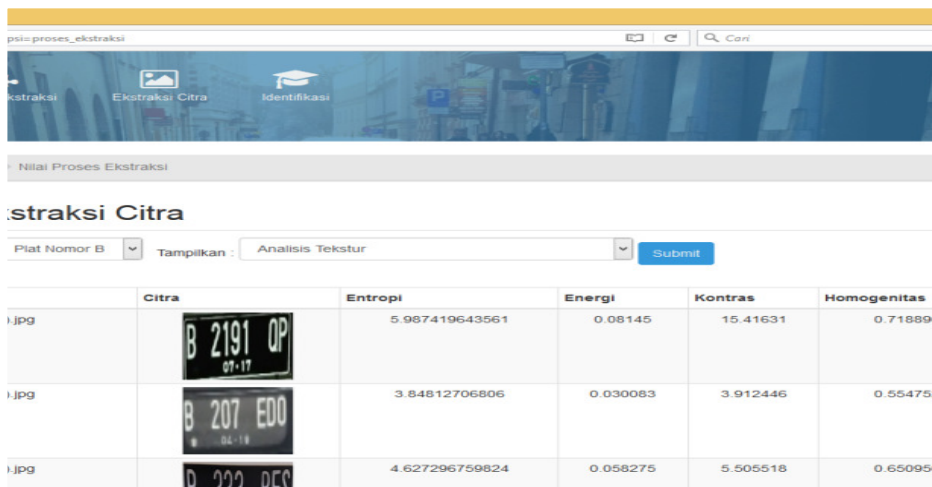

Figure 3. Application flowchart
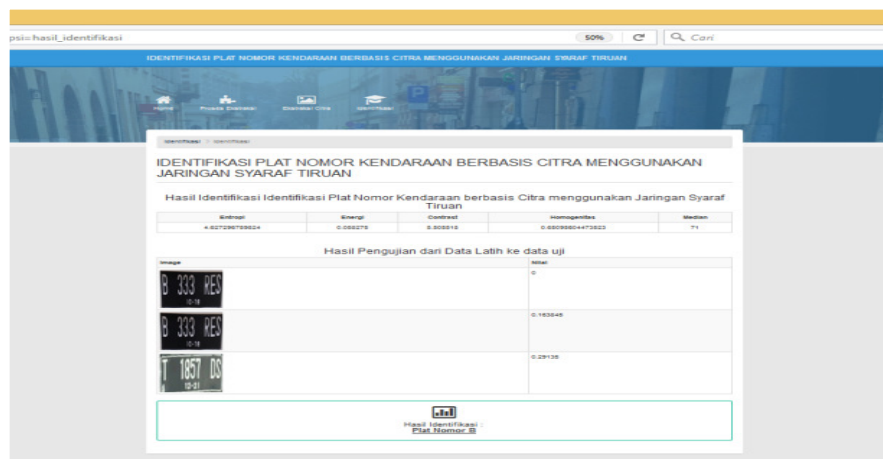
Figure 4. Image Identification

Figure 5. Result of Identification

The process of identification by inputting test data by selecting the image to be tested into the system. The identification results will display the number plate code by region. The application displays the value of the image feature extraction of test data that is the value of entropy, energy, contrast and homogeneity.

4. Conclusion

Application Identification of vehicle number plate based on region using Artificial Neural Network (ANN) based on digital image processing aims to identify number plate using image divided into 4 classes, namely class 1 for Jakarta (B), class 2 for Purwakarta (T) grade 3 for Bandung (D), and Grade 4 for Bogor (F). The data consisted of 120 pieces, with each class divided into 30 pieces of image. Image data is divided into 80 training data and 40 pieces as test data. The characteristic extraction used in this research consists of 4 parameters: entropy value, energy, contrast, and homogeneity, while identification process using artificial neural network. The identification results will display test data with the region code based on the value closest to the training data. The results of the test resulted in a score of 70 percent.

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