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Hospital Safety Box Monitoring: Building Brand Trust in Healthcare Business During Covid -19 Wave

Muhamad Deni Johansyah[1*] and Susan Purnama[2]

[1]Department of Mathematics, Faculty of Mathematics and Natural Sciences, Universitas Padjajaran Jl. Raya Bandung-Sumedang Km 21, Jatinangor 45363
[2]Faculty of Economics and Business, Universitas Informatika dan Bisnis Indonesia, Indonesia

**Corresponding author email: Muhamad.deni@unpad.ac.id*

Abstract

The health business is adjusting to a new reality where bargaining power has shifted to consumers. Consumers are now playing a key role in the commercialization process, making them important stakeholders to full fill their needs. Health business reforms have convinced consumers to give protection a greater priority than ever since the COVID-19 pandemic escalated around the world. Health care businesses in Indonesia are no exception, should increase their brand trust, because of the huge responsibility to protect consumers from the prevention of COVID-19, and brand trust also gives added value to the hospital's own brand. A brand with the right value proposition can "prove" the true value of its product or service to patients in the minds of consumers, one of which is from medical waste management. Hospital waste is usually a contagious and toxic chemical that can affect human health and environmental impacts if not treated properly. Medical waste including sharp objects, infectious waste, pharmaceutical waste, and other waste is mostly generated in health facilities such as health centers and hospitals. such as intravenous lines, syringes, gloves, which after use must be handled and destroyed in such a way that they do not fall into the hands of the public or even injure medical personnel. The Smart Waste concept is here to answer the challenges of trust in hospital brands in Indonesia, especially in the city of Bandung, increasing the sense of security of consumers is the main goal of this concept where hospital safety boxes work together with sensors and microcontrollers, disposal of syringes can be done more intelligently, safe and the risk of medical personnel punctured by infected needle waste can be reduced.

Keywords: Smart Waste, Hospital Safety Box, Medical Waste, Brand Trust, Covid-19.

1. Introduction

The need for a sense of security and comfort for consumers to visit the hospital during the Covid-19 pandemic has decreased sharply, especially in the city of Bandung, which is recorded as a red zone for the spread of the Covid-19 virus. It is an important note for marketers and public relations in several major hospitals in Bandung, Indonesia to be able to rise up and ensure that their hospitals are safe and comfortable to visit. Data from the Ministry of Health for August 2020, the condition of almost all hospitals serving Covid-19, hospital income has decreased by 20-50 percent throughout Indonesia. All

efforts to prevent consumers from coming to the hospital are also an obstacle for this business to rise. Competitive advantage and innovation are needed to survive in this pandemic era. Branding is so strong that consumers are willing to pay more for a trusted name than lesser-known brands - even when the services offered are similar (Fatimah et al., 2020). To answer this challenge, the concept of smart waste is here. Management of brand trust with smart waste is expected to be able to improve human rights and improve the hygiene of hospitals, medical personnel, and the surrounding environment so that patients and people who need medical services are no longer afraid to come to the hospital.

Significant population growth and changing consumption patterns of society, as well as the increasing development of industrial centers, now indirectly increase the volume of waste produced and the types of characteristics of waste such as glass, paper, cardboard, and metal are increasingly diverse. Currently, waste in the form of medical waste is still sorted and sorted manually. It is necessary to automatically classify the type of waste by computer with reference to the classification of waste that is filled with data collected is used as a collection of data to classify waste, especially medical waste, which is handled more specifically and requires special attention because the medical will be toxic if left too long in the trash because of the occurrence of chemical changes in the waste (Alotaibi et al., 2019).

Previous research has conducted benchmarking tests for deep learning algorithms and support vector machine (SVM) to analyze data patterns used as classifications based on image processing. From the research results, SVM gets the best accuracy for waste classification. The SVM algorithm is a suitable algorithm for classifying waste. The advantages of the SVM algorithm are generalizations to classify patterns that do not contain data used at the method learning stage, as well as feasibility, which means that SVM can be implemented relatively easily. In the trial, the SVM system is connected to the IoT device. To use image processing techniques, it is then processed for image processing before computer vision.

2. Theoritical Basic

This research is an effort to improve the monitoring of hospital safety boxes through collaboration between hospital safety boxes with sensors and microcontrollers, so that is applied makes it easier for medical personnel not to forget to replace the safety box when the condition is almost full and/or 3 days have passed (Zeidan, et al. 2018). Garbage is something that is not desired by those who have and comply with Law Number 18 of 2008 concerning Waste Management, which states that waste is the residue of daily human activities. The definition of waste according to SNI 19-2454-2002 regarding the operational procedures for city waste disposal is waste made from organic and inorganic materials that are deemed unusable and must be processed in such a way so that the environment is not threatened and development investment is protected.

Waste disposal is a systematic, comprehensive, and sustainable activity that includes waste reduction and processing. The disposal of waste starts from the source, container, collection, transfer and transportation, administration, and final disposal. The reduction includes limiting the production, recycling, and/or reuse of waste. Waste processing includes activities related to sorting, collecting transportation, and final processing of waste. Mechanical learning support vector machines are also referred to as support vector networks. This is a supervised method that refers to a learning algorithm to analyze data patterns used for classification and regression in this type of medical waste data. Support Vector Machine (SVM) developed by Boser et al (1992). First presented in 1992 at the annual workshop on Computational Learning Theory. Unlike the neural network strategy, which tries to find the hyperplane that separates classes, SVM tries to find the best hyperplane in the input space (Costa, et al. 2018). The basic principle of SVM is a linear classifier that is further developed in order to solve non-linear problems. by integrating the trick kernel concept into the high dimensional workspace. This development has sparked research interest in the field of pattern recognition to examine the potential capabilities of SVM both theoretically and in terms of application. SVM has been successfully implemented.

In real-world problems and generally offer a better solution than conventional methods, this method is able to classify and read trash data according to the characteristics and datasets used (Özkaya, et al. 2018). Open CV is a branch of computer science and engineering that aims to create computers that can see and understand events in the outside world. Computer Vision is dedicated to the discovery of algorithms, data representations, and computer architectures that embody the principles underlying visual abilities. Computer vision is a combination of image processing and pattern recognition. Here is a part of computer vision (Hossain, et al. 2019; Fang et al., 2020):

• Image processing: the area assigned to an image or image transformation process. This process aims to get better image quality.

• Pattern recognition: The area associated with the process of identifying objects in images or interpreting images. This process aims to extract the information or message conveyed by the image or image.

Computer vision involves a series of primary manipulations (initial manipulations) of this binary data. Image processing helps to enhance and enhance image quality so that it can be analyzed and further processed more efficiently. Image processing increases the signal-to-noise ratio (signal-to-noise ratio = s / n). This signal is information that represents the object in the image. While noise is any form of distraction, there is a little obscurity that occurs in an object (Al-Omairi, et al. 2019).

3. Research Methods

This system requirements analysis is intended to describe the needs that must be provided by the system in order to meet the user's needs and in accordance with the objectives of this study. System design describes interface requirements, input data requirements, and output data indicating system specifications to be made, and when analyzing requirements. The system is divided into three areas, namely functional and non-functional software requirements and hardware requirements, described as Figure 1.

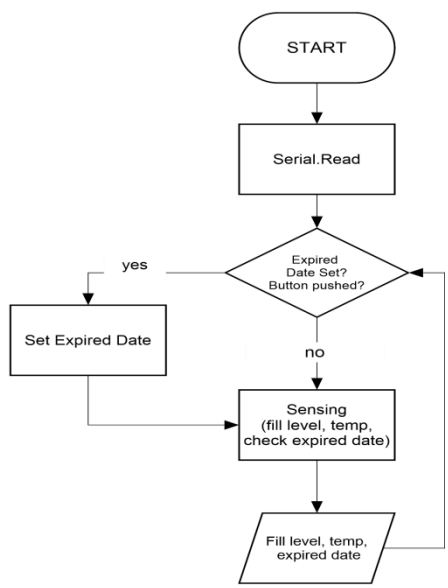

Figure 1. Medical waste sorting and monitoring system

The prediction process from the file requires several steps before running the two commands above. Make sure the data has entered a predictive image in each directory provided for the file prediction process. The following image is a directory provided to predict files for each alphabetical image. The function of providing this data is to facilitate the characteristics of the type of garbage.

4. System Implementation And Testing

This implementation section describes the steps to build a system from a pre-designed design. The following is an implementation of the Safety Box Monitoring tool that has been made. In this section only describes the part that the author does in carrying out practical work when he considers and takes into account the wide area of the system is created.

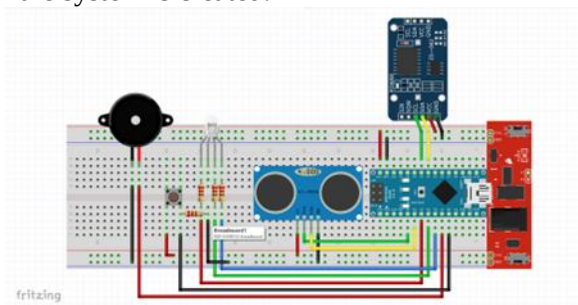

Figure 2. Assembling the monitor trash can

Materials and components consisting of a microcontroller and sensor are put together according to the sketch made. All components are already installed on the motherboard, namely the board where the components are, in this section consisting of the Power supply component, then a microcontroller and ultrasonic sensor, RTC, Bluetooth module, push-button, bell, and RGB LED. Each sensor is connected to the microcontroller using jumper cables and resistors according to the electronic rules (Mujiarto et al., 2019; Kuncoro et al., 2020)

Test results for the acquisition function:

• If the instrument is aimed at an object remotely or measures a value from 0% to 50% of the safety box, the RGB LED lights up blue, which means the remote sensing process is successful.

• If the instrument is aimed at an object with a medium or high distance 50% to 80% of the safety box, the RGB LED will light green, which means that the medium-range detection process was successful.

• If the appliance is faced with objects in close range or if the fill level measures>80% of the fill level in the safe, the RGB LED will light red, which means that the remote sensing process is successful.

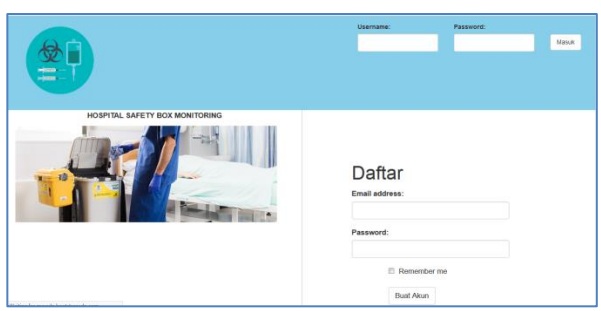

Figure 3. The dashboard system of the trash can

Figure 3 is the implementation of a web-based safety box system, the menu is given access to the login page which will be used by the officer, each officer will have different access rights data and must first register with the main administrator

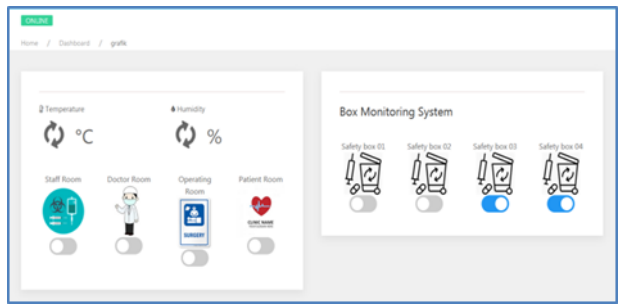

Figure 4. Dashboard system settings for the trash

Figure 4 is a trash can management system that is stored in several rooms in the hospital, each trash can will send data wirelessly through the cloud server and forward the data to the server, on the dashboard menu you can see that several trash cans are stored in the staff room, room doctors, operating rooms and treatment rooms, besides that there is a menu to measure the temperature of the trash can and its humidity, on the dashboard there is a menu icon that regulates and monitors medical waste, where each trash can is named for each safety box 01 to 04. and the name of the trash can be adjusted according to the number of bins available as needed.

5. Conclusion

Based on the results of the experiment above, the trash can detection system and monitoring can be implemented easily using the IoT device, each IoT device will be installed in all medical trash cans and can use several sensors, between the ultrasonic sensor to measure whether the trash can is full and the DHT 11 sensor. and humidity for humidity changes to the substance in the trash, a web-based monitoring system makes it easy to use the application to see and record which trash cans will be activated and are in full or empty condition, automatically the trash can be activated or deactivated in accordance with needs.

References

Al-Omairi, D., AlNasheri, W., Al-Qarni, W., Almarashdeh, I., Alsmadi, M., Alshabanah, M., & Alrajhi, D. (2019). Developing and Implementing a Web-Based Recycling System for Protecting the Green Environment. *International Journal of Software Engineering & Applications (IJSEA)*, *10*(3), 1-12.

Alotaibi, D. M., Akrami, M., Dibaj, M., & Javadi, A. A. (2019). Smart energy solution for an optimised sustainable hospital in the green city of NEOM. *Sustainable Energy Technologies and Assessments*, *35*, 32-40.

Boser, B. E., Guyon, I. M., & Vapnik, V. N. (1992, July). A training algorithm for optimal margin classifiers. In *Proceedings of the fifth annual workshop on Computational learning theory* (pp. 144-152).

Costa, B. S., Bernardes, A. C., Pereira, J. V., Zampa, V. H., Pereira, V. A., Matos, G. F & Silva, A. F. (2018, October). Artificial intelligence in automated sorting in trash recycling. In *Anais do XV Encontro Nacional de Inteligência Artificial e Computacional* (pp. 198-205). SBC.

Fang, W., Love, P. E., Luo, H., & Ding, L. (2020). Computer vision for behaviour-based safety in construction: A review and future directions. *Advanced Engineering Informatics*, *43*, 100980.

Fatimah, Y. A., Govindan, K., Murniningsih, R., & Setiawan, A. (2020). Industry 4.0 based sustainable circular economy approach for smart waste management system to achieve sustainable development goals: A case study of Indonesia. *Journal of Cleaner Production*, *269*, 122263.

Hossain, S., Debnath, B., Anika, A., Junaed-Al-Hossain, M., Biswas, S., & Shahnaz, C. (2019, October). Autonomous Trash Collector Based on Object Detection Using Deep Neural Network. In *TENCON 2019-2019 IEEE Region 10 Conference (TENCON)* (pp. 1406-1410). IEEE.

Kuncoro, A. K., Mellyanawaty, M., Sambas, A., Maulana, D. S., Subiyanto and Mamat, M. (2020). Air Quality Monitoring System in the City of Tasikmalaya based on the Internet of Things (IoT), *Jour of Adv Research in Dynamical & Control Systems*, *12*(2), 2473-2479.

Mujiarto, Djohar, A., Komaro, M., Mohamed, M. A., Rahayu, D. S., Sanjaya W. S. M., Mamat, M., Sambas, A., and Subiyanto, (2019). Colored object detection using 5 dof robot arm based adaptive neuro-fuzzy method. *Indonesian Journal of Electrical Engineering and Computer Science*, *13*(1), 293-299.

Özkaya, U & Seyfi, L. (2018). Fine-Tuning Models Comparisons on Garbage Classification for Recycability. *SETSCI Conference Indexing System*, *3*, 514-517.

Zeidan, H., Karam, K., Hayek, A., & Boercsoek, J. (2018, November). Smart Medicine Box System. In *2018 IEEE International Multidisciplinary Conference on Engineering Technology (IMCET)* (pp. 1-5). IEEE.