PalArch's Journal of Archaeology of Egypt / Egyptology

HUMAN ACTIVITY RECOGNITION (HAR) COMPUTER VISION SYSTEM USING DEEP LEARNING-BASED DETECTION CORONA (COVID-19) FOR PEOPLE MOBILIZATION

AneKustiana[1], Muhammad FahmiGunawan[2], Pekra Mardi Pongrekun[3], FauziFirdaus[4] , Ari PurnoWahyu W[5]

[1,2,3,4,5]Fakultas TeknikInformatikaUniversitasWidyatama

E-mail:[1]ane.kustiana@widyatama.ac.id, [2]fahmi.gunawan@widyatama.ac.id,

[3]pekra.pongrekun@widyatama.ac.id, [4]fauzididaa@Gmail.com,

[5]ari.purno@widyatama.ac.id

Anekustiana, Muhammad Fahmigunawan, Pekra Mardi Pongrekun, Fauzifirdaus, Ari Purnowahyu W. Human Activity Recognition (Har) Computer Vision System Using Deep Learning-Based Detection Corona (Covid-19) For People Mobilization-- Palarch's Journal Of Archaeology Of Egypt/Egyptology 17(5), 515-524. ISSN 1567-214x

Keywords: Monitoring, Thermal, Imaging, Computer, Vision

ABSTRACT

The spread of disease will be difficult to detect in person who is active outside the home and requires a wide active wide of motion, person who feels healthy will leave the house ignoring normal body temperature conditions which are very dangerous, because some viruses will mutation and easily spread to other people especially if we are in same area public, the emergence of a virus in a person's body is the easiest to find the symptoms of body temperature above normal such as covid 19 disease and other diseases caused by fever and shortness of breath , the prevention solution is currently by placing several officers in other public places with measureon temperature using thermal sensors to detect body temperature above normal between 37^C to 38^C, if the temperature indication is found unhealth people need to prioritize and monitoring the health conducting further tests in the form of rapid tests and swabtest, the weakness of this monitoring is the number of person passing in public areas is very lot of people and disrupts the activities of especially those requiring high mobility need causes long and long-term checks. The inspection system able to carried out quickly, it is necessary for check and read with computer vision technology using thermal technology have capability and accurately for record body temperature, thermal data can read individual body conditions but unused

directly in public areas, systems machine learning will provide a visual sign that can only be seen by the officer with the marking will make it easier for officers to indentify more person's condition and take action checking and prevention, this system has accuracy above 90% and usefull in masse and large public areas.

INTRODUCTION

The development of increasingly advanced computers has been implemented in various fields, especially in the health sector, where computer technology has been connected with sensors can easily monitor all activities our health conditions, any data collected by sensors able to stored in a server and the data can be used as a reference by health experts as doctors to see our health conditions even more sophisticated systems have made use artificial intelligence that makes an application or system more smart and at the same time reads the symptoms of diseases that exist in our bodies even the condition of the surrounding environmenthealth is very important, especially for those of us who work with high mobility, we need to maintain health patterns so that our immune system grows, several applications have been found in the market, especially those that have a connected with body conditions, such as watches that have heart rate sensor or eat reminder application that able to count calories in each food we consume, the source of the disease itselfcome from inside and outside our body, the most severe is a disease caused by a virus because of its spread very fast and difficult to detect and the risk will be more dangerous if the virus attaches to our body will be even risk if our condition is unhealthy and get with people without realizing we ourselves have become carriers of disease, and some types of viruses even can be spread through animals and pets.

Some diseases caused by viruses become caution considering, some viruses unrecognize by weather conditions, age or even countries, still remember in our minds about the flu bird virus or SARS which has become a global problem and entered an epidemic resulting in paralysis for health condition and even able to paralyze the country's economy, the virus works by damaging the respiratory system which is characterized by fever, flu, and dizziness and threatening one's health if not directly handled by some cases can be fatal, this way of handle with identifying the initial symptoms of the disease three is symptoms that are most easily identified are fever symptoms indicated by rising body temperature due to antibodies is trying to kill germs and protect themselves, how to detect body temperature can easy for example using digital measuring devices that are commonly used for home-based, but these devices can’t be used in masse and detect body temperature directly. the solution to the problem is to create an integrated body detection system with a camera able to monitor the temperature people directly, the technique can be easily implemented to measure the temperature of a person or many people above normal condition, the machine learning algorithm will detect temperature differences and give marking marks visually to the person priority for inspection.

Corona (covid-19)

Corona disease will become a serious threat if proper prevention procedures are not carried out, several studies and studies have developed a diagnosis and detection system using high electric power or high-voltage (HV) to detect the presence of a disease caused by spread viruses, this system be a solution that can be relied operating using ultrasonic signal guidance or also called double-helix-ultrasonic-array (DHUA), this sensor works by detecting the development position of the area virus that attaches our body that is diagnosed with the possibility of the virus developing , data from this sensor is displayed into a static number form, this method combines ultrasonic signal detection with a matrix technique to result the diagnostic method process, this process can be operated in realtime or also called air insulated substation (AIS)[1].

Sensor technology has been widely used in the health sector and has been developed for six decades, the technology is divided into several parts we call ultra-high-frequency (UHF) electromagnetic, (EM) wave detection, acoustic emission (AE), detection ultra-violet (UV)) imaging detection, some sensors work using high frequency frequencies with use of ultraviolet light and this technology is very useful for diagnosis of a micro-scale test and the sensor is widely used in many applications, the sensors with the frequency of VHF can even detect the presence of viruses corona while it is still in the open room or in the air[2].

Human activity recognition (HAR)

The current modren field on health system has valuable can't unnegotiable anymore, several countries have begun to develop good medical devices use sensor technology that is directly connected with computers, one of the countries that developed the technology is China by developing a technology known as Human activity recognition (HAR), this method uses the aid vision technology from a computer to monitor human activities and has three monitoring activities, namely primitive activities, immediate activities or actions and the last is interacting or interacting recognition, the three activities are divided into seven parts and analyzed with deep learning methods, this HAR application has begun to be applied in several countries in the world included in an application successfully implemented[3].

Type of virus

An indication of the disease able to detect by using a data calculation, and this methods has been used when SARS-CovV-2 and MERS disease, that virus arise in Asia and the Middle East, the symptoms of this disease are similar to SARS

symptoms, whereas other countries especially Asia the worst effects have ever happened in Korea precisely, in North Korea but in a number that is not so severe, identification of the disease in the country uses a mathematical calculation that is used to predict when the disease will recover and when expected In 2019 the place was spread in December precisely in the city of wuhan in hubei province and the type of virus was given the name corona virus (2019-Cov) the name was given because this virus was still similar to SARS-CoV-2, whereas officially the name was given by International Committee and Taxomony in February 2020 and the first time it was detected was suspected on traditional market and some researchers indicated the origin of the virus came from a type of beef and other seafood dishes which are still under investigation today [4].

The increasing number of the world's population will have a large impact on the health sector so that a health monitoring tool that is sophisticate and required, combination of medical devices currently with computer technology and sensor systems that can be directly used to record activities person or patient. Making the system is expected to help in health sector previously identified system manually, health system detection system using computer techniques that have an accuracy rate of up to 96.5%, the computer will compare with a database that is divided into two parts, namely training data and data This system testing proved to be more accurate than the manual method [5].

Using the online monitoring system means we make an observation and record all forms activities of patients or person that are mde on mobilecondotion, the weakness of this system is the device need to sends data from the sensor to the server computer sometimes blocked, the weakness of the sensor is then combined with Computer vision technology (CVT) system is a tool and other alternatives to detect a disease and at the same time read and record all the activities and environmental situation or place that can be done in realtime, the system will easily display in the form of applications that can seen directly by doctors and patients, all data from these sensors turn into numbers and then can be processed using a machine learning algorithm so that changes in data on an activity will be done automatically by the system[6][7] [8].

Collecting a data on can be combined with a camera sensor that can collect all human activities that influence from the the person's activity with the sensor mounted, the sensor can be installed in the patient's room and usually in a bed or other room, the sensor can work for 24 hours and able to transmit data constantly, while the sensor installation depends on patients needed so that sensor can be stored statically in the room and suitable made for mobile, while a new algorithm is used to differentiatemanual activity and patient activity and compared with tranning data for evaluation, the amount Patients who are monitored manually also need to be considered amount of data sent will be large as well and the data recording system becomes larger and requires a large memory space[9].

A model for detecting patient activity in raltime can be combined using neural network algorithms, where the data sent has different variables and data values that record the patient's condition, this agorithm is also known as the RESNET, this algorithm method is able to scan data in numbers Very large [10] [11] [12] .

RESEARCH METHODS

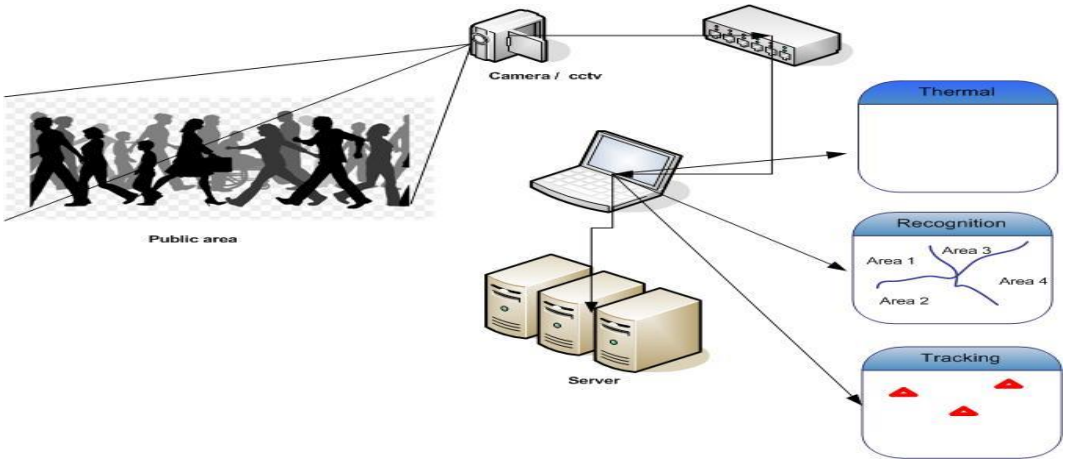

Figure 1.1 methods of Human activity recognition system (HAR)

Methods Human Activity Recognition (HAR) works by reading signals in the database. This system reading difference of body temperature with directlydetecting, input data is taken on using CCTV cameras installed in public areas, indications of body temperature above normal indicates that the person has a temperature above normal which indicates an indication of another disease or virus, the system works by converting colors with image processing techniques, the object will be converted by machine learning algorithm, the stages of the detection system are as follows

- camera data input

Input could be taken through cameras that are monitored in realtime, camera systems placed in public areas such as airports, malls, campuses and other agencies.

- Distribution of data frames

the next process the data retrieved is then converted into a number of frames, this process is used to record images to make it easier when conected with image processing techniques.

- mage sharpening

the next process is sharpening image, this process is needed to converted color conversion process error data reading can be minimized

- color conversion

processthe next process is the color conversion system from RGB to thermal colors, this color change is adjusted to changes in body temperature of people and change data is then displayed visually

- marking systemimage

data taken aims to read body temperature, the system is placed systematically to detect changes in body temperature directly, the condition of many people's objects will then be given a marking, mark on people body temperature above normal then it will be prioritized to continue monitor the condition

- object recognition

the next step the system automatically performs a visual clustering system, the system facilitates the monitoring system over a large area so that the monotoring process can be done easily and not mixed with other objects

TESTING SYSTEM

In testing this system the authors take several pictures from various sources that will be used as a dataset, the data will be processed using color conversion techniques and processed using a machine learning algorithm.

Figure 1.2monitoring system

explanation in Figure 1.2 is a process of taking people activity, in this test the algorithm will take image data and then separated into several frames, each picture frame containing these activities and then converted into a form of binary numbers and later will be compared with databases related to temperature changes body caused by other activities.

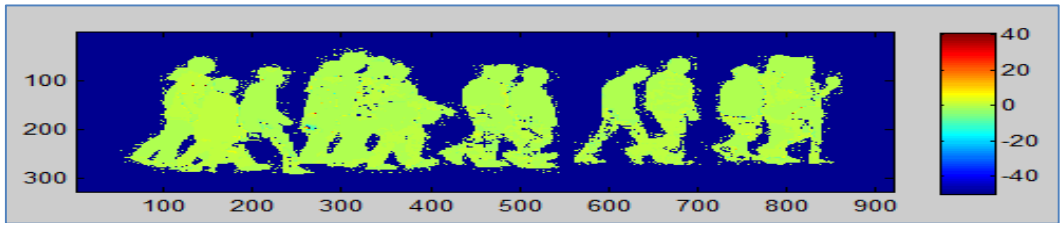

Figure 1.3 body temperature monitoring system

explanation in picture 1.3 is a process of sharpening the image of people, the sharpening process is done so that the data can convert the right object and not affected by other objects, the test results above can be ascertained the state of people walking in normal conditions with no visible spikes in body temperature

can cause the person to have a fever caused by a virus and normal body temperature conditions

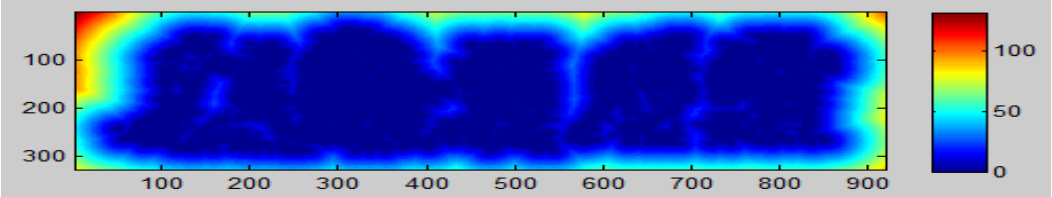

Figure 1.4 results of monitoring body temperature

explanation In the picture 1.4 shows normal body temperature parameters, the system will automatically read and convert the color if it is found above normal body temperature, the system will convert and warn the system that the person is in an unhealthy condition.

Figure 1.5 public areas during a corona

explanation In the picture above is the condition of God when a lockdown occurs at an airport and other public areas during a corona outbreak (covid-19), the picture will be used as a sample system for body temperature detection, the picture can be taken using a CCTV then the image will be taken and obtained using a computer vision algorithm that has been integrated with the Human activity recognition (HAR) system

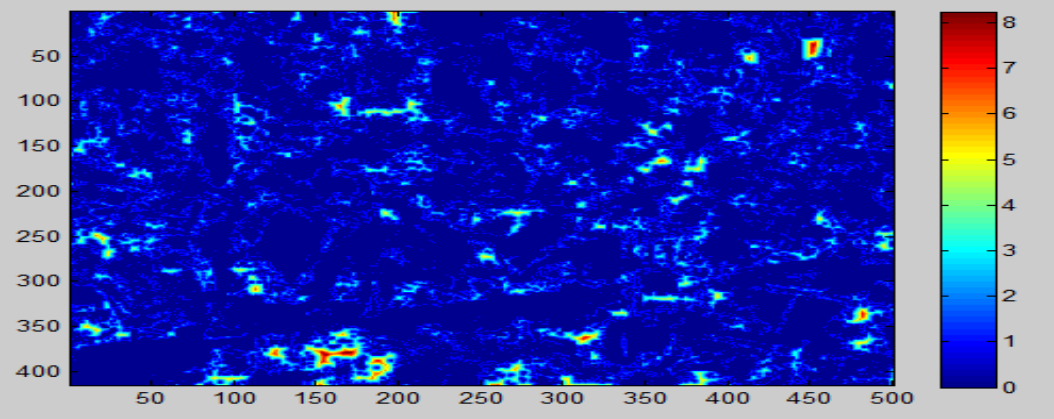

Figure 1.6 temperature scanning

explanation in the picture above is a result of temperature scanning using computer vision, in the picture it appears that some people have a body temperature above normal or can be conditioned to the body temperature in a fever, with the reading of the body temperature then people whose body temperature is above 37-38C will be prioritized for checking

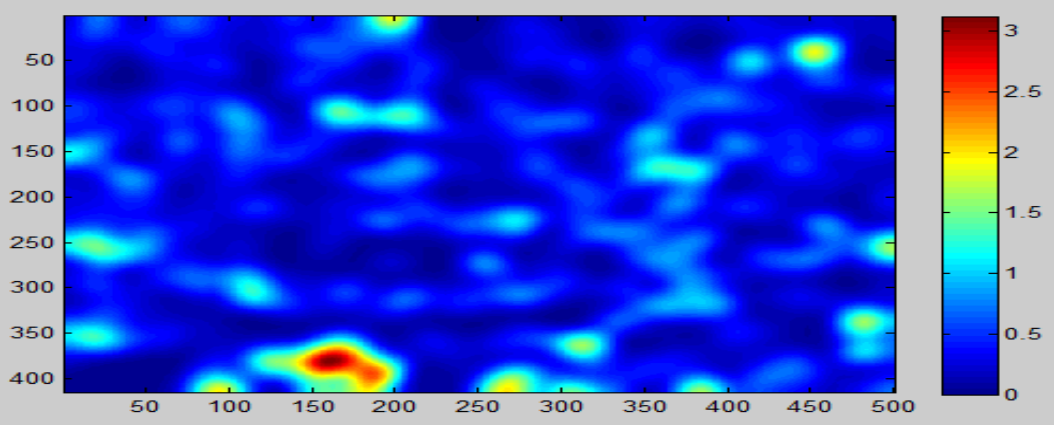

Figure 1.7harpening the image

in the picture above is the process of sharpening the image again to ensure that people who have the temperature are in which area, the HAR system will map the position and coordinates of people who are kissing so that it will reduce and minimize errors in reading from the data because the system used is designed to detect large areas of the crowd people

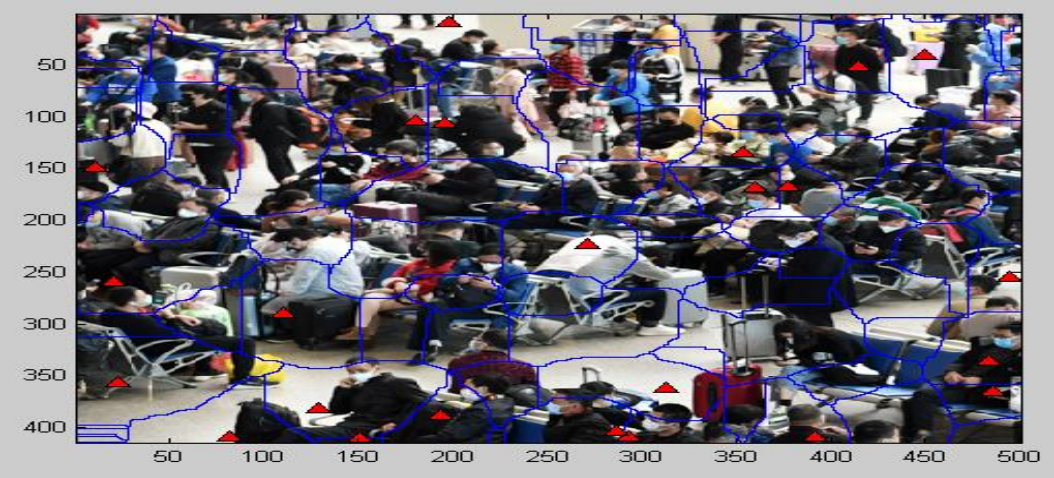

Figure 1.8 mapping of body temperature

Explanation in the picture above the process of recognition or mapping of body temperature areas in people who have body temperature above the nornal, mapping the blue line and given a red triangle marking that the body temperature is above normal which can indicate the body condition of someone who is sick or has a fever or other disease indications.

CONCLUSION

in experiments using computer vision algorithms to detect body temperature in a system Human activity recognition (HAR) system can be implemented easily, the movement of people and the process of mobility temperature changes can be monitored directly, the temperature above based on previous research is a sign of an indication of disease or fever caused by a virus that is in the body, the system is able to read body temperature en masse numbers that people are gathering. This system is suitable for use in large public areas such as campuses, airports, malls and etc., the weakness of the system is that computer vision algorithm will read data randomly not only body temperature but can be influenced by the situation around the camera or the system installed in outdoor conditions or reading other hot objects that cause the position of reading the data could be error and need to analyze the storage process and placement of the right camera so it isn't affected by the temperature from surrounding objects.

REFERENCES

Ming Dong 1, Ao Ma ; Ming Ren ; Chongxing Zhang ; Jiacheng Xie , "Positioning and Imaging Detection of Corona Discharge in Air with Double Helix Acoustic Sensors Array," Electrical Power and Energy System, 2017.

Markalous, S.M.; Tenbohlen, S.; Feser, K. , "Detection and location of partial discharge in power transformers using acoustic and electromagnetic signals," IEEE, vol. 15, p. 1576–1583, 2008.

Junfeng Gao ; Yong Yang ; Pan Lin ; Dong Sun Park, "Computer Vision in Healthcare

Applications," Journal of Healthcare Engineering, p. 4, 2018.

Tian-Mu Chen1* , Jia Rui; Qiu-Peng Wang ; Ze-Yu Zhao ; Jing-An Cui ; Ling Yin, "A mathematical model for simulating the phase-based transmissibility of a novel coronavirus," idpjournal.biomedcentral, 2020.

Hindawi, "pageshttps://doi.org/10.1155/2018/5157020," Journal of Healthcare Engineering, vol. 8, 2018.

Berney, S. C.; Rose, J. W.; Bernhardt, J. ; Denehy, L, "Prospective observation ofphysical activity in critically ill patients who were intubated for more than 48," p. 658–663, 2015.

17. Jette, D. U. et al., "Validity of the AM-PAC“6-Clicks”inpatient daily activity andbasic mobility short forms.Phys," p. 379–391, 2014.

Yeung, S.; Downing, N. L.;Fei-Fei, L. ; Milstein, Bedside computer vision -moving artificial intelligence from driver assistance to patient safety, New Engl, 2018, p. 1271–1273.

Fleiss,J.L, Measuring nominal scale agreement among many raters raters.Psychol, 1971.

Yeung, S. et al., "Every moment counts: dense detailed labeling of actions incomplex videos," Int J. Comput, p. 375–389, 2018.

He K., Zhang X., Ren S., Sun J., "Deep residual learning for image recognition," in InProceedings of the IEEE conference on computer vision and pattern recognition, 2016.

Russakovsky, O. et al., "Imagenet large scale visual recognition challenge," Int J.Comput, vol. 115, p. 211–252, 2015.