

REVIEW: FACERECOGNITION SYSTEM USING VIOLA JONES
ALGORITHM & CASCADE CLASSIFICATION

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Keywords:Face detection,Open CV , Cascade Clasifier

ABSTRACT

Recognition of a face identification system has become a necessity in the current modern era, where facial features have been installed in various applications which become an additional security feature in a particular software or application, on a mobile device these application features are found as good applications for multimedia or password security on a smartphone, the face detection algorithm itself has several weaknesses, this feature can't detect the face area in a tilted condition and isn't perpendicular camera to overcome the problem. a two-dimensional image of the process can increase the accuracy of face detection systems up to 90% and this algorithm can run on all operating systems.

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INTRODUCTION

Many monitoring tools currently can be used to monitoring personal activity, these tools are usually integrated with the internet and need an electronic device that works with certain sensors, this monitoring system becomes very important because crimes occur generally outdoor and the majority of these abductions are targeting children as victims, the easiest tool to use is GPS, where the device must be connected to main device or microcontroller, the GPS device will provide data form coordinate movement map that will continue to change according changing positions. [1]. The use of a monitoring system using a GPS device has several advantages, this device is easy to use and installation, the system gives a signal to

the computer and transmits it with a mobile device, capability this device use GPS depends on the presence and location of cellular telephone networks around us, whereas on the receiving computer able to online with the concept indoor & outdoor[2].

Currently the most sophisticated monitoring system is to use the concept of image processing, this method can express the shape of a face that is closely related to one's emotions, where an emotion will affect one's nature and health.

Some methods used face detection system combination with adaboost algorithm where the stages of this method are features, Integral image, Cascade classifier, this adaboost method is made to complete the computer vision algorithm because it still has weaknesses. The most important stage when creating a face detection application is how this method can detect a face without being affected by surrounding objects, a good algorithm system have v capable of reconstructing the shape of face without being affected by light and other disturbing objects[3]. The face detection system itself can be divided into four important parts, i.e.

1. Knowledge-based Method, this method provides its own standard rules before detecting faces. The standard rules are based on the way humans vision at faces.
2. Feature Invariant, this method looks for the structure of the core elements of a face.
3. Template Matching, this method looks for faces by providing a standard model of a face image.
4. Appearance-Based Methods, this method looks for faces based on the structural faces that have been given before, from the process of taking faces then in training.

Face detection process method able to runing in realtime and can run on all operating systems, the computer system is able to read and compare data with available database[4]. This realtime and accurate system creates a face detection algorithm that is widely used by the cascada classifier selection process to process data using the Viola method algorithm type. The computer vision algorithm only reads data that faces directly on the camera, but this method has a good level of accuracy and is widely used in mobile applications[5].

Cascade of Classifiers

Cascade of classifier is a process to record and classify by increasing the efficiency of the process, this data process is divided into several sub-images so that the addboost process will scan the face for several times[6]

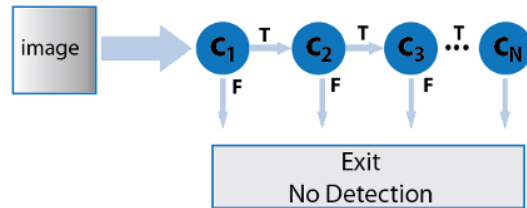


figure 1.1 Metode Cascade of Classifier

in the picture above is a sub-image process by reading the data of a image with variable value (true) if an object image and will give a False value if the object doesn't meet the requirements until the face data on the object found and all of these methods enter into the adaboost process[7]

RESEARCH METHODS

in this research method using the viola jones algorithm method by using a sample of 300 images taken randomly, the data is combined with the cascade classifier method

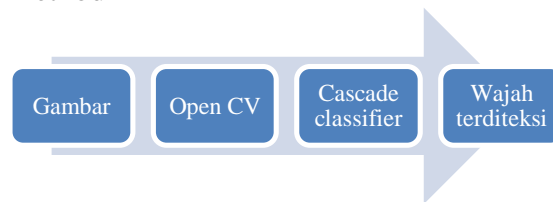


Figure 1.1 Cascade Classifier

Fitur Haar cascade

In this method the function is to read objects with three-dimensional image features by comparing two bright and dark contrast colors, this feature can determine the average number of pixel objects in each image data image and then display it with a different scale with the image data that is read integrally

Open CV(Computer vision)

Application of a face detection feature on an application and can run on a variety of operations, the system needs an additional library that is a computer vision library, the library that is commonly used is the open CV library can work on many platforms and supports all programming languages and operating systems.

Machine learning addBoost

this method is to declare an image from a smaller method to be an integral, the angle of taking an image from the smallest to the largest value and convert a calculation into a round word at the value of each pixel in the image.

Cascade Classifier

In an image there is a threshold value, this value is used to measure the treshold which is generally used in machine learning methods to increase the value of the treshlod by using the concept of adaboost algorithm, this method has the ability to filter an image and classify the image values separately, if the filter system unable

for classification process, the face area is not found, this process performs repeated data will scanning system.

Detected Face Area

when a data consists of a pixel that has previously been carried out the conversion and classification process, the scanning process in the image is done in two dimensions from the top down, if the classification process is successful then the system will display an image of the image and mark the face area.

Kalman Filter Algorithm (KFA)

The Kalman filter algorithm is a solution and method that can be optimized in many tracking systems and data prediction by creating a visual motion on an object [8]. Kalman filter is also widely used in the field of economy and navigation system. Kalman filter method works by finding the area or region of each object contained in the frame, then the frame position will be predicted in each frame and then calculated in each frame determined by gaussian, the Kalman filter algorithm consists have two processes, the first process is prediction and the second is the optimization process for each frame [9]. The Kalman filter algorithm model can be formulated with an equation with the value "t" or evolution time(5) and (6). [10] [11]

$$x_t = A_t x_{t-1} + B_t u_{t-1} + \epsilon_t \quad (5)$$

where , $\mu_{t-1} = A_t x_{t-1} + B_t u_{t-1}$ is mean and Σ_{t-1} covarian form ϵ_t

$$Z_t = C_t x_t + \delta_t \quad (6)$$

formula (5) equation "x_t" states the value of a state, the value of which is called a random variable and has a value of 0 while the constant value contained in equation (6) "A_t" and "B_t" in the equation, value of part 6 is a random variable of the gaussian method and has the equation value 0 mean (μ) and covariance is the cost value that is in the kalman filter algorithm

Computer vision

Researchers in computer vision have been try computer vision method on a parallel computer technique that can change the appearance of 2d objects or make images with stereo matching techniques, with this method a computer system is able to find someone's name based on photos, base on names, clothing colors or by detecting hair, this method can track the movement even with a different background [12]. In other words computer vision is a process of transforming a data taken from video input able to presented back into information, for making an object tracking system is very important that used to identify an interesting thing based on an object movement [13]. To start the tracking process the first thing to do is to detect feature points in the initial frame, then try to track these points in the next frame. the data finds where these points are now located in a frame. Obviously, because we are dealing with video sequences, by determining

that an object that has feature points found has moved or can be caused by camera motion. Therefore, you must search around the previous location point to find a new location in the next frame[14]. Background subtraction technique is a method for analyzing the weaknesses and strengths of the object detection method and is very widely used in various fields [15].This method is widely used in the field of computer vision and has been compared with other methods that can be used to evaluate system performance by motion tracking or detection of moving objects. taking in motion tracking is taken from a static position[16][17] [18].OpenCV is a "C" language programming library implemented with the image processing technique first developed by Intel and has been developed until version 2.0 above [19] [20].

IMPLEMENTATION SYSTEM

In this system testing method using data in the form of images taken randomly by using a number of pixels and different image distances form face detection method uses open CV.



Figure 1.2 Detection system towards the camera

In the picture above is the system of testing the system using images perpendicular to the camera, from the test results it can be concluded that the computer vision algorithm can detect areas of the face with the concept of direct photos



Figure 1.3 taking pictures in groups

in Figure 1.3 is a process of taking pictures in groups with a distance by facing toward the camera, in this method the camera can detect all areas of the face and display the system visually.



Figure 1.4 system testing process with the number of groups at a various distance



Figure 1.5 detection test with open Computer vision

In Figure 1.5 is the process of testing the system with a greater number of people over a distance, in this method computer vision algorithm can only detect faces of people who are upright to the camera facing the image, there is data on the undetected face area because it is not perpendicular in the direction of the camera.



Figure 1.7 Detection system with face tilted towards the camera

in Figure 1.7 is a face detection system testing system with a distance from the camera, in the test the system can't recognize the face area because this computer vision algorithm can't recognize a face that isn't perpendicular to the camera and a great distance scanning process on the image will process twice until the face pixel area is detected.

CONCLUSION

From the above test it can be concluded that the face detection algorithm can only detect areas of the face that are upright to the camera and at very close distances, the weakness of this method is then analyzed using an open CV and cascade classifier where the face area can be detected clearly even with the use of a camera whose distance far, the accuracy system with this algorithm has an accuracy of above 90%, the high accuracy allows a face detection application and with the open library face detection CV able to run on all programming languages and operating systems. and this method can be used for monitoring or used as an additional feature of multimedia and data security.

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