# Attendance System Based on Face Recognition Using Hybrid Feature Extraction Method

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# Attendance System Based on Face Recognition Using Hybrid Feature Extraction Method

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*Abstract*—**One of the implementation of a human face recognition system is an attendance system application. Attendance system is used to detect and recognize a person's identity and stored as a face database. The face-based presence system developed in this study is a facial presence system using a hybrid feature extraction method. This method is a new method development that combines several feature extraction methods by weighting each method and produce a more accurate system. This face presence system was implemented using a client-server architecture that was integrated into a computer network. The server-client architectural model on this computer network was used for face presence machines that can be accessed intranet or via online using the internet. The face presence system using this camera is very safe and accurate for detecting users. This system has a more accurate and high accuracy data process. This system produced a reliable and robust system for identifying human faces. This face presence system produced presence data that can be accessed online, real-time and used in different places.**

*Keywords—face recognition system, attendance system application, hybrid feature extraction method, face recognition accuracy*

## I. INTRODUCTION

Biometric is a system that reads parts of the human body to identify authenticity (authentication). This biometric technology uses a unique and fixed part of the human body. There are three things that are currently often used in biometrics systems, such as fingerprints, iris and face. All the data that used can be detected and stored in the biometric technology database. One of the most widely used as biometric systems is the face recognition system.

Several studies on face recognition have been conducted by previous researchers, including some of face recognition research that conducted by [1-3]. Generally, the research on faces discusses face recognition accuracy based on the use of several feature extraction methods [4,5]. In several other face recognition studies, the classification method for face recognition has become a very important issue, including several researches that conducted by [6-8].

In general, face recognition research is widely used to identify faces that detected by the cameras. Some face recognition research is currently widely used for presence or attendance systems that are used based on face recognition [9-12]. The attendance system based on face recognition can make it easier to detect someone as well as to know the time of attendance and return of someone in an office. This face recognition based attendance system can work in real-time and becomes an automatic biometrics attendance machine.

## II. METHODS

One of the implementation of a human face recognition system is an attendance system application. Attendance system is used to detect and recognize a person's identity and stored as a face database. The face presence system that developed in this study is a face presence/attendance system using the hybrid feature extraction method using the Convolutional Neural Network - Principal Component Analysis (CNN-PCA). This system is built using a combination of the face detection and face recognition framework models. We use a real-time camera to detect and to identify a face in this system. The face presence system using Hybrid Method is shown in Figure 1.
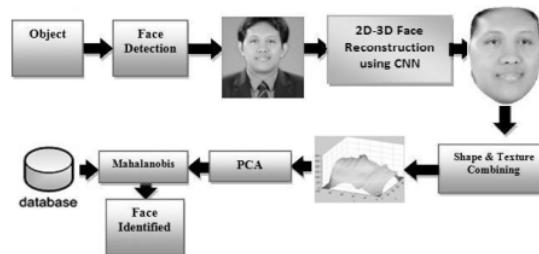


Fig. 1. Face presence system using hybrid method.

Face detection is used to detect each face as an object that captured by the camera. In the face recognition process, to produce an image that will be used in the feature extraction method, we carry out the process of reconstructing face images from 2D to 3D using CNN and Shape and texture combining, and then processed using PCA. The face identification process is carried out by comparing the image that stored in the database with the test face image. In this process, the Mahalanobis method is used for the classification process. The face detection process using a camera, and we use the Viola-

Jones face detection method. Face detection is carried out by a camera to take a face image of the object being taken. In this face detection, the process of detecting and searching for face features is carried out on the camera image, then at this stage the system recognizes the pattern as a face or not.

In this study, the face presence system using the hybrid feature extraction method is then integrated using a server-client architecture on a computer network using a real-time camera. This research was conducted using an intranet computer network interconnection model using a server-client architecture. The model of the architecture that used in this research is shown in Figure 2.
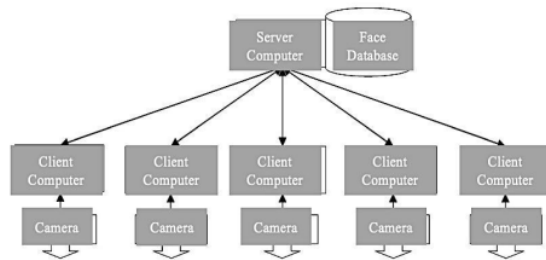
Fig. 2. Integration model with server-client architecture in face presence system.

The presence system that is integrated using a server-client architecture connected to a computer network is able to work as a real-time / online presence machine.

## III. RESULTS AND DISCUSSION

In this research, the preprocessing or normalization process is also carried out by combining several models of face image processing. The methods that used are cropping, RGB-Gray, resizing, and contrast-brightness adjustment methods using histogram equalization to produce information values that can be used to improve face recognition to be more optimal. The preprocessing method that used in this study is used to increase image sharpness so that it can be used to anticipate the variation of illuminance that will appear when capturing face images.

The attendance system based on face recognition that developed in this study is integrated using a server-client architecture. This attendance system uses a server computer and several client computers to find out whether the presence system developed can work properly. The attendance system based on face recognition can be implemented on a server-client architecture, so that the system can work in an integrated manner with several client computers in different places. In general, attendance systems with server-client architecture can work as a platform in the development of attendance systems that require a large number of client computers.

In this study, face recognition testing was carried out in the presence system which was developed by taking face images using several angles. Each test on the client computer is carried

out at an angle of 0°, 22,5°, 45° and 90°, and each angle is carried out 10 times. After testing the recognition of face objects from 10 client computers, the highest success angle is the 0° angle with 100% success percentage and 22.5 with 90% success percentage. The detailed test results that shown face recognition accuracy can be seen in the diagram in Figure 3.
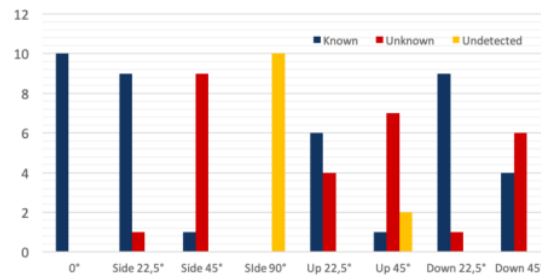
Fig. 3. Face recognition accuracy.

## IV. CONCLUSION

Attendance System Based on Face Recognition Using Hybrid Feature Extraction Method is a presence system that used CNN-PCA as a hybrid feature extraction. This method can produce a new face recognition system and has an optimal level of accuracy as a presence machine. In the experiment using a client server architecture, the presence system works well even though it uses several client computers as its users. Testing on this presence system shows that the system works well when the angle of the face is between 0-22.5° from the frontal position.

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