NST PROCEEDINGS
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Conference Paper

Class Attendance System Using The Multiple Face Recognition Technique (Case Study: UPN "Veteran" East Java)

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Abstract

Currently, Face Recognition Technology has been widely implemented in various fields of life. One of them is to verify someone's identity. In this research, an application system has been developed related to the process of recording student attendance in a lecture class, where student attendance is obtained from faces data taken from image acquisition in a classroom. Automatically, face recognition results are inputed into the presence system. In this system, the lecturer can verify the results of the automatic attendance made by the system. This verification process is needed because the face recognition process carried out by the system cannot reach 100% accuracy. So, the student attendance record in class can be valid.

Keywords: class attendance, face recognition, UPN Veteran East Java

Introduction

Face recognition technology has been widely implemented in everyday life such as finding someone with a CCTV camera, a security system on a smartphone device and the attendance system of employees and students. Biometric authentication is a technology implementation to verify a person's identity by using human characteristics so that it can limit access to certain services (Viola et all, 2011). We can use it in the fields education to determine student attendance. There are many colleges and schools where thousands of students take education. In each class there are around fifty students who study. To maintain attendance and record attendance students are very difficult assignments (Priyanka et all, 2016). In classrooms with large numbers of students, it's a time-consuming task to take attendance manually. Attendance is very important to prove that he is present in lectures (Muni et al. 2015). Each institution has its own method in this regard. The application of attendance is still used in lectures, especially in UPN "Veteran" East Java, still using paper with student signatures. However, this absence is considered not effective and accurate in data collection because there are still opportunities for manipulation of attendance data. On the other hand, an automatic attendance system might be able to provide some benefits to the faculty namely at least the burden of administrative staff can be reduced because they no longer enter student data one-by-one (Samuel et al. 2016). The automatic attendance system is one of the applications of a biometric authentication system. The presence system that is often found is the presence using fingerprints, faces, or a combination of both (Rao et all, 2013). There have been many research on student attendance systems using human biometric functions. Mohamed Basheer et al 2013 in their research developing a fingerprint attendance tool. Students will be asked to put their

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How to cite this article: Nugroho, B., Saputra, W. S. J. and Puspaningrum, E. Y. (2019). Class attendance system using the multiple face recognition technique (Case study: UPN "Veteran" East Java). *4th International Seminar of Research Month*. NST Proceedings. pages 112-117.doi: 10.11594/nstp.2019.0416.

finger on the sensor to mark their presence in class. It can communicate with the host computer using its USB interface. This device operates from a rechargeable battery. In addition there are also several student attendance systems using face recognition. Ralph et al 2013 in their research the face recognition for attendance system uses the Illumination Invariant algorithm to increase the problem of light intensity and the Eigen face technique. However this technique is very sensitive to head orientation, therefore camera and scanner support must be implemented for more flexibility. In the face detection need to use the various algorithms like Ada-Boost algorithm, neural networks, support vector machines, etc. Neural Networks algorithm, only works for one image a system (Naveed et al. 2012). But we cannot apply a single image to the system because in the class attendance system we need to recognize multiple faces. Ada-Boost algorithm is the most effective and efficient algorithm of several face detection algorithms (Yasaman et al. 2011). Therefore we will use this algorithm for sdetecting faces of students by using the haar feature and cascade classifier. For attendance systems that adopt human face recognition techniques, such systems usually involve the process of extracting the main features of each existing face image in class or when everyone already occupies his seat in class. After successful detection, the system starts marks the attendance of students who are recognized automatically by capturing faces from students in the class. In this paper is based on face recognition techniques that are known in developing specific computer applications that can be used to recognize students who are registered automatically from the captured face image by the camera in class.

Research Method

The data used in this research uses UPN "Veteran" student's data in Jawa Timur. Data is stored in a database that will later be matched with the attendance system that is running. Data that has been stored is 200 data of students who have done face recording. Furthermore, in this attendance system the data is carried out in real-time during the teaching and learning process. The flow of the system in this study can be seen in Figure 1. After the face data is obtained, the training process will be carried out, namely the stages of image color space transformation, lighting compensation, refinement filters, opening operations, face detection with multiple face have been done before feature extraction and then the data will be stored on the database.

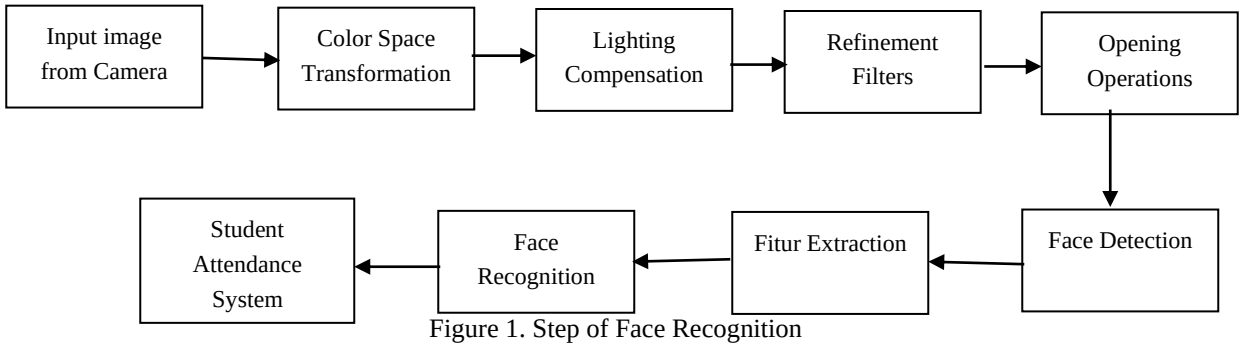

Figure 1. Step of Face Recognition

The process of transforming the color space is carried out at the Grayscale stage. After going through the grayscale stage, the image will be compensated for exposure using histogram equalization. Histogram Equalization is a feature compensation technique for normalizing digital visual features of an image, such as brightness, gray-level scale, contrast, and so on. The next process is the refinement feature. At this step using Gaussian smoothing method. Gaussian smoothing is used as a refinement filter on the image. Filters in image processing are used to suppress high frequencies. In digital imagery means refinement also means noise reduction, because noise has high intensity. After the image refinement process is performed, an opening operation will be performed. After all the pre-processing stages are

finished the face detection will be detection. After a frame is recognized as a face area, the HOG (Histogram of Oriented Gradient) feature is detected, followed by a feature extraction process so that features from a face frame are obtained. In the face extraction face features will be obtained and will be matched with face features in the database. After recognizing the face of a student, the attendance system will record all student attendance in class. Flow of this system is divided into 2 stages, namely the stage of data collection and the attendance system stage, can be seen in Figure 2.

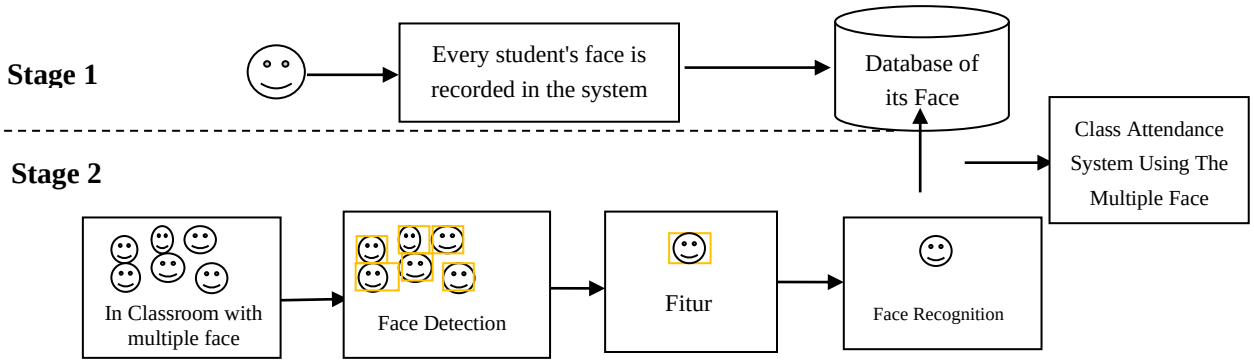

Figure 2. Flow of Class Attendance System

Result and Discussion

The first step the application is run the system will detect all cameras connected to the local computer. A local computer is a set of computers located in a classroom. The purpose of the local computer is to recognize the faces of the lecturers obtained from the connected camera. The application will display the main window after the camera is selected and seen in Figure 3. The presence program has several panels: a panel to display images captured by a camera connected to a computer, a panel to display a list of names of participants whose faces have been recognized, and a panel containing several button. The application will start taking pictures from the camera and start the face recognition process. The system will immediately prepare the engine to recognize faces from the list of lecture participants that have been previously stored in the database. The data displayed from the presence system is the course and class data, while the lecture schedule is displayed on the website.

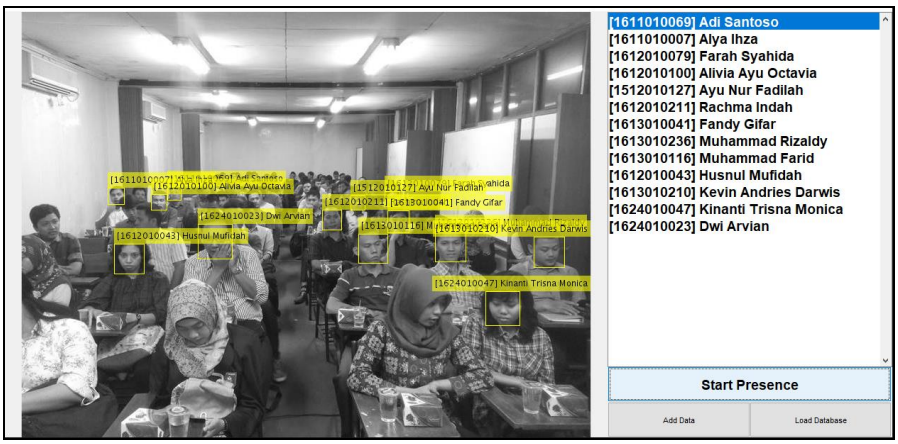

Figure 3. Display the Main System

Before the core attendance process, data has been added to add the data of college participants to the data database that is entered is the Student Identification Number (NPM), name, and photo data. In the process of taking photos automatically the system will recognize the face area and save it as digital image data of college participants. Face data stored on each student is 10 digital images. The digital image of the student's face will be used as a reference data for the face recognition process. The data addition process window can be seen in Figure 4. During the filtering process, if there is a filter that fails to pass through an area of the image, then that area is classified as not a face. However, when the filter passes through an area of the image and passes all the filter processes in the series, then the area is classified as a face.

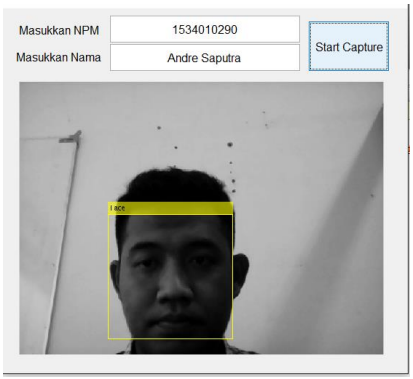

Figure 4. Process of Adding Data

In the presence application there is also a web base system that functions as a system to monitor class and attendance. In Figure 4 you can see the main page of the web system in which there is some information and several menus. The information that can be seen on the home page is a graph of percentage of attendance reports on each date during the current month.

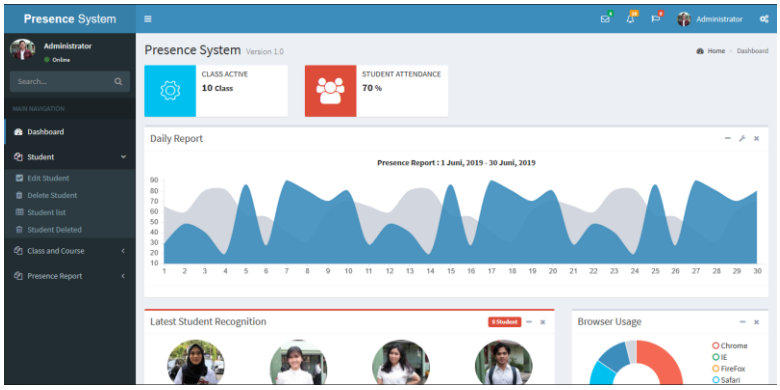

Figure 5. Main Page of the Web System

In addition to the percentage chart there is also information on the class being active and the percentage of attendance of lectures on that day. At the bottom of the homepage there is a list of participants who have been identified, which displays information in the form of photos of the participants of the lecture, the names of the participants, as well as the names of the courses and classes being followed. On the left side there are several menus including: Edit Student, Delete Student, Student List, Add Course, Edit Student Course, Course List, Presence Report Monthly and Presence Report Semester. The student edit menu is used to access lecturer data change features. Changes in lecture participant data include name changes and profile photo changes. Student edit page can be seen in Figure 5. In Figure 5 there is a number of lecture ID numbers, can be filled with NPM (Student Identification Number). The next entry is the full name of the lecture participant and then there is a photo that can be

uploaded. If the photo has never been uploaded, the photo data automatically retrieves one of the photo data when adding data.

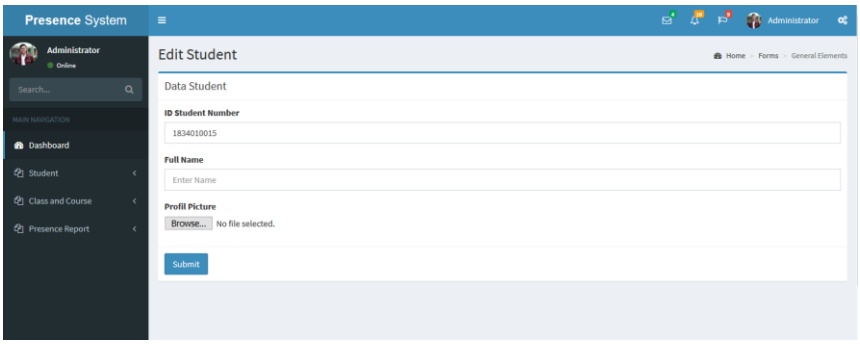

Figure 6. Student edit page

In Figure 6 you can see the page to add a lecture schedule there are some fields, namely the name of the course that can be chosen and the class or parallel available in the course. The next entry is the start date of the lecture which when entered will be a reference day and will be repeated every week at the same time and the same time. The lecture schedule can be changed but the old schedule must be deleted to avoid duplicate data. Changes in course schedules change the list of participants.

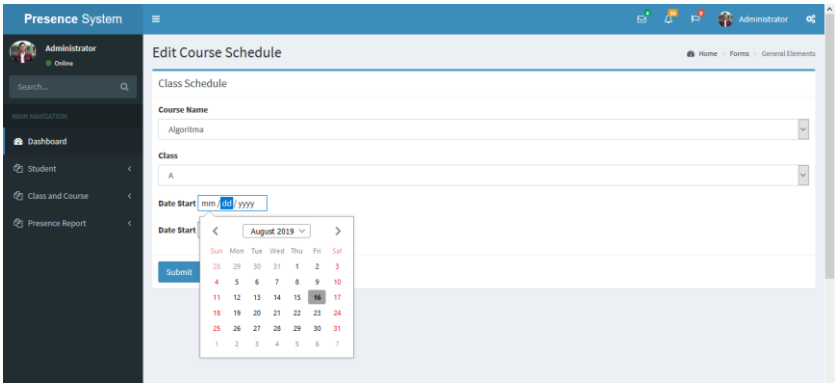

Figure 7. Page to Add a Schedule

Changes to the list of lecture participants can be accessed using the edit course student menu. On the lecture participant page there is a menu for adding participants, by displaying a list of names that can be chosen to be included in the class. In addition to the list of names there is also a search so that the addition of data from college participants becomes easier. One lecture participant can be enrolled in several classes as long as the specified schedule does not coincide. Besides that in this system, lecturers can also verify attendance manually on this system. This verification process is needed because the face recognition process carried out by the system cannot reach 100% accuracy. Because there must be faces that are covered or faces that cannot be recognized because of the inaccurate student position.

Conclusion

In this study, an application system has been developed related to the process of recording student attendance in class lectures, where student attendance is obtained from face data taken from image acquisition in classrooms. Automatically, face recognition results are entered into the presence system. In this system, lecturers can verify the results of automatic attendance made by the system. The face

recognition process was successfully carried out but could not yet reach 100% accuracy because the level of accuracy was greatly influenced by the number of datasets used in addition to the position of the student's face when class could experience obstacles such as inappropriate or closed positions by other student heads.

Acknowledgment

This work is to fulfill the outputs from the Mandiri Research RISTI UPN Veteran Jawa Timur and supported by LPPM UPN Veteran Jawa Timur.

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