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Optimization of Data Security System Control with CRC (Cyclic Redundancy Check) Algorithm

Dedi Purwanto
Universitas Pembangunan Panca Budi Medan, Indonesia
dedipurwanto@dosen.pancabudi.ac.id

Abstract

Authenticity is one of the critical factors in data communication; moreover, making a program implementation design tasked with data security is one solution to determine the authenticity of the data. This application system is designed using Microsoft Visual Studio 2010, WampServer 5.0, ODBC Connector 5.3. This application system is built using the CRC (Cyclic Redundancy Check) algorithm to determine the file's checksum. Thus, the author hopes that the user can find out whether the received file has been modified in the transmission process. to avoid access by unauthorized parties. The method of sending data often has the risk of unwanted changes to the data.

Keywords
data authenticity; CRC (Cyclic Redundancy Check); checksum file

I. Introduction

Authenticity and security are essential factors in data communication, especially to avoid access by unauthorized parties (Handy Wicaksono et al., 2008). The process of sending or storing data often has the risk of unwanted changes to the data. The development of technology and information at this time is very rapid and bring changes to human life (Lubis et al, 2019).To maintain the authenticity and security of data, we can use an algorithm developed to detect the authenticity or damage of data in the process of data transmission and data storage(Aryza et al., 2017).

We can also use the authentication process on the information we get to know the authenticity of the information. Based on the problems above, the authors try to make an implementation design for data security with an algorithm to check the authenticity of the data using the CRC 32 algorithm so that it allows someone who wants to check the authenticity of data or important information that has been received from other people can be done accurately. Many hash algorithm functions that we can use to find the authenticity and security of files. Here the author raises one of the algorithm functions commonly used, namely CRC (Cyclic Redundancy Check).(Aryza et al., 2017).

Before becoming input for security method, usually the data is processed first to get characteristics that will be input for research in research Here, the face image is cut to taste using a computer, then the texture measuring element is taken. Texture can be used as image information to predict the condition of the object from surface properties. “Texture measurement carried out by measuring energy, contrast, homogeneity, and entropy” (Haralic, 1973). “Literally, an image is an image on a dual plane (two-dimensional) dimensions), and when viewed from the angle of From a mathematical point of view, an image is a continuous function of light intensity in the two-dimensional plane, the light sourceilluminate objects, objects reflect return part of the light beam, the reflection of this light is captured by the optical tools so that the image of the object recorded” (Munir, 2004).

Facial recognition is very useful for attendance based on facial image which is very helpful for the security system in an attendance system, because at the time of identification the face of the data that is seen is not based on the name or characteristics but based on the displayed image (image capture in real time).

ANN with back propagation algorithm has good ability in pattern recognition, Signal Processing, Speech Production, Business and others. For example use for fingerprint pattern recognition. This usually carried out by members of the security or police for identification criminal fingerprints. In addition, ANN also widely used for compression data, data transmission, denoising, prediction, filtering, smoothing, deburring, reconstructive tomography, identification, classification, or various operations other. Especially for the use of identification, especially on faces, it becomes problem currently being prosecuted high accuracy with efficiency optimal time. Based on things that, then in this paper we will review the ANN algorithm that has been developed for static images and will analyzed its effectiveness for identification face in real time.

II. Review of Literature

2.1 Digital Documents

Digital document is any electronic information created, forwarded, sent, received, or stored in analog, digital, electromagnetic, optical, or similar forms, which can be seen, displayed, and heard through a computer or electronic system, but is not limited to writing, sounds or pictures, maps, designs, photographs or the like, letters, signs, numbers, access codes, symbols or perforations that have meaning or meaning and can be understood by many people(Setiadi, R. & Wulandari, F., 2016)

2.2 Digital Document Processing

To process a digital document, special software is needed, which is often referred to as word processing software (Word Processor). Word processing software is a computer application used to compose, edit, format, and print any printable material(Setiadi, R. & Wulandari, F., 2016)

2.3 Algorithm

An algorithm is a specification of a sequence of steps to perform a particular job. The considerations in choosing an algorithm are,

a. The algorithm must be correct. This means that the algorithm will provide the desired output from a given number of inputs. It doesn't matter how good the algorithm is; if it issues wrong work, it's not a good algorithm algorithm(Solly Aryza, Hermansyah, Muhammad Irwanto, Zulkarnain Lubis, 2017).
b. How well the results achieved by the algorithm. This is especially important in algorithms for solving problems that require approximation results (results that are only approximations). A good algorithm must give results that are as close as possible to the actual value.
c. Algorithm efficiency. The algorithm's efficiency can be viewed from two things: the efficiency of time and memory. Although the algorithm gives the correct output (closest), if we have to wait for hours to get the work, the algorithm will not be used; everyone wants fast creation. Likewise with memory, the larger the memory used, the worse the algorithm(Siahaan et al., 2018).

2.4. Checksum

The checksum is a technology to mark a file, where every file must have the same checksum, and if the checksum value is different even by one bit, then the file is a separate file even though it has the same file name. (Schlegel et al., 2009).

2.5. CRC 32 (Cyclic Redundancy Check 32)

CRC(Cyclic Redundancy Check) is an algorithm to ensure data integrity and check for errors in data to be transmitted or stored. Data that is about to be transferred or kept to a storage medium is prone to errors.

2.6. System Design Tools

As for the tools in the design of this application development, the author uses the Unified Modeling Language (UML) method. Unified Modeling Language (UML) is the successor to object-oriented analysis and design (OOA&D)..

2.7 Digital Image Component

The digital image components used in this study are components sourced from RGB images and grayscale images. RGB Image From the RGB image taken is
elements of red, green and blue. The basis is the accepted colors by the eye (human visual system) is the result of a combination of light with different wavelengths. Study shows that the color combination which gives a wide color range the widest is red (R), green (G),and blue (B) (Munir, 2004). By normalizing each color components by equation as follows :

$$r = \frac{R}{R+G+B}$$

$$g = \frac{G}{R+G+B}$$

$$b = \frac{B}{R+G+B}$$

2.8 Grayscale Image

This section involves the occurrence correlation matrix of an image. Co-occurrence matrix aims to analyze pair of pixels that are next to each other horizontally. On the gray-level image object. This matrix is called GLCM (Gray-level). co-occurrence matrix). If the object is binary image, a matrix will be formed GLCM 2 levels (2 x 2). Whereas if object in the form of an intensity image, it will an 8-level GLCM matrix is formed (Gonzales and Woods, 2004).

1. Energy

   Used to measure the concentration of gray level pairs. This value obtained by raising each elements in GLCM, then summed up (Mathwork, 1999).

2. Contrast

   Expresses the spread of light (lightness) and dark (darkness) inside a picture. Function to measure local differences in image (Mathwork, 1999).

3. Homogeneity

   Serves to measure the homogeneity of local gray level variations in image (Mathwork, 1999).

4. Entropy

   Serves to measure the randomness of the distribution of local differences in the image (Mathwork, 1999).

5. Degrees of gray

Is the global threshold value of grayscale (250 x 250) (Mathwork, 1999).

6. Standard deviation

Is the standard deviation value of grayscale image (250 x 250) (Mathwork, 1999).

Components 1 – 4 are used in texture measurement (Haralic, 1973).

III. Research Methods

3.1 Program Design

The system's design begins with the creation of the CRC32 Algorithm, Use Case Diagrams, Use Case Scenarios, Sequence Diagrams, and Activity Diagrams.

3.2 Design *Use case* Diagram

Use a case diagram in the design of the application program to describe the relationship of several external actors with the use cases contained in the system. This use case diagram only represents the state of the system environment that can be seen outside by the actor. In designing use case diagrams, there are two actors, namely, file senders and file recipients

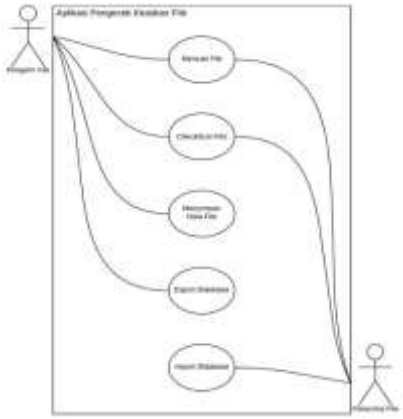

Figure 1. *Use case diagram of File Authenticity Check Application*

a. Use case Scenario Design

Use case scenarios aim to explain each description of each use case in the Use case diagram design, as well as the interactions between use cases.

Table 1. Description of Use case Diagram

NO	Kode	Nama *Use case*	Keterangan
1.	UC – P01	Mencari *File*	Proses mencari *file* yang akan diperiksa keasliannya
2.	UC – P02	Checksum *File*	Proses menghitung dan menentukan keaslian *file*
3.	UC – P03	Menyimpan Data *File*	Menyimpan nilai sum *file* yang sudah di check
4.	UC – P04	*Export Database*	Memindahkan *record database* menjadi *file* Excel
5.	UC – P05	*Import Database*	Menyalin *record database* dari *file* Excel menuju *database* aplikasi

Table 2. Scenario: Searching Files

Nama *Use Case*	Mencari *File*	
Kode	UC – P01	
Aktor	Pengirim *File*, Penerima *File*	
Kondisi Awal	Halaman Utama Program	
Reaksi Aktor		**Reaksi Sistem**
1. User mencari lokasi *file*		2. Menampilkan drive komputer
Kondisi Akhir	User telah menemukan *file* yang akan diperiksa	
Pengecualian	*File* tidak ditemukan	

Table 3. Scenario: Checksum File

Nama *Use Case*	Checksum *File*	
Kode	UC – P02	
Aktor	Pengirim *File*, Penerima *File*	
Kondisi Awal	User telah menemukan *file* yang akan diperiksa	
Reaksi Aktor		**Reaksi Sistem**
1. User memilih tombol check *file*		2. Sistem akan menampilkan nilai Sum *file*, memeriksa nilai berubah.
Kondisi Akhir	Menampilkan nilai sum dan hasil pengecekan	
Pengecualian	Data belum tersimpan atau *database* belum di *import*	

Table 4. Scenario: Saving File

Nama *Use Case*	Menyimpan Data *File*	
Kode	UC – P03	
Aktor	Pengirim *File*	
Kondisi Awal	Menampilkan nilai sum dan hasil pengecekan	
Reaksi Aktor		**Reaksi Sistem**
1. User memilih tombol save result		2. Sistem akan menyimpan data kedalam *database*
Kondisi Akhir	Data sudah tersimpan kedalam *database*	
Pengecualian	Sistem tidak menghasilkan nilai *sum* dan hasil pengecekan	

Table 5. Scenario: Export Database

Nama *Use Case*	*Export Database*	
Kode	UC – P04	
Aktor	Pengirim *File*	
Kondisi Awal	Data Sudah tersimpan kedalam *database*	
Reaksi Aktor		**Reaksi Sistem**
1. User membuka halaman *database*		2. Menampilkan halaman *database*
3. Memilih tombol *Export database*		3. Memindahkan *record database* kehalaman kerja Excel
4. Menyimpan halaman Excel yang berisi *record database*		
Kondisi Akhir	*Database* sudah berbentuk *file* Excel	
Pengecualian	Komputer tidak terdapat aplikasi Excel	

Table 6. Scenario: Import Database

Nama *Use Case*	*Import Database*
Kode	UC – P05
Aktor	Penerima *File*
Kondisi Awal	*Database* sudah berbentuk *file* Excel
Reaksi Aktor	**Reaksi Sistem**
1. User membuka halaman *database*	2. Menampilkan halaman *database*
3. User memilih tombol Browser	4. Menampilkan *drive* komputer
5. Mencari *file database*	6. Menampilkan isi *record file database*
5. User memilih tombol *Import*	
Kondisi Akhir	*Record database* sudah masuk kedalam *database* aplikasi
Pengecualian	*File database* tidak ada

b. Design *Sequence* Diagram

Sequence The diagram is a description of the interaction of objects arranged in time sequence or can be called a sequence diagram is a step-by-step description, including a logical sequence of changes.

c. Design *Activity Use case* Diagram

Activity Diagram is a series of data flow from activity use case diagram. In other words, Activity diagrams describe the various flow of activities in the system that is being designed.

d. Design *Databases*

Database Design is a process to determine the content and power settings required to support various system designs. In designing this system the author uses a MySQL database, as we know MySql is an open source database

3.3 Interface Design

Interface design is the first step in making application programs. The program must be designed according to the needs of the future users.

a. Main Page Display Design

The main menu page design is the first display that appears when the application program is run. The main page is designed to search for files that you want to check for authenticity and input data into the database

b. Page Display Design *Databases*

Database page design, database pages are designed for the import, export database and for deleting data records

IV. Results and Discussion

4.1 Program View

In this section the author will display the parts of the program, both the main page, the database in detail so that users can understand the purpose of the page, the following is the program page display.

a. Main Page Display File Authenticity Checker App

This page is the first display that appears when the application program is run. The main page is designed to search *File* For those who want to check their authenticity and input data into the database, here is the main page view.

1) Database Page View

Database page, database page is designed for importing, exporting database and for deleting data records, here's how the database page looks.

Figure 2. *Application Database Page*

2) About Page View

About page, contains the version of the application and the name of the maker the application. Here's what the about page looks like.

Figure 3. *About page*

3) Export Database

Export Database To MS.Excel Page Display On this page the MS.Excel worksheet contains records (data) from the database file to be sent, while the contents of the records are scrambled so that other users cannot know the value of the record.

Figure 4. *Export Database page to MS.Excel*

4) Import Database Page Display

The Import Database page shows the contents of the file that will be imported into a database, while the value that can be seen is only the name of the file, it is enough to know whether the file is the database that the sender intended.

Figure 4. *Export Database Page*

V. Conclusion

Based on the test results of the File Authenticity Checker application, the conclusions are as follows:

a. Applications that have been built can detect the authenticity of files from certain party modifications.
b. Applications can minimize users (users) infected with malware from files received because irresponsible parties have modified them..

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