DEVELOPMENT OF MONITORING APLICATION AND CONTROLING OF NEGATIVE CONTENT ON ANDROID BASED SMART DEVICES USING CLARIFAI API

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ABSTRACT

Availability The Application Programing interface (API) for third-party applications on Android devices provides an opportunity to monitor Android devices with each other. This is used by the author to create an application that can facilitate parents in pengawasan on children through Android devices owned. In this study, researchers added a feature for the classification of image content on target Android devices related to negative content. In this case researchers using Clarifai API. The result of this research is to produce a system which has feature, give report of image file contained in target smartphone and can do deletion on image file, receive browser history report and can directly visit in application, receive report of child location, contacts that can be directly contacted via app. This application works well on the Android Lollipop (API Level 22) and above because it has enough API support to run system functionality.

Index Terms: *Application Programming Interface(API), Monitoring, Negative Content, Children, Parent.*

1. PREFACE

Information technology is now more advanced and growing rapidly, especially after the presence of mobile devices, where we are more facilitated to access any desired information, according to a survey conducted by the Internet Service Provider Association Indonesia (APJII) internet users in Indonesia in 2016 as much as 132.7 million or about 51.5% of the total population in Indonesia of 256.2 million people, where the most use of mobile smartphone devices to access the internet of 63.1 million people or 47.6% [1]. Internet users in Indonesia are dominated by children and adolescents who use their smartphones to access the internet either to look for learning references such as for tasks, or social media, discussion forums and so on [2] however, not necessarily the content served safely especially for children, according to a survey conducted by APJII that as many as 76.4% argue for the safety of the Internet for unsafe children [1].

According to the results of questionnaire data processing regarding the responses of parents to the behavior patterns of children in using smartphones to 40 parental respondents who performed online and offline, with the age of the most respondents is 40 years as many as 12.8%, it is known that parents can not know or monitor fully the activities carried out by the child with his smartphone to supervise the sites that children have visited as much as 72.5%. In fact, parental supervision is very necessary for children to keep from the risks that would not be expected by every parent and achieved a healthy internet program [3].

To support the research, interviewed to the mother of Yanti, a housewife who has two boys in grade 6 and 3 elementary school, from the interview result can be seen that parents feel difficulty in checking smartphone owned by his children because parents only can use the smartphone limited to the use of communication such as calling, sending short messages, and social media only so that parents can not check what files are stored on his child's smartphone like image files that could contain negative content.

Other problems can also arise during school hours and school hours, where parents can not know for certain where the child is, whether in school during school hours and where children leave at school hours, because sometimes children do not ask permission to parents to go to a place after school, as in the results of the questionnaire that is as much as 90% of parents want to know the location of the existence of children during the outdoors.

Parents find it difficult to know who is in contact with child smartphones, where to find out who are the friends of the child, to be able to know with whom the child mingle and useful for parents so that parents can find out who are the closest people to the child can parents contact when parents need it.

Given the importance of the supervision that should be done by parents to their children in connection with the use of smartphones so that children can avoid the dangers of negative content spread over the internet need an application that can monitor and filter on the use of child smartphones, as previously done by Taufik Hidayat , Mansur and Rahmah [4] but more focused on monitoring the browser to monitor the sites visited, Nitin P. Jagtap, Kanchan A. Patil, Shaziya Sayyed Shakil, Nitin S. Ingle [5] about monitoring activities using Android smartphone devices.

Research has also been conducted previously about the development of parental control applications in children for parental supervision conducted by Lingga Agitya [6]. However, the study has not included application functionality to filter negative content in the form of images that exist in child smartphones.

To be able to identify or adapt a negative content image, it takes an Application Programming Interface (API) or Library that can make an introduction to an imagery or videos based on elements and visual patterns using the Clarifai FIRE [7].

Based on the description of the problem above then required an application that can help facilitate the parents in performing the examination or scanning image files on child smartphones and monitoring or monitoring of smartphones is the development of Android Smartphone Monitoring System Using Clarifai API using Clarifai fire. Applications will be built based on Android because based on smartphone user statistics in the first quarter of 2017 [8], as many as 85% of smartphone users use the Android operating system.

From the above understanding, the researcher can conclude that the application is a program or software created for a specific purpose to be able to solve a problem in a particular scope encountered both created and developed for the purpose of performing tasks that are general or can also be developed to perform a specific task. It is based on the application with certain unique packages so that no suitable programming packages can be used. Therefore the development of the application itself needs to be done.

2. CONTENT OF RESEARCH

2.1. Application

An application is a program or software designed to meet a particular purpose, according to the Oxford English Dictionary. Meanwhile, according to Jogiyanto [9] in Lingga Agitya research [6] application is the applicate, store or something matter data problem. Work into a medium or medium that can be used to implement or implement existing things or problems so that it changes into a new form without losing the basic values of the data, problems, the work itself.

2.2. Monitoring

Monitoring is the process of maintaining or monitoring the existence and magnitude of changes in state and data flow in a system. Monitoring aims to identify errors and progress in determining subsequent decisions. Techniques used in monitoring system information bypass real-time processing fields, statistics, and data analysis. A set of software components used for data collection, processing, and presentation are called monitoring systems [10*]*.

2.3. Negative Content

According to Big Indonesian Dictionary meaning content means information available through media or electronic products, whereas negative means uncertain or uncertain, not good or bad [11]. Thus, it can be concluded that negative content is an information contained in the electronic media be it TV, Radio, Smartphone, or in a web page containing elements that are distorted or unfavorable to be presented to the general public that is usually charged with violence and pornography.

2.4. Clarifai

Clarifai is an artificial intelligence company that excels in visual recognition, Clarifai was founded in 2013 by Matthew Zeiler, a leading expert in Machine Learning, Clarifai has been a market leader since winning the top five spots in image classification at ImageNet 2013 competition.].

Clarifai is a tool that can identify or recognize an image or video that is inserted as an input that can produce predictive results about what is in the picture or video of its probability [15].

2.5 Result and Discussion

In this discussion consists of a general description of the system's built and system design, as well as system implementation and testing.

2.5.1 General Description

In general, the system built is an application system with two login accounts, ie login on the parent smartphone and log on the child smartphone using the same account. The system can monitor or monitor the target smartphone, the system will send data to the server and then sent to the parent smartphone. In the image monitoring, used Clarifai help to identify the content of the picture.

2.5.2 System Architecture Analysis

Before doing the design of the application, firstly done analysis on the system architecture to be built. This is done with the aim that the application to be built later in accordance with the existing system coverage. The system architecture of the application can be seen in the following figure:

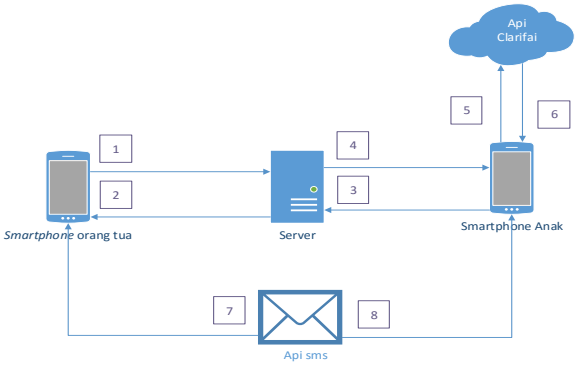


Figure 1 System Architecture

Stages in the model image of the application system built in the picture above are as follows:

1. Login to the system by checking the account, the process of sending the image deletion instructions.
2. The server process sends monitoring data of child smartphones from the database on the server.

3. The process of logging into the system by checking the account, the process of storing the data from the monitoring to the database server.
4. The process of removing image data instructions on a child's smartphone.
5. Upload image data to be identified to Clarifai.
6. Clarifai process sends positive or negative image identification result data.
7. SMS API process sends code verification list and password forgot password account to parent's handphone account number.
8. Proses API SMS mengirimkan kode verifikasi daftar dan password akun lupa pasword ke nomor HP akun orang tua.

2.5.3 Analysis Method of Monitoring System

In any system there is a necessary stage to be able to conduct monitoring system on *smartphones* which will be discussed below.

1. Analysis of permissions on the System

In the system to be built the system requires a permission for the system to access facilities or usability that already exist on the Android device for the system to run. Which will be described as in Table 1 below:

No	*Permission*	Keterangan
1	INTERNET	Allows applications to open network sockets.
2	ACCESS_NETWORK_STATE	Allows applications to access information about networks.
3	WRITE_EXTERNAL_STORAGE	Allows an application to write to external storage.
4	READ_EXTERNAL_STORAGE	Allows an application to read from external storage.
5	READ_GSERVICES	Allows the system to be able to use the google maps API
6	ACCESS_COARSE_LOCATION	Allows an app to access approximate location.
7	ACCESS_FINE_LOCATION	Allows an app to access precise location.
8	READ_CONTACTS	Allows an application to read the user's contacts data.
9	READ_HISTORY_BOOKMARKS	Allows the system to be able to read and access browser history and bookmarks

2. *Monitoring System Smartphone Monitor*

Image monitoring is done through parental smartphones where parents can view image files contained in child smartphones in the process of monitoring the system. Here is an overview of the process of image monitoring as shown in the following figure:

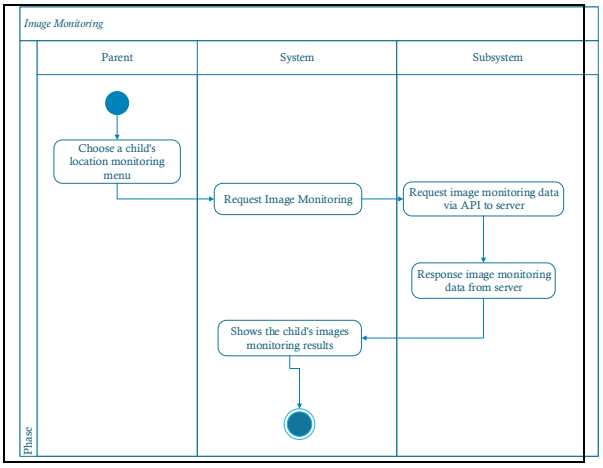


Figure 2 Image File Monitoring Process

Keterangan:

1. The user selects the image monitoring menu.
2. The system performs the function to request image monitoring data.
3. The system requests data through the API.
4. The server provides a response of JSON captured by the system.
5. The system displays the image monitoring data to the user.

3. Monitoring of Targeted Smartphone System

The target smartphone accesses and sends requested data to the server for later access by smartphone monitors. The following diagram of the process flow of supervision on the target smartphone as in Figure 3.

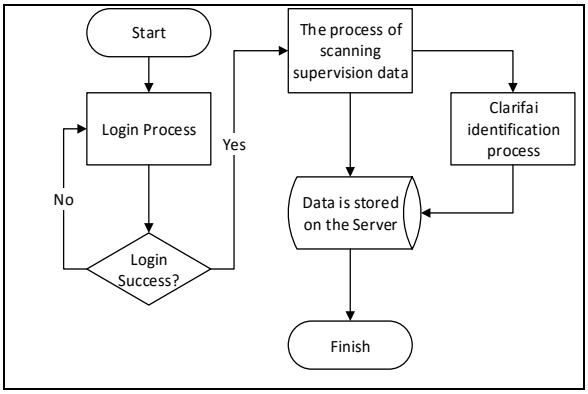


Figure 3 Diagram Alir Proses Pengawasan Pada *Smartphone Target*

2.5.4 Analisis Use Case Diagram

Use case diagrams illustrate how actors or users will use and utilize the system. The use case diagram also describes what the system will do, as shown in Figure 4 below:.

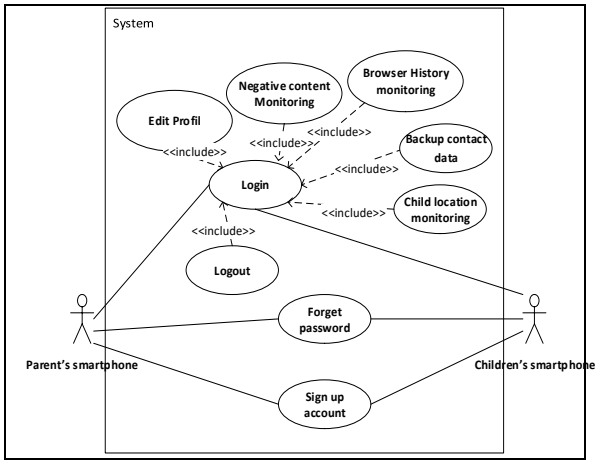


Figure 4 *Use Case* Diagram

2.5.5 Clarifai Analysis

Clarifai gives *response* reversed as a result of identification of images sent to Clarifai, the result of identification in the form of objects or something contained in an image. The result of identification comes from a model that has been done previous *training*, Clarifai itself has built-in models that are available for use, the following is Figure 5 Clarifai work concept:

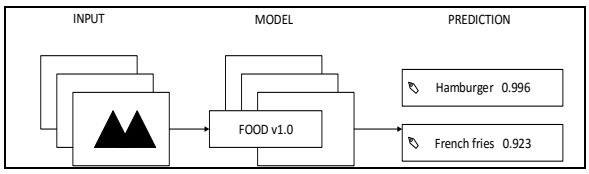


Figure 5 Clarifai Work Concept

Example Clarifai installation code in Java language as in the following of Figure 6:

```
package yourPackageName;

import clarifai2.api.ClarifaiBuilder;
import clarifai2.api.ClarifaiClient;
import okhttp3.OkHttpClient;

public class YourClassName {
  public static void main(String[] arg) {
    ClarifaiClient     client     =     new
ClarifaiBuilder("YOUR_API_KEY")
        .client(new    OkHttpClient())    //
OPTIONAL. Allows customization of OkHttp by
the user
        .buildSync();
  }
}
```

Figure 6 Clarifai installation code in Applications Example

The application sends the image to Clarifai, then the image will be identified by Clarifai and Clarifai sends the response data to the application.

Example code for image send code to Clarifai as in Figure 7:

```
client.getDefaultModels().generalModel().pr
edict()

.withInputs(ClarifaiInput.forImage("https:/
/samples.clarifai.com/metro-north.jpg"))
    .executeSync();
```

Figure 7 Image Delivery Code Example

Then Clarifai sends JSON data response as in Figure 8 below:

```
{
   "id": "ai_HLmqFqBf",
   "name": "train",
   "app_id": null,
            "value": 0.9989112
         },
 {
   "id": "ai_fvlBqXZR",
   "name": "railway",
   "app_id": null,
    "value": 0.9975532
         }
```

Figure 8 Sample Response of JSON Data from Clarifai

Sample *train* code *on Clarifai* can be seen in Figure 9 below:

```
package yourPackageName;

import clarifai2.api.ClarifaiBuilder;
import clarifai2.api.ClarifaiClient;
import clarifai2.dto.input.ClarifaiInput;
import clarifai2.dto.model.ConceptModel;
import
clarifai2.dto.model.output_info.ConceptOutp
utInfo;
import clarifai2.dto.prediction.Concept;

public class YourClassName {

  public static void main(String[] arg) {

    ClarifaiClient     client     =     new
ClarifaiBuilder("YOUR_API_KEY")
        .buildSync();
    // Create some concepts
    client.addConcepts()
        .plus(
           Concept.forID("boscoe")
        )
        .executeSync();
    client.addInputs()
        .plus(
ClarifaiInput.forImage("https://samples.cla
rifai.com/puppy.jpeg")
                .withConcepts(
Concept.forID("boscoe")
                ),
ClarifaiInput.forImage("https://samples.cla
rifai.com/wedding.jpg")
                .withConcepts(

Concept.forID("boscoe").withValue(false)
                )
        )
        .executeSync();
    final    ConceptModel    petsModel    =
client.createModel("pets")

.withOutputInfo(ConceptOutputInfo.forConcep
ts(
            Concept.forID("boscoe")
```

```
        ))
        .executeSync()
        .get();
    petsModel.train().executeSync();

  }
}
```

3 Figure 9 Train model on Clarifai

3.5.1 System Implementation

Implementation stage is a stage where the results of the design of the analysis is translated into a specific programming language and the application of software built in the real environment so that can be seen directly from the results of the development of the software. In this study the discussion of the implementation consists of, software builder, hardware builder, software testers, hardware testers, as well as interface implementation.

3.5.2 Implementation Environtment

The implementation environment to be discussed in this research is a specification of hardware and software built to run applications. The following T abel 2 of the implementation environment of the built system.

Table 1 Specifications of System Hardware

No.	Hardware	Specification
1	CPU	1 GHz
2	Disk Space	45 MB
3	RAM	512 MB

In addition, the hardware specifications required for the development of Android Smartphone Monitoring System Using Clarifai API recommended specification can be seen in table 3.4 is the following:

Table 2 Hardware Specification System Development

No.	Hardware	Specification
1	CPU	Intel® Core™ i3 M350 dengan kecepatan 2.27GHz (4CPU)
2	RAM	4 GB
3	Hard Disk	500GB
4	VGA	Intel® HD Graphicc 1696 MB

While the software needed to build and run Android Smartphone Monitoring System Using Clarifai API, the required software specifications can be seen in the following table:

Table 3 Software System Requirements Specifications

No.	Software	Specification
1	Operating system	Android Lollipop 5.1 (API Level 22)
2	Google Play Services	Latest version

In addition, the software requirements specification required for the development of Android Smartphone Monitoring System Using Clarifai API using Clarifai API can be seen in the table as follows:

Table 4 Software System Builder Specification Requirements

No.	Software	Specification
1	Operating system	Windows 7
2	Programing language	PHP, Java, JSON
3	IDE	Android Studio, Sublime Text
4	Database	MySQL
5	Browser	Google Chrome

3.5.3 System Interface Implementation

After the system design is done then the next is the result of the implementation of the system interface, as can be seen in the following figure:

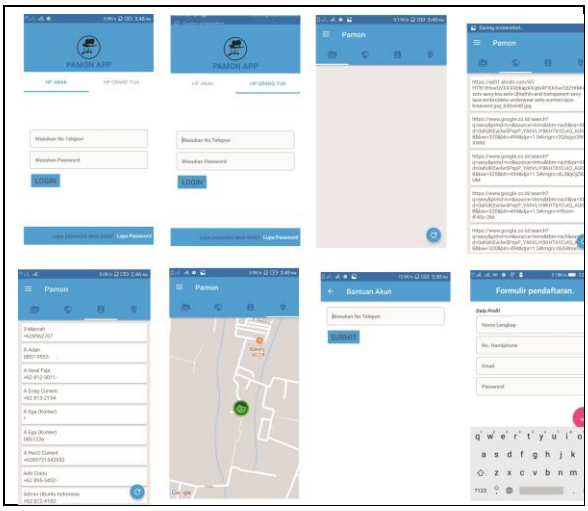


Figure 10 System Interface Implementation

The picture above is a picture of the implementation of the system interface of the image there is a display interface such as login parent, child login, account list, forgot passwords, monitoring the image content, monitoring browser history, monitoring contacts, and monitoring the location of children.

Parents log in on child smartphones and parent smartphones first to run system functionality, then parents can see the results of monitoring on parent smartphones. Users can make a list to create an account to enter into the system and perform the existing functionality and can choose forgot password menu to get login assistance to be given password and code verification to be able to enter into the system.

3.5.4 System Testing

Testing is a step done to find errors and deficiencies that may occur in software built so it can be seen whether the software built meet the existing criteria.

The testing method used is Black Box testing, where black box testing focuses on the requirements of functionality in the software. Black box testing method consists of two stages of testing of alpha and beta testing stage.

1. Testing Plan

System testing is divided into two stages: the first phase of testing focuses on functionality
software built using the blackbox testing method, then in the second phase of testing will focus on the user's assessment of the software built, data collection methods conducted by using a questionnaire filled by 10 respondents.

2. Testing Method Functionality

The application functionality testing method describes the sequence of tests as well as any of the things tested on the functionality contained in the Android Smartphone Monitoring System Using the Clarifai API using the Clarifai API. The application testing functionality scenarios can be seen in the following table.

Table 5 Functionality Testing

Test Item	Functionality
Authentication	Logging in
	Signup account
	Forget password help
Image content control	Send a picture surveillance data request
	Displays image surveillance data on parent smartphone
Browser history monitoring	Send request browser history data
	Displays browser history monitoring data on parent smartphones
Monitoring of contact data	Send a supervisory contact data request
	Show contact monitoring data on parent smartphone
Location Monitoring	Send a child's location request
	Displays the child's current location on parent's smartphone

Based on the results of functionality testing above it can be concluded that Android Smartphone Monitoring System Using Clarifai API using Clarifai API functionally can be used and running as expected.

3. Clarifai Functionality Testing On Applications

Clarifai functionality testing is performed to test whether the functionality of image identification with the help of Clarifai API has been able to run as expected.

The calculation formula for finding the success percentage of Clarifai test can be seen as follows:

Percentage formula:

$$Y = \frac{X}{Ideal\ Score} x100\%$$

Information:
Y = Percentage value searched.
X = Number of answer categories multiplied by frequency (∑ = N x F).

Table 6 Hasil Pengujian Clarifai pada Aplikasi

No	Smartphone	Many Test (x)	Percent of Success
1	Lenovo A7000a	10	92,30%
2	Samsung J1	10	100%
3	SONY X-peria E	10	92,30%
4	ADVAN i45	10	84,61%

Based on the results of testing Clarifai on the system in table 5 above can be concluded that as follows:

1. Tests conducted on four Smartphones namely Lenovo A7000, Samsung J1, Sony Xperia E, and Advan i45.
2. The number of test images as many as 13 images.
3. Pictures tested each smartphone the same.
4. Of the 13 Failed test images of 1 fruit where the image with the top is covered is related to the training data used.

4. Beta Test Results

The test is done by spreading the questionnaire and using the Likert scale where the range of values 5 to strongly agree (SS), 4 to agree (S), 3 for doubt (R), 2 for less agree (KS), and the smallest value 1 to disagree (TS). Data obtained from the questionnaire as many as 10 respondents.

Based on the questionnaire data then, can be obtained a percentage of each answer by using the formula:

$$Y$$

$$Y = \frac{X}{Ideal\ Score} x100\%$$

Information:
Y = Percentage value searched.
X = Number of answer categories multiplied by frequency (∑ = N x F).
N = The value of each answer.
F = Frequency.

The following Table 7 Beta test results on the system:

Table 7 Beta Test Results

The first question: Is the Android Smartphone Monitoring System Using Clarifai APIs make it easier for parents to check image files on child smartphones?					
SS	S	R	KS	TS	NxF
5	4	1	0	0	44
Y = (44/50)*100% = 88%					
The second question: Is the Android Smartphone monitoring System Using Clarifai API can make it easier for parents to monitor the sites that the child has accessed with the smartphone?					
`	S	R	KS	TS	NxF
5	5	0	0	0	45
Y = (45/50)*100% = 90%					
The third question: Does the presence of Android Smartphone Monitoring System Using Clarifai API can make it easier for parents to know where the child is located?					
SS	S	R	KS	TS	NxF
4	5	1	0	0	43
Y = (43/50)*100% = 86%					
Fourth Question: Is the Android Smartphone Monitoring System Using Clarifai API can help parents in knowing the contacts that parents can contact?					
SS	S	R	KS	TS	NxR
4	6	0	0	0	44
Y = (44/50)*100% = 88%					

Based on the results of the calculation of questionnaires from beta testing as in the table, it can be concluded the test results are:

a. From the detailed calculation results from the questionnaire on the first question can be concluded that the first goal is to help parents in checking the image file on the child's smartphone has been fulfilled with a value of 88%.
b. The second goal is to help parents in supervising the sites that have been visited children have been met with the details of the calculation of 90%
c. The third purpose of assisting parents in supervising the child's location has been met with a breakdown of the value of the calculation of 86%.

The fourth purpose of helping parents in supervising the contact data on child smartphones has been met with the details of the value of the calculation of 88%.

3. CONCLUSION

Adapun kesimpulan dan saran yang didapatkan dari hasil penelitian ini yaitu :

3.1. Conclusion

Based on the results of implementation and testing has been done, it can be concluded development of Android Smartphone Monitoring System Using Clarifai API is as follows:

1. The system has been built can help parents in the supervision and filtering on the image file that is on the child smartphone from the image file with negative content in it.
2. The system has been built to help parents on supervision of websites on the internet that have been visited, parents can directly visit the site on the application.
3. The system has been built can help parents in monitoring the location of the existence of the child so that parents can know the location of the existence of children in the context of parental supervision of the child.
4. The system has been built that can help parents to be able to know the data of contacts of children who can contact if parents in an emergency situation

3.2 Suggestion

In the development of Android Smartphone Monitoring System Using Clarifai API still has many shortcomings. Need for development and improvement in the future for the application can be better again. The authors suggestions for future application development are as follows:

1. In the development of Android Smartphone Monitoring System Using Clarifai API in the future, there needs to be additional functionality to be able to find out the source smartphones are under surveillance, to anticipate logging more than one target.
2. There is a need for future adjustments in the development of applications regarding privacy and permissions due to an increase in the android version going forward.

In the future System, development can be developed from the features it has to detect or filter on video files.

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