EJIP as an Instructional Media for Image Processing

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Abstract—**Easy Java Image Processing (EJIP) is application for image processing using java language programming. While image processing technique is a technique to do manipulation and an image by programming. This application using methods basic image filtering buffered image by making use of that has already been integrated (built-in) on java 2D. A filter all packed in the same package application just like the filter to adobe photoshop, it just got an interface that with simpler and user friendly. A filter that available on the application this among others, bluring, sharpening, edge detection, negative, rotating, scalling, contrast and brightness values and to support storage a picture with a variety of formats (jpg, jpeg, bmp, gif, png) commonly used by the public at large. From the results of the making of the application of this EJIP, we can conclude these applications support filtering image and file storage image many simultaneously**

Keywords—java; image processing; user friendly

I. INTRODUCTION

Acceleration of technological development very quickly became the main attraction for users, such as in the world of photography for example. The emergence of a digital camera as one of the sophisticated devices in the digital age raises a very high interest for the public to capture every important moment through the images in the form of photographs. However, of these technological developments also pose a problem in a good image processing, such as when a person continues to collect photos in large numbers, it will make the data storage space runs out. Besides other examples when one wants to convert the image into other forms, but difficulties when using applications that are used for such applications do not apply the concept of user friendly. Easy Java application Image Processing (EJIP) or can be called an image processing application is one solution to these problems. EJIP application is to apply the concept of user friendly and interactive products that are objective reflects the concept, which facilitate processing of the image.

Previous applications have image processing concept has also been made, such as applications Easy Graphic Converter issued by EtruSoft Technology.

II. LITERATURE REVIEW

A. Image Processing

Image processing or image processing is an activity of improving the quality of the image to be easily interpreted by a human/ machine (computer).

The input is the image and the output is also the image but with better quality than the input image, ie the image of color are less sharp, blur (blurring), contains noise (eg white spots), and others that need no processing to improve the image because the image becomes difficult to interpret because the information conveyed is reduced. Illustration of the process is shown in Figure 1.Java 2D

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B. Java 2D

Java2D provides several classes for image processing or image filtering. Class image processing can be obtained through the library java.awt.image.BufferImageOp. Here is a table of available classes with effects that can be obtained.
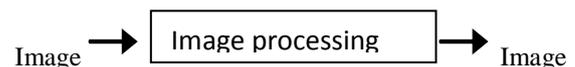

Fig. 1. Image Processing Process

Class Name	Support Class	Effect
ConvolveOp	Java.awt.image. kernel	*Blurring, Sharpening, edge detection*
Affine TransformOp	Java.awt.geom. AffineTransform	*Transformasi Geometri*
LookupOp	Lookup Table, ByteLookupTable, ShortLookup Table	*Posterizing, color, in-vertion*
RescaleOp	-	*Brightening, darkening*
ColorConvert Op	Java.awt.color. ColorSpace	Color Space Conversion

1) Class ConvolveOp

ConvolveOP class is a class that do convolution operation in the image. Convolution operation is an operation where the pixel image produced is the sum of the original pixel by pixel in the surroundings. This convolution operation is done with the help of the kernel, which is the matrix representing the pixels, which represents a central element pixels source and other elements representing the pixels around the pixel source.

2) Class AffineTransformOp

AffineTransformOp class is used to perform image transformation operations, such as geometric magnification and rotation. Constructors and AffineTransformOp are as follows:

AffineTransformOP (AffineTransform *xform*, int *InterpolationType*);

There are two types of interpolation are provided, namely:
- **Nearest Neighbour:** the type of operation is faster, but the quality is declining
- **Bilinear:** type of operation is slower but better quality

3) Class LookupOp

Class LookupOp basically used for mapping the pixel color through a table (array) of type lookup table.

4) Class RescaleOp

RescaleOp surgery changes the color scale, for example the color component of the pixel is x then rescale operation can change the value of x becomes:

$$x \ (new) = a * x \ (old) + b$$

5) Class ColorConvertOp

ColorConvertOp class is used to perform color space conversion, for example from RGB space to a color space gray (gry-scale). The constructor is as follows:

ColorConvertOp (colorspace source, dest ColorSpace, RenderHints rh);

C. EJIP System Analysis

There are three main stages in the flowchart EJIP that determine the occurrence of image processing, which opens the file, the conversion process, and save the image file of the type that has been determined.

1) Open File

The purpose of opening a file is to get kanditat EJIP. The input of this stage can be 1 or vary any image file image files, input file types can be shaped JPG, BMP, PNG, GIF etc. Phase open this file is a preparatory step which will be continued in the processing stage.

2) Filtering Process

This stage includes the process of selecting files that have been, creation of new file types, and compresed image. The election process this file depends on when the first phase, while the manufacture of the new file type is a phase of metamorphosis appropriate file associated user instructions.

In the image compression, image files will be compressed or reduced in order not to burden the load data peny¬impanan the data, basically this image compression removes information that is not required in the image.

3) Saving Files

This stage to store files that have been processed in the second stage, this stage is the finishing stage of the application EJIP. At this stage also provided facilities Output To that indeed serves as a director later files are stored.

The basic idea of Easy Java Image Processing (EJIP) is the image processing in features like image conversion, image compression, and edit images in the concept of user friendly and interactive products, not just the application EJIP can convert image much in time simultaneously, so it can be seen that the relevant product excellence. EJIP stage of the process is not really complicated, but in general, the application EJIP take steps image loading, image filtering and image saving.

The application process it self, as in Figure 3, begins with inserting/ input image file to be processed. Then choose the type of filtering conditions existing image in the edit menu is done. When selected blur filter, then the application will performs the function of blur.

When selected sharpen filter, then the application will perform functions sharpen, so next to the other. After stage image processing is done then the image data is saved into a new file (can be a variety of image file types). Once the application process is complete.

III. IMPLEMENTATION AND TESTING SYSTEM

A. Implementation of Library and Classroom

Implementation of libraries and classes refers to the architectural description and classes that have been identified in the literature review. Implementation of libraries and their own using libraries java.awt.image.BufferImageOp the classes that have been included in the application EJIP.
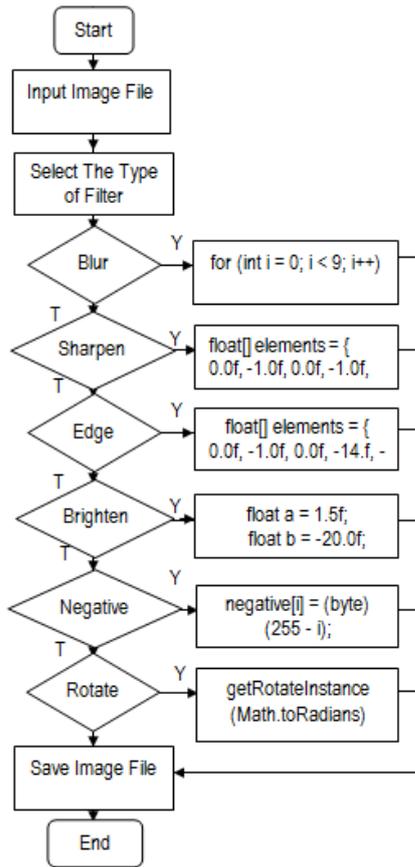
B. System Architecture

Fig. 2.   Image Processing Flow Chart

The implementation will yield forming elements filtering the image, such as blurring, sharpening, edge detection, color Invertion, Brighten, etc. Use of libraries and the class aims to facilitate the grouping supporting components image processing.

C. Implementation System

Implementation of this system refers to the system design, so that the functions that have been designed to be applied to physically into EJIP application form, the form of the application interface is as follows:

1) The File Menu

Menu file an initial menu in the interface of this application, the file menu contains several menu items, such as open, save, and exit.

a) Open

The menu item is used to insert the picture / image loaded into the application interface EJIP, the objective that the image can be processed in such applications as the interface to use, open the image can also be done with a quick button, the Ctrl + O. Display open image shown in Figure 4.
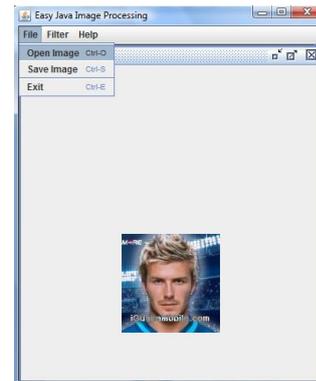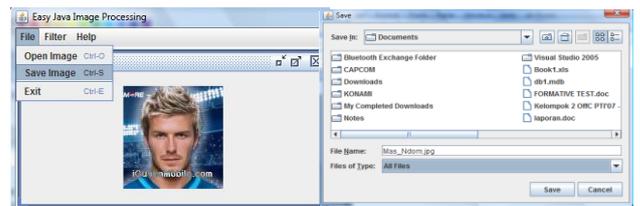

Fig. 3.   Load Image Picture

Fig. 4.   Save Image Picture

b) Save

The second menu item is used to store the image filtering results in a computer directory / other media. Display save image shown in Figure 5.

c) Exit

Exit menu is used to exit from the user interface or application can quickly key is Ctrl + E.

2) The Filter Menu

The filter menu is a menu that functioned as a picture editor that utilizes filtering features are widely known image, in this menu offered a variety of models designed in a simple filtering. Display filter menu as shown in Figure 6, and the results in Figure 7.
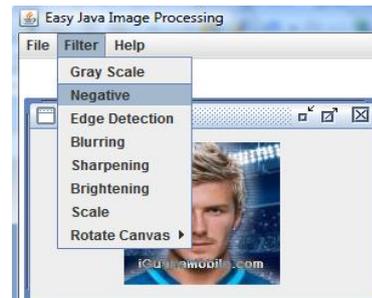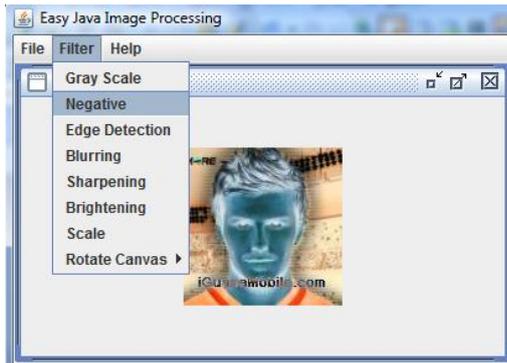

Fig. 5.   Image Filtering Picture

Fig. 6.   Display Filtering Result

3) The Help Menu

Help menu is a menu that contains the information about the identity of the creator of the program that contains the email address, telephone as well as data that support the author information program, the purpose of this menu is nothing but a penjebatani between the user and the programmer, so that if there is trouble shotting, the user can call programmer.

Within this menu is also provided about the menu item, which function as instructions for using the application manually, the goal that the user does not get confused when using this application. About menu display shown in Figure 8.

4) System Testing

Tests performed as verification that the application EJIP can be run in accordance with the design of the system has been made. The main purpose of this testing phase is to find errors that might occur when the application is running. There are two types of testing methods are commonly used when we want to test an application, namely white-box and black-box.

White-box testing emphasis on internal processes, while the black-box testing more emphasis on system functionality.

In this application, use the black-box testing to see and pay attention to the running program, in other words a programmer tried every menu in the application.

From the test results the whole interface applications, the results look goes well with other words not found error refers to the application scenarios

IV. CONCLUSION

Image Processing Easy Java applications can be built by implementing the image processing method using classes therein.

Fig. 7.   *Help Picture*

Results of the implementation of the application indicates that the application has many features of filtering image much, the application also has the capability to store many files simultaneously, and no less important this application has a simple display, but the value of the benefit and ease of use are very strong in this application.

V. SUGGESTION

To make the application more optimal image processing, image filtering in the menu should be given some sort of scrooling filter on each type of filtering image that has been identified in the application, so pros¬entase filtering can be controlled by the user.

In general, the output image filtering results using EJIP is good enough, but to get more interactive, it is necessary for quality measurement method, in addition to the comparison should be made use of libraries or classes that support other image processing, so that the results can be optimized.

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