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LABORATORY WORK #1

Image editor.

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Laboratory work #1

1 Purpose of the laboratory

Develop an application capable of editing one or more images.

2 Laboratory Work Requirements

Develop an application capable of editing an imported image. Application should have the following functionality:

- Rotate image.
- Adjust contrast.
- Save the final image.
- Draw on top of image using a pencil with different colors.
- Show image in white and black.
- Distort the image.
- Mirror the image.

3 Laboratory work implementation

3.1 Image editing

Image editing encompasses the processes of altering images, whether they are digital photographs, traditional photo-chemical photographs, or illustrations. Traditional analog image editing is known as photo retouching, using tools such as an airbrush to modify photographs, or editing illustrations with any traditional art medium. Graphic software programs, which can be broadly grouped into vector graphics editors, raster graphics editors, and 3D modelers, are the primary tools with which a user may manipulate, enhance, and transform images. Many image editing programs are also used to render or create computer art from scratch.

Basics of image editing Raster images are stored in a computer in the form of a grid of picture elements, or pixels. These pixels contain the image's color and brightness information. Image editors can change the pixels to enhance the image in many ways. The pixels can be changed as a group, or individually, by the sophisticated algorithms within the image editors. This article mostly refers to bitmap graphics editors, which are often used to alter photographs and other raster graphics. However, vector graphics software, such as Adobe Illustrator, CorelDRAW, Xara Designer Pro, PixelStyle Photo Editor, Inkscape or Vectr, are used to create and modify vector images, which are stored as descriptions of lines, Bézier curves, and text instead of pixels. It is easier to rasterize a vector image than to vectorize a raster image; how to go about vectorizing a raster image is the focus of much research in the field of computer vision. Vector images can be modified more easily, because they contain descriptions of the shapes for easy rearrangement. They are also scalable, being rasterizable at any resolution.

Automatic image enhancement Camera or computer image editing programs often offer basic automatic image enhancement features that correct color hue and brightness imbalances as well as other image editing features, such as red eye removal, sharpness adjustments, zoom features and automatic cropping. These are called automatic because generally they happen without user interaction or are offered with one click of a button or mouse button or by selecting an option from a menu. Additionally, some automatic editing features offer a combination of editing actions with little or no user interaction.

Digital data compression Many image file formats use data compression to reduce file size and save storage space. Digital compression of images may take place in the camera, or can be done in the computer with the image editor. When images are stored in JPEG format, compression has already taken place. Both cameras and computer programs allow the user to set the level of compression.

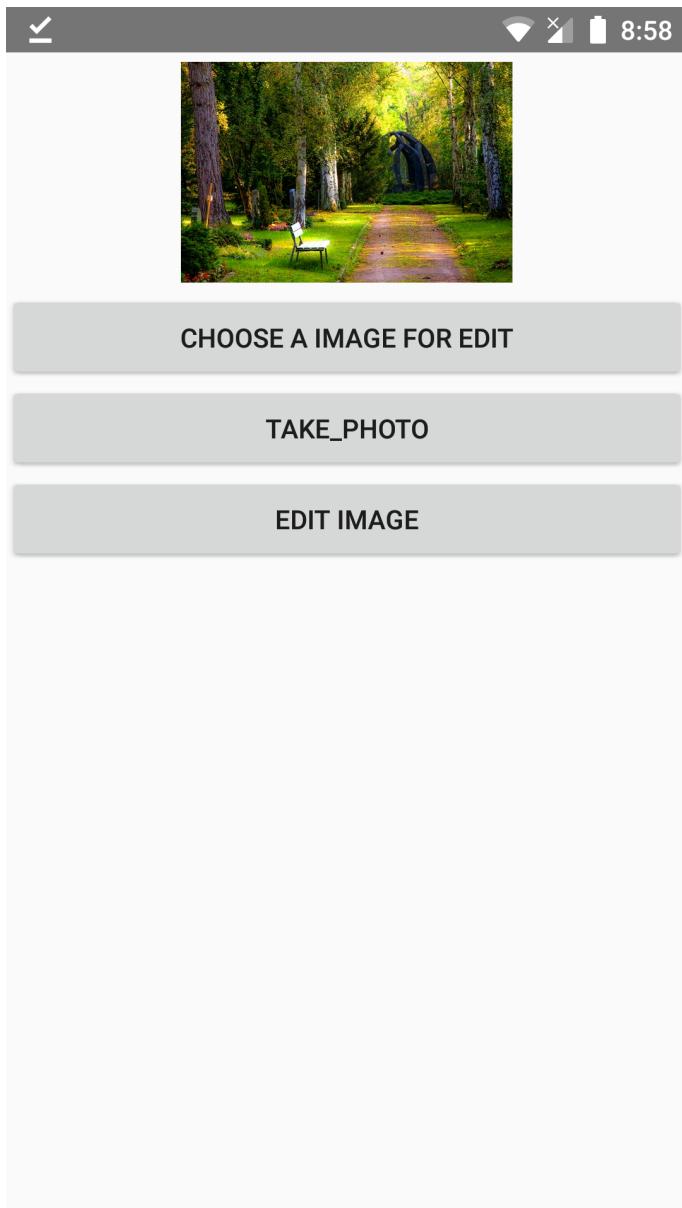
Some compression algorithms, such as those used in PNG file format, are lossless, which means no information is lost when the file is saved. By contrast, the JPEG file format uses a lossy compression algorithm by which the greater the compression, the more information is lost, ultimately reducing image quality or detail that can not be restored. JPEG uses knowledge of the way the human brain and eyes perceive color to make this loss of detail less noticeable.

3.2 Implementation

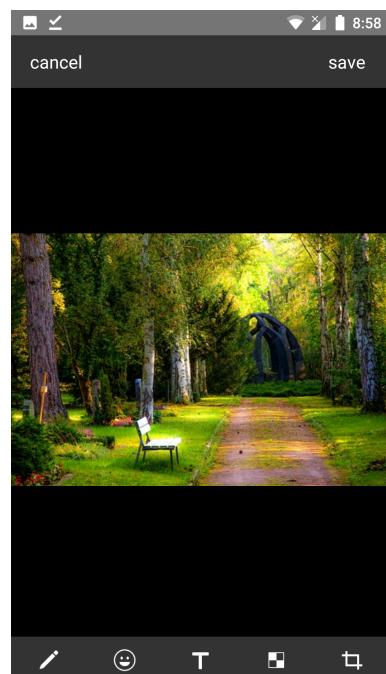
The laboratory work was implemented for android in languages Java and C++ using JNI. The application has the following functionality:

- Choose image from gallery.
- Take a photo.
- Pencil with different colors.
- Adding a image.
- Adding text.
- Resizing and rotating of added images or text.
- Sharpen tool.
- Blur tool.
- Cropping of image.

3.3 Screenshots

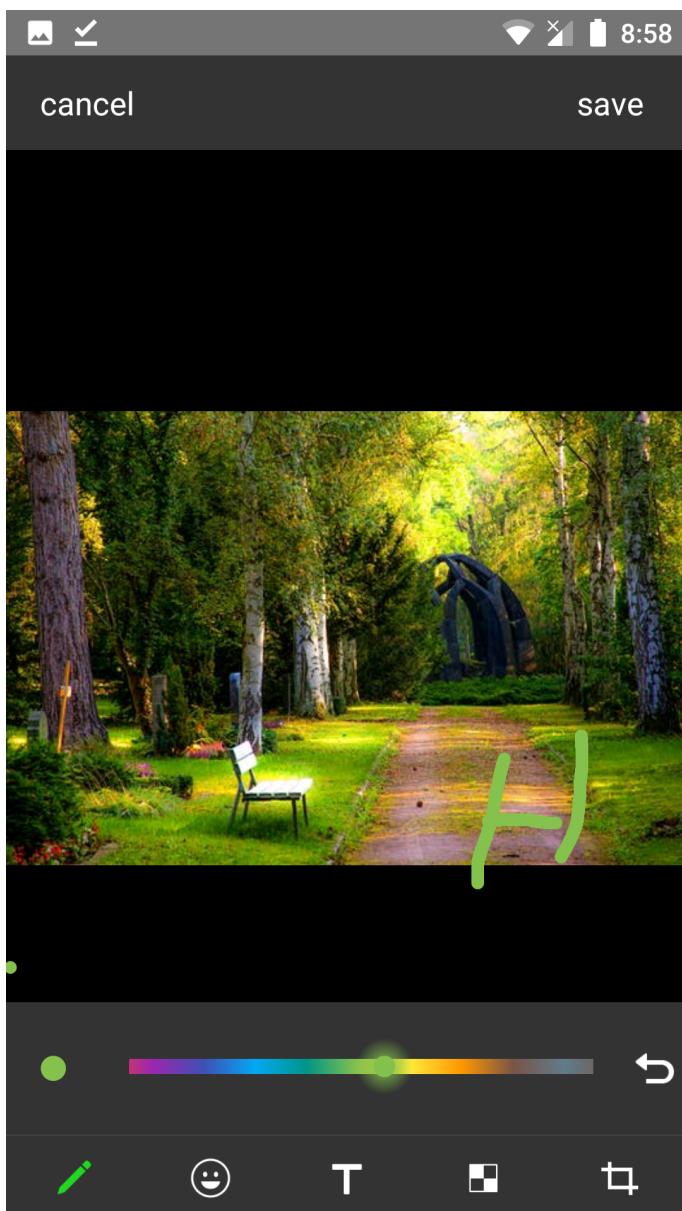


(a)Main Menu.

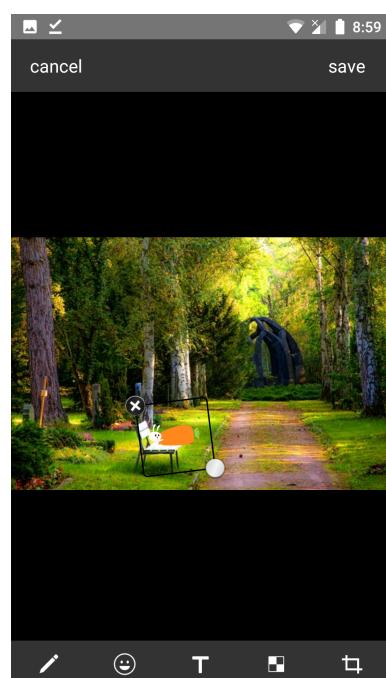


(b)Edit Menu.

Figure 3.1 – Menus

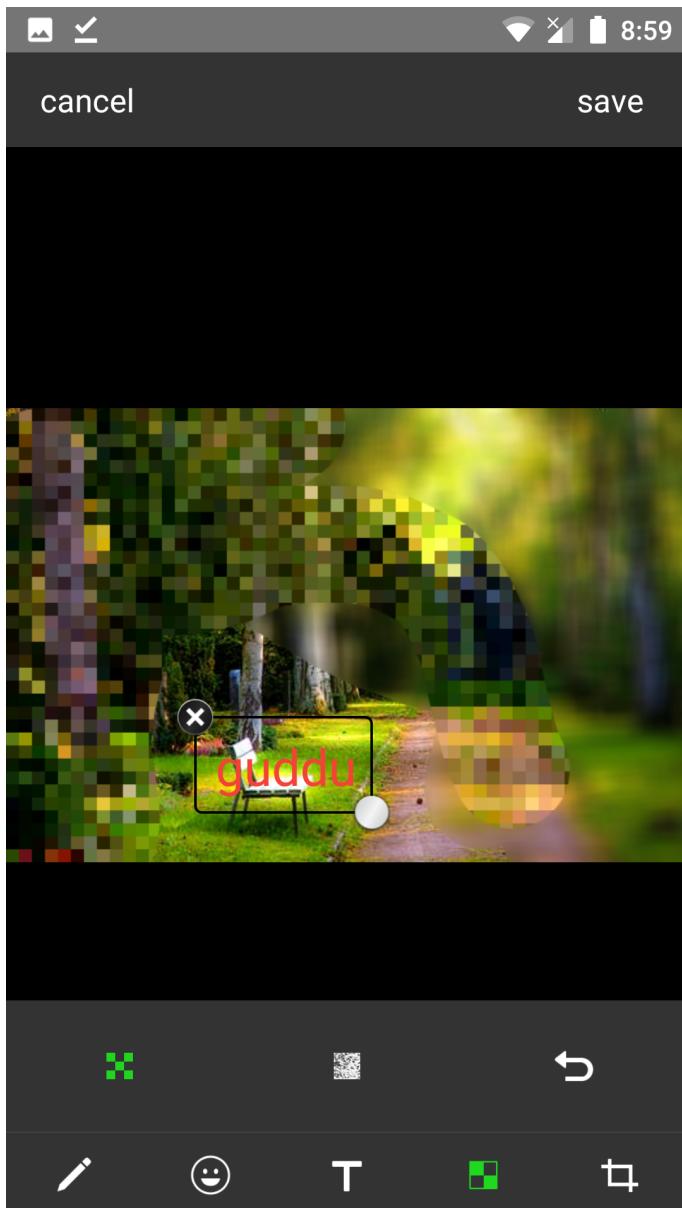


(a)Using pencil tool.

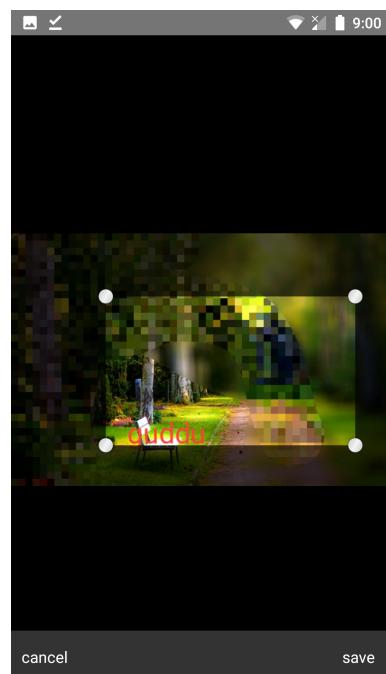


(b)Inserting image.

Figure 3.2 – Edit tool.



(a) Adding blur, sharpen and text.



(b) Cropping the image.

Figure 3.3 – Edit tool 2.

Conclusions

In this laboratory work we studied different tools and methods to process images. As accessible as it may seem nowadays, such tools are hard to implement.