

Institute of Technology, Carlow

B.Sc. Hons. in Software Engineering

CW228

User Manual

Project Title: Number Plate

Recognition

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Table of Contents

1. Features of Number Plate Recognition	3
2. System Requirements	3
2.1 Hardware	3
2.2 Software	3
3. Functionality	4
4. Getting Started	7
4.1 Installation	7
4.2 Main Interface	8
4.3 Open File	8
4.3 Pre-processing	10
4.4 Localization	10
4.5 Segmentation	11
4.6 Recognition	12

1. Features of Number Plate Recognition

NPR (Number Plate Recognition) is used to automatically identify vehicles by their number plate by analysis the imported image.

- **Only support Irish number plate.**
- **Supported image type:** support two kinds of common image type: BMP and JPG.
- **Supported image size:** 600 pixels X 500 pixels
- **Image quality:** allow the image be taken in front of the number plate around 2 meters with a tilt angle less than 3°, allow complex background and certain amount of noises the imported image.
- **High recognition rate:** the correct read rate of number plates is higher than 90%.
- **High efficiency:** takes less than 5 seconds to output the result after import an image.
- **Easy to use:** the functions are all practical with friendly interface.

2. System Requirements

2.1 Hardware

Intel CPU - Pentium 4 2.0GHz/AMD CPU - Athlon XP 2000+

2.2 Software

Windows Operating System, Java Running Environment

3. Functionality

NPR can detect the number palate of the vehicle from an imported image and recognize its registration number. NPR can automatically recognize the registration number if user click **run** button. Also, user can run the recognition process step by step by click the menu item in menu bar.

Here is an example of the results of each step in a recognition process:

Result of when user imports an image, see Figure 1.

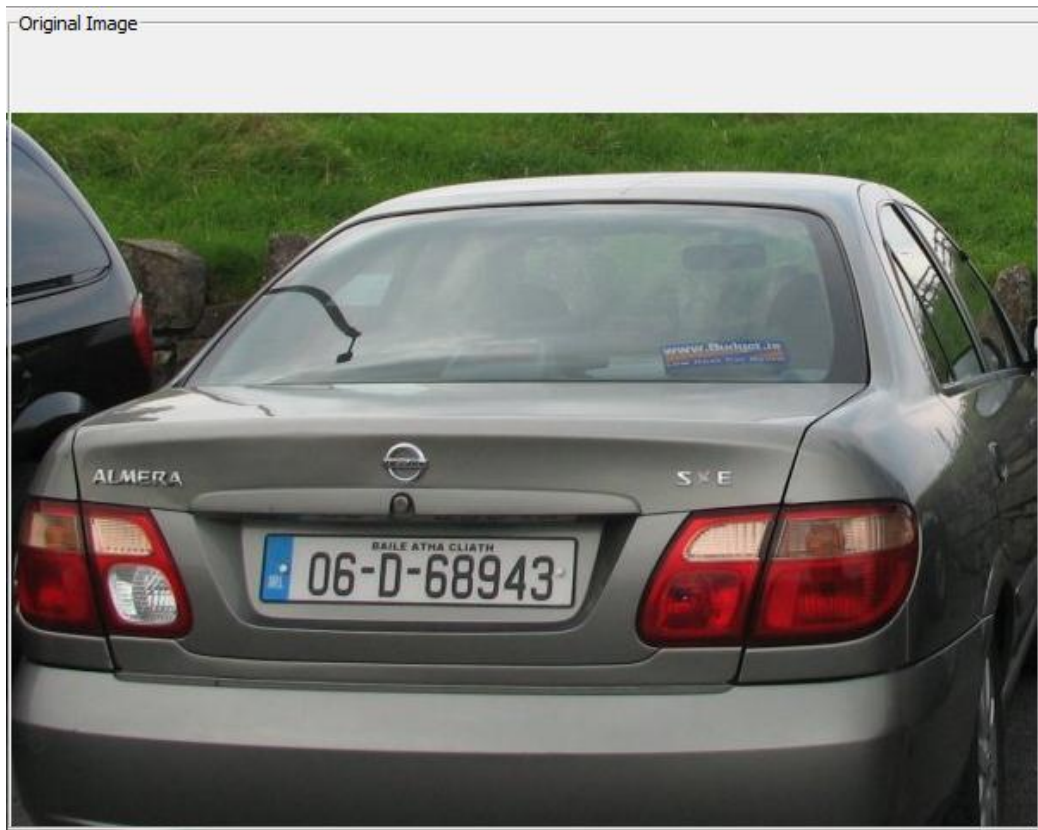


Figure 1 original image

Result of grayscale, see Figure 2.

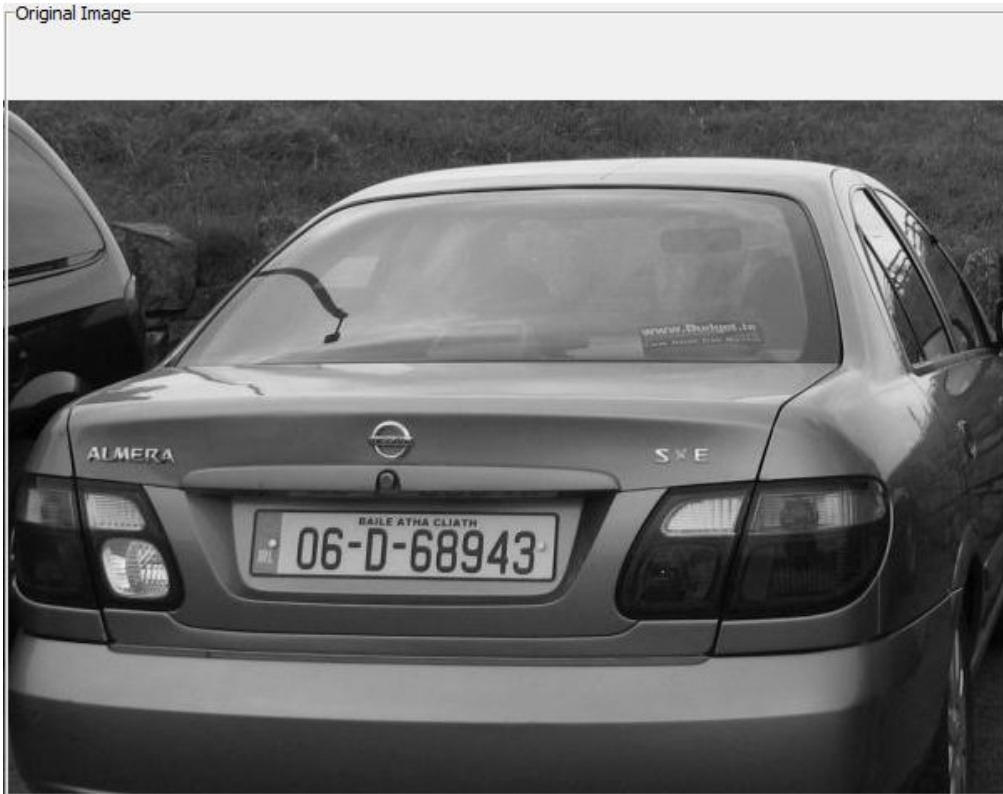


Figure 2 grayscaled image

Result of applying edge detection, see Figure 3.

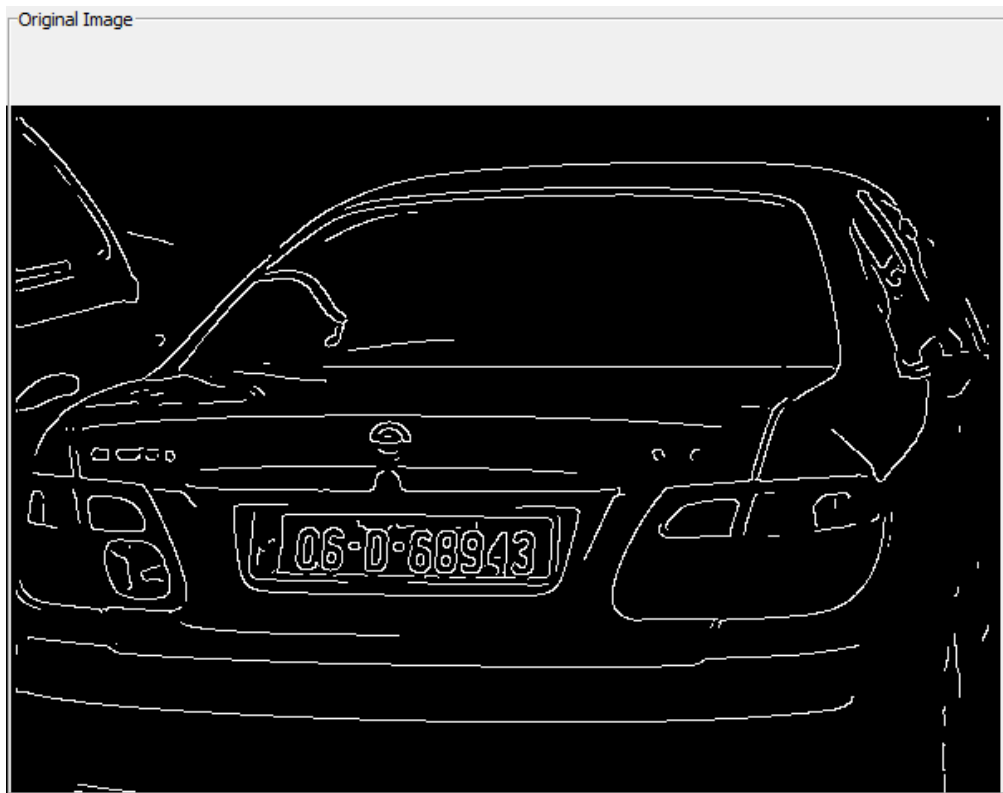


Figure 3 edge detected image

Result of plate localization, see figure 4.



Figure 4 plate localization

Result of character segmentation, see Figure 5.



Figure 5 character segmentation

Result of character recognition, see Figure 6.

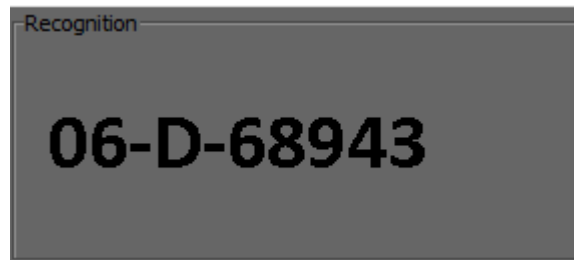


Figure 6 character recognition

4. Getting Started

4.1 Installation

No installation needed for this program. To run the program, just copy the **Number Plate Recognition** fold from the CD (Figure 7) to any directions and then double click the **NumberPlateRecognition.jar** (Figure 8).



Figure 7 Number Plate Recognition fold

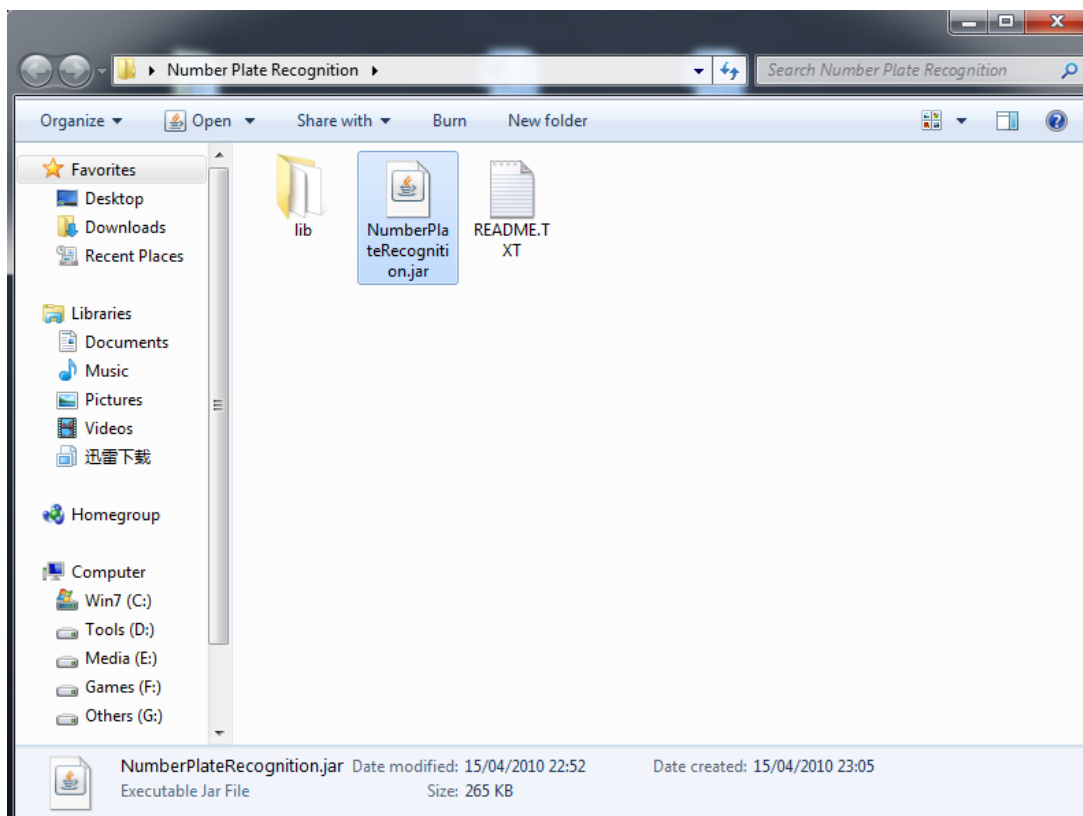


Figure 8 double click "Number Plate Recognition.jar"

4.2 Main Interface

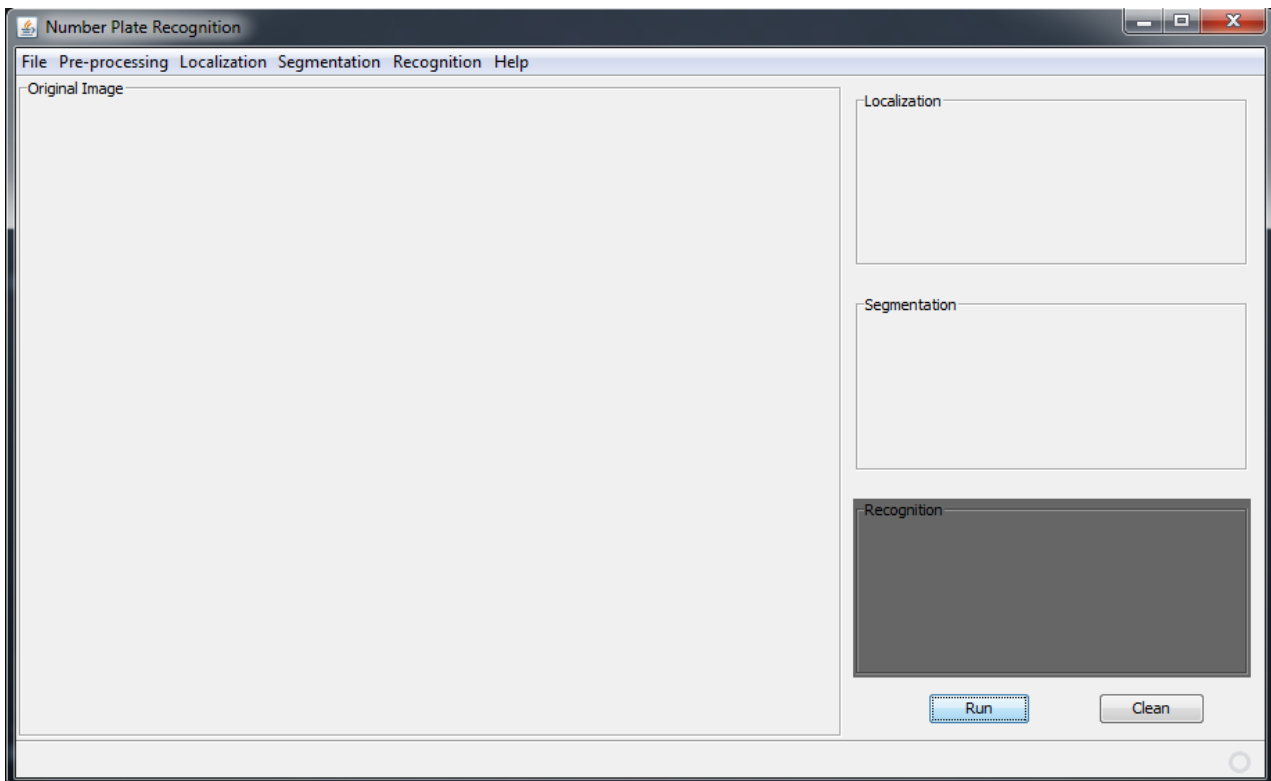


Figure 9 Main interface of NPR

When open this software, user can see the main interface as shown in Figure 7. There are four image panels in this form: original image panel, localization image panel, segmentation image panel and recognition image panel. They are used to display the result of each step in a number plate recognition process. The four menus in menu bar: Pre-processing, Localization, Segmentation and Recognition are used to allow user run a recognition process step by step. There are two buttons in right bottom, user can click **Run** to run the whole process and see result directly or click **Clean** to clean all the previous operation.

4.3 Open File

If user wants to run a recognition process, the first thing need to do is import an image. NPR support two kinds image file type: JPG and BMP. To import an image, click **File** menu, and then click **Open** (Figure 10). In file chooser dialog box, choose an image file and click **Open** button (Figure 11). And then the imported image will be displayed in Original Image Panel (Figure 12).

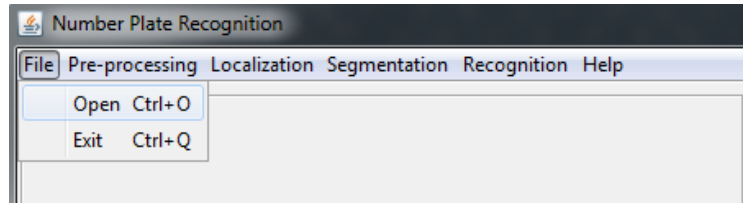


Figure 10 menu of "File"

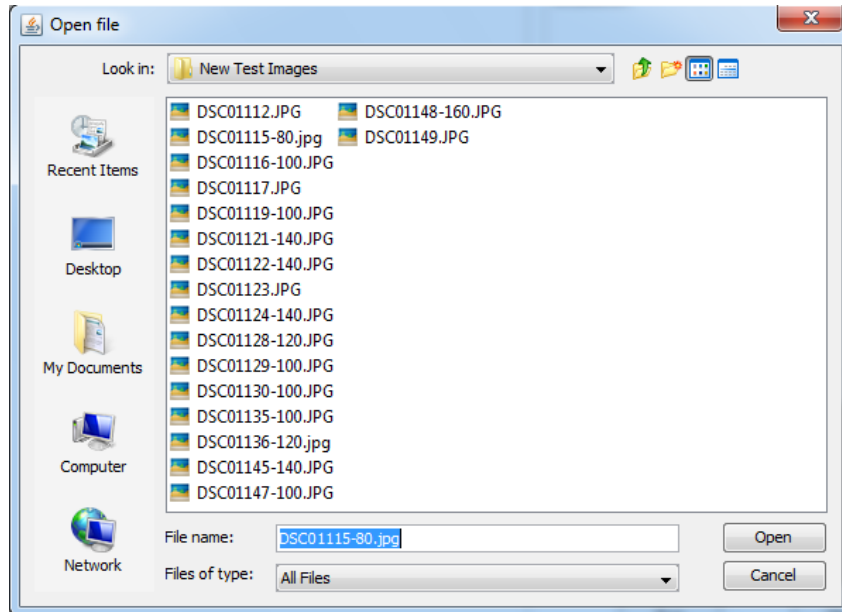


Figure 11 file chooser dialog box

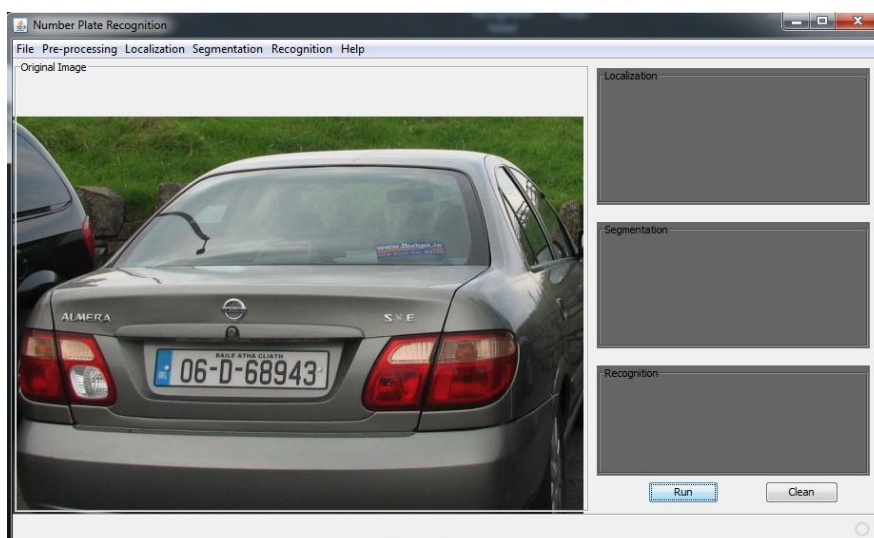


Figure 12 import an image

4.3 Pre-processing

Click **Pre-processing** menu, and then click Convert to **Grayscale**(Figure 13). The imported source image will be converted into grayscale and will be displayed in Original Image Panel (Figure 14).

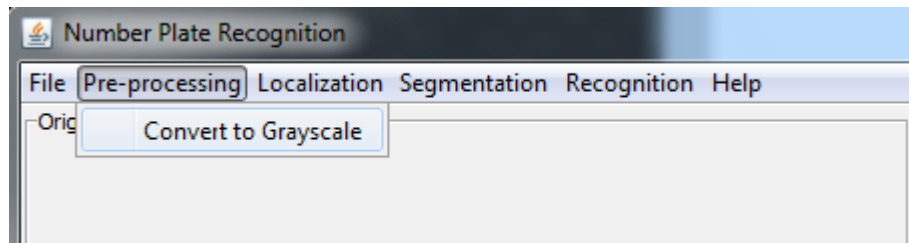


Figure 13 Menu of "Pre-processing"

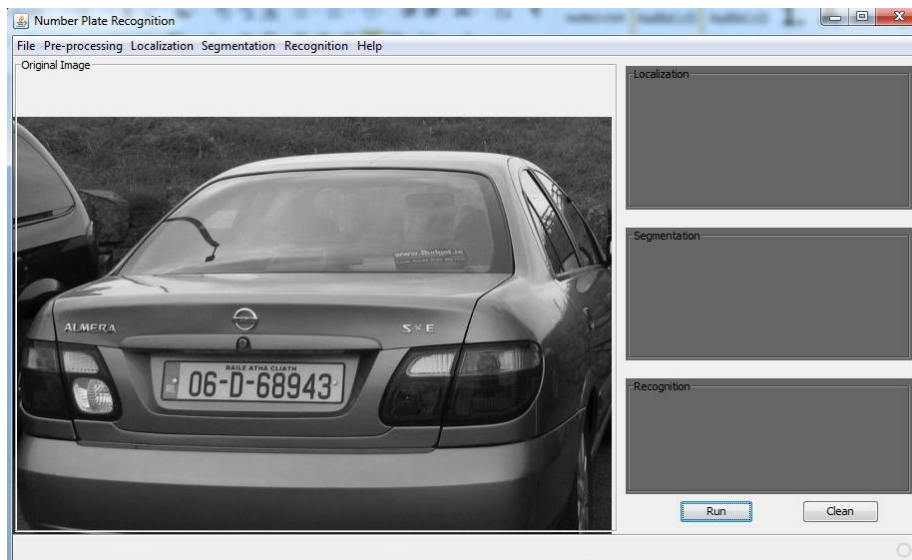


Figure 14 grayscale

4.4 Localization

Click **Localization** menu and then click **Canny Edge Detection** to apply edge detection algorithm to the grayscale image (Figure 15), the result will be display in Original Image Panel (Figure 16).

Click **Localization** menu and then click Number Plate Isolation to isolate the number plate area from the source image (Figure 15), the result will be displayed in Localization Image Panel (Figure 16).

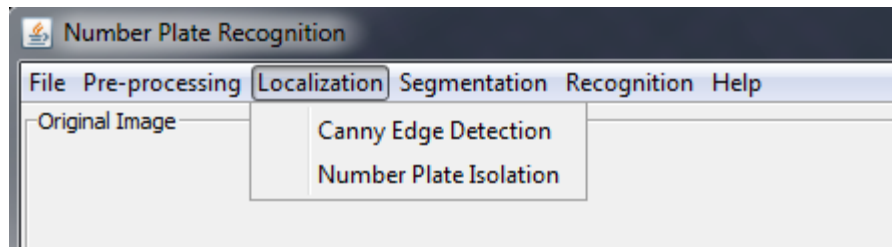


Figure 15 Menu of "Localization"

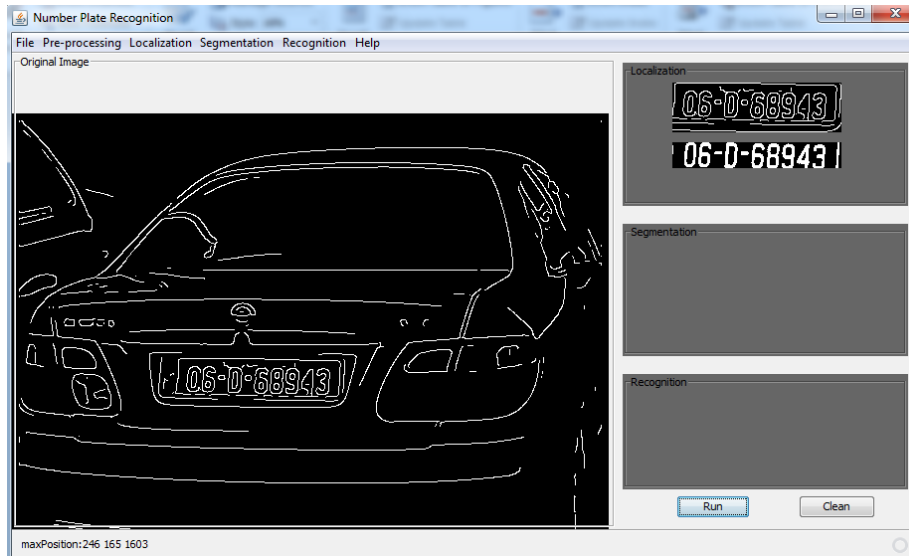


Figure 16 edge detection and plate localization

4.5 Segmentation

Click **Segmentation** menu (Figure 17), the characters in isolated number plate area will be segmented and displayed in Segmentation Image Panel (Figure 18).

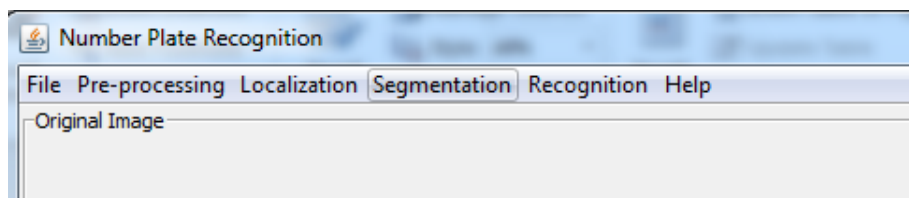


Figure 17 menu of "Segmentation"

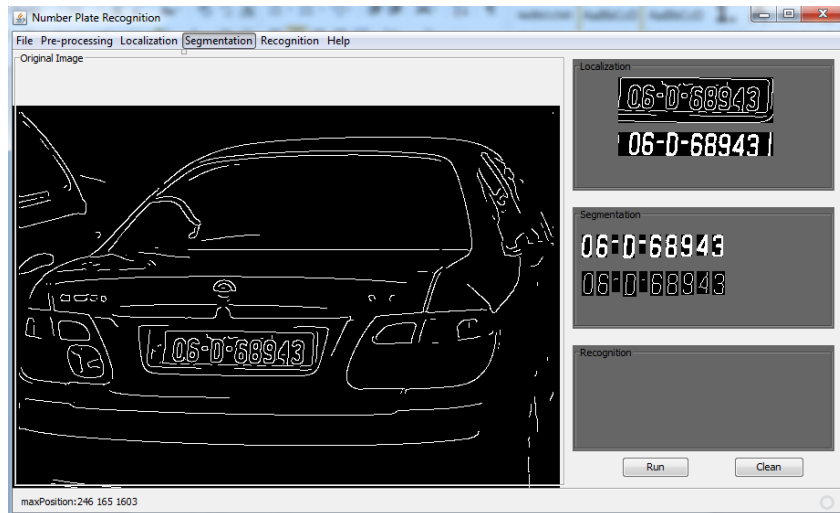


Figure 18 segmentation

4.6 Recognition

Click **Recognition** menu (Figure 19), the character recognition algorithm will be applied to the segmented character image and the result will be displayed in Recognition Panel (Figure 20).

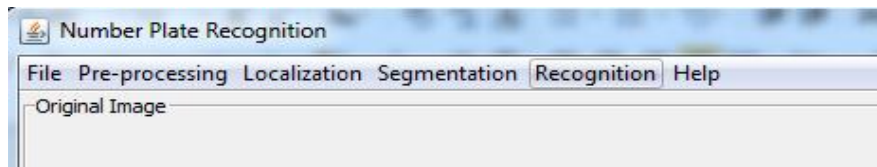


Figure 19 menu of "Recognition"

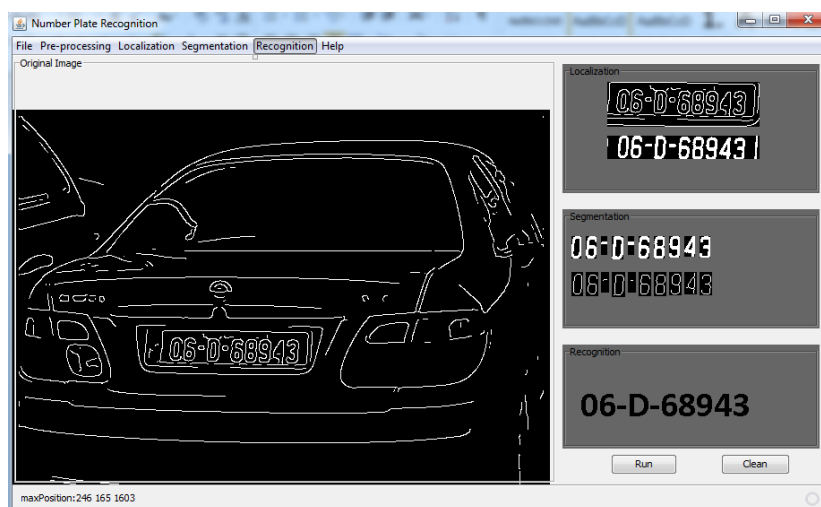


Figure 20 recognition