

Farmland Composition Analyzer

User's Manual

ENSC 26 – Computer Applications in Engineering

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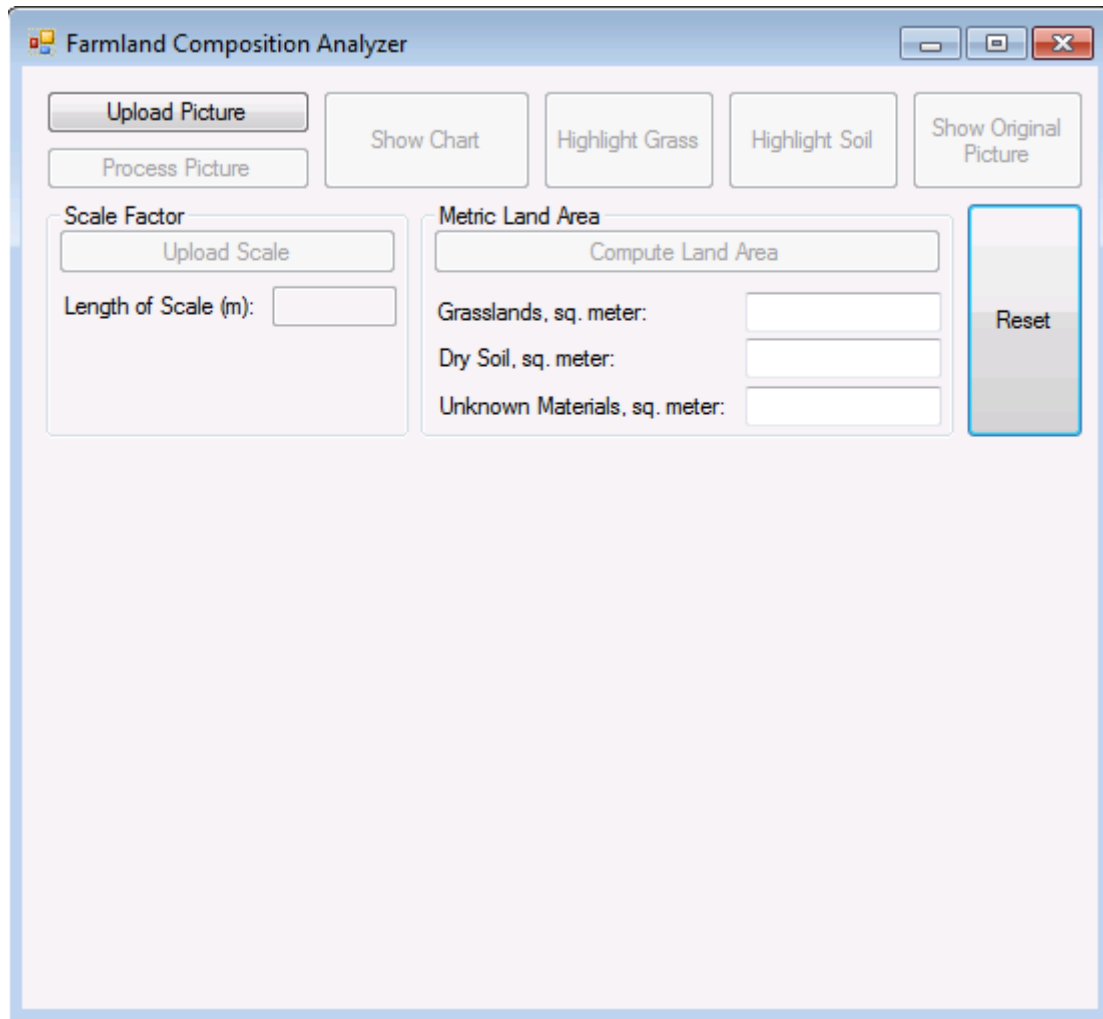
Brief Introduction

Computers are very convenient; it enables the user to create programs in which the principles of their fields of interest are put into application. With the sufficient knowledge in the field and computer programming, the programs become very useful and convenient, considering that all the desired functions are met. However, to make programs run properly, the codes must be written completely and correct. Also, the interface must be user-friendly and be able to function properly through the codes.

This manual shows how to use one of the applications of computer in engineering. The program is called *Farmland Composition Analyzer*, which determines what percentage of a certain land area is composed of grass, soil, and other unknown materials. This manual shows the step-by-step procedure on how to use the user interface.

Also it is important to note that the program is only suitable for farmlands. Other images captured from Google Maps aside from that will yield inaccurate results.

The User Interface



The screenshot shows the 'Farmland Composition Analyzer' application window. The title bar includes standard Windows window controls (minimize, maximize, close). The interface is organized into several sections:

- Top Row of Buttons:** 'Upload Picture' (highlighted with a grey background), 'Show Chart', 'Highlight Grass', 'Highlight Soil', and 'Show Original Picture'.
- Second Row of Buttons:** 'Process Picture'.
- Scale Factor Section:** Contains an 'Upload Scale' button and a text input field labeled 'Length of Scale (m):'.
- Metric Land Area Section:** Contains a 'Compute Land Area' button and three text input fields labeled 'Grasslands, sq. meter:', 'Dry Soil, sq. meter:', and 'Unknown Materials, sq. meter:'.
- Reset Button:** A large, vertically-oriented button labeled 'Reset' is positioned to the right of the input fields.

The 'Upload Picture' and 'Reset' buttons are highlighted with a grey background, indicating they are the active or default state.

Upon opening the program, only the Upload Picture and Reset buttons are enabled. Since the Reset button will only return the program in its initial state, it is not yet necessary to click. Thus, a picture must be uploaded first.

Capturing Farmland Image

The first thing to do is to capture a farmland from Google Maps. In order to do this, the user must open Google Maps first from the Internet, and then switch the map into satellite mode.





Example of a Satellite Image

Afterwards, use the Snipping Tool from the Computer and capture a farmland. A farmland should look like this:



Capturing the Scale

Along with the image, the scale (image and value), should be captured as well. This will be used in the program, especially in the calculation of land area. The scale can be found in the bottom right portion of Google Map.



After capturing the image and scale, it must be uploaded to the program. The next section will show how to upload and process the captured image.

Image Processing

Step 1: Click the Upload Picture button

Analyzer

Upload Picture

Process Picture

Show Chart

Highlight Grass

Highlight Soil

Show Original Picture

Scale Factor

Upload Scale

Length of Scale (m):

Metric Land Area

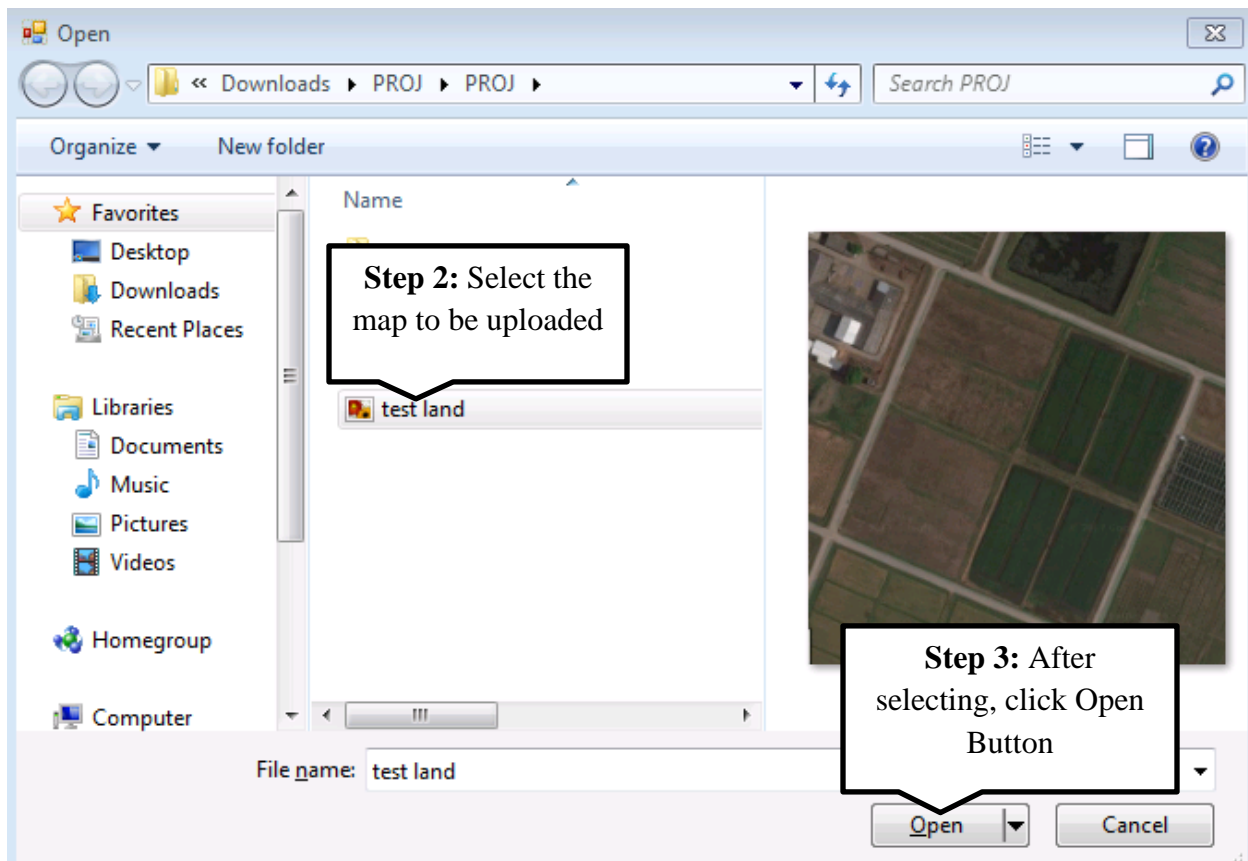
Compute Land Area

Grasslands, sq. meter:

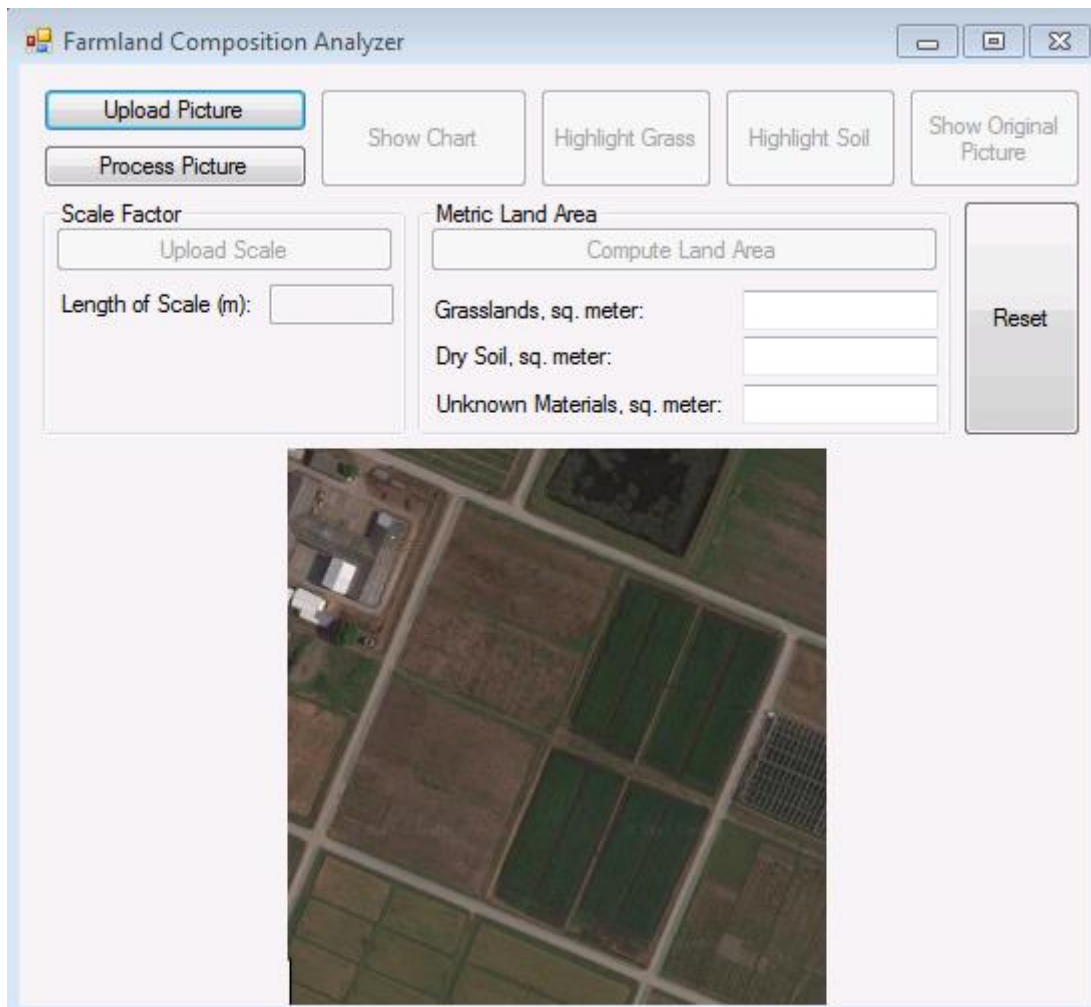
Dry Soil, sq. meter:

Unknown Materials, sq. meter:

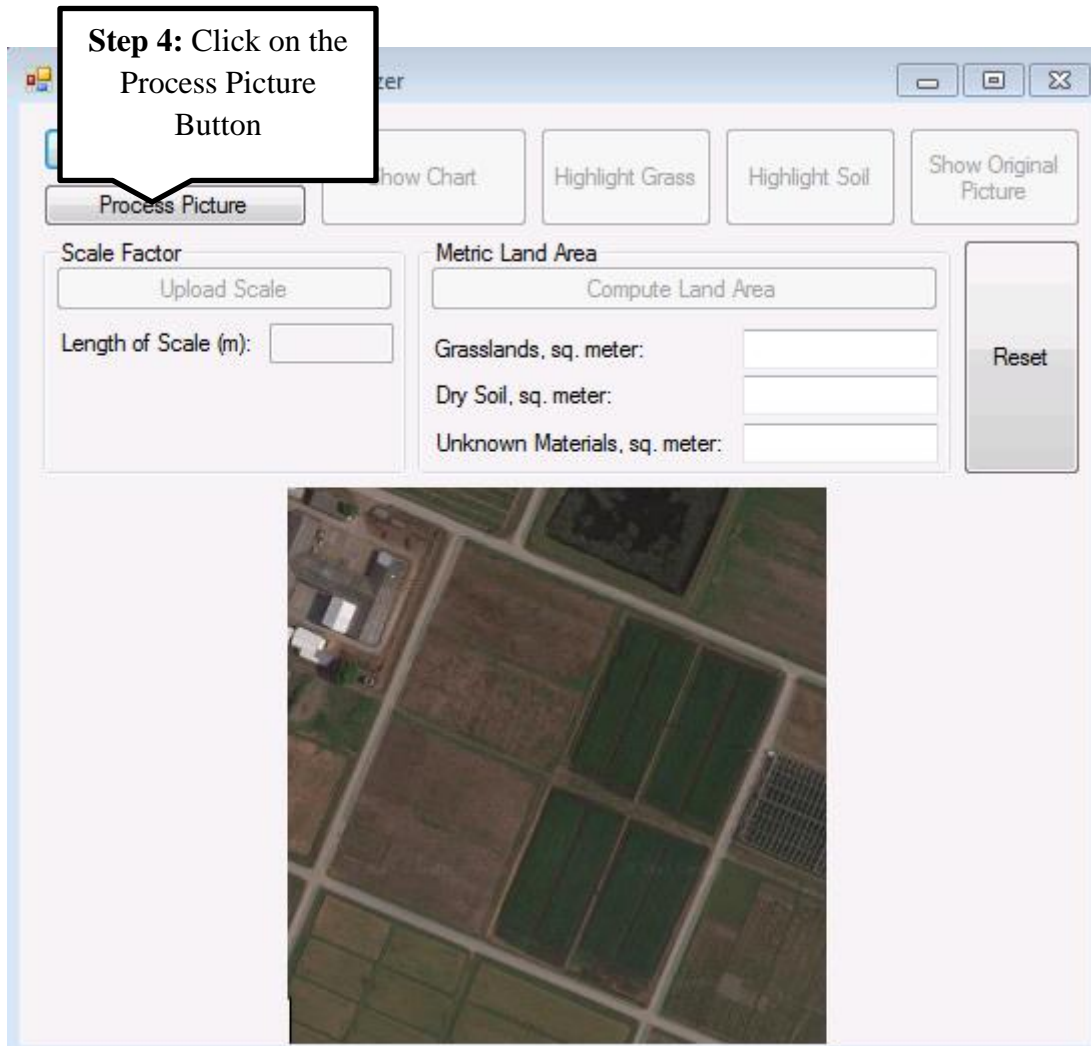
Reset

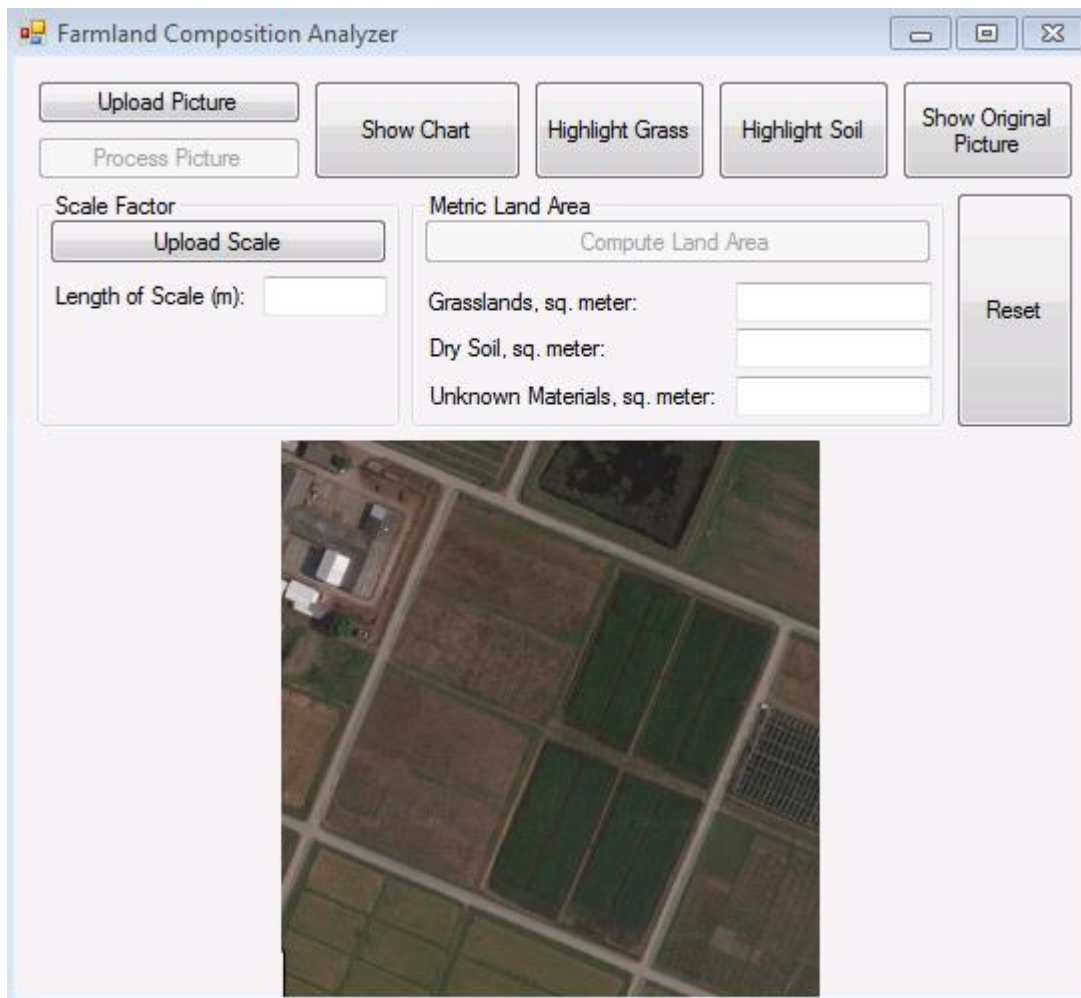


Upon clicking, a dialog box will appear, and will require the user to upload pictures. Specifically, farmland images from Google Maps should be uploaded.



After uploading the image, it will appear on the center bottom part of the interface. The image is now ready to be processed and analyzed.



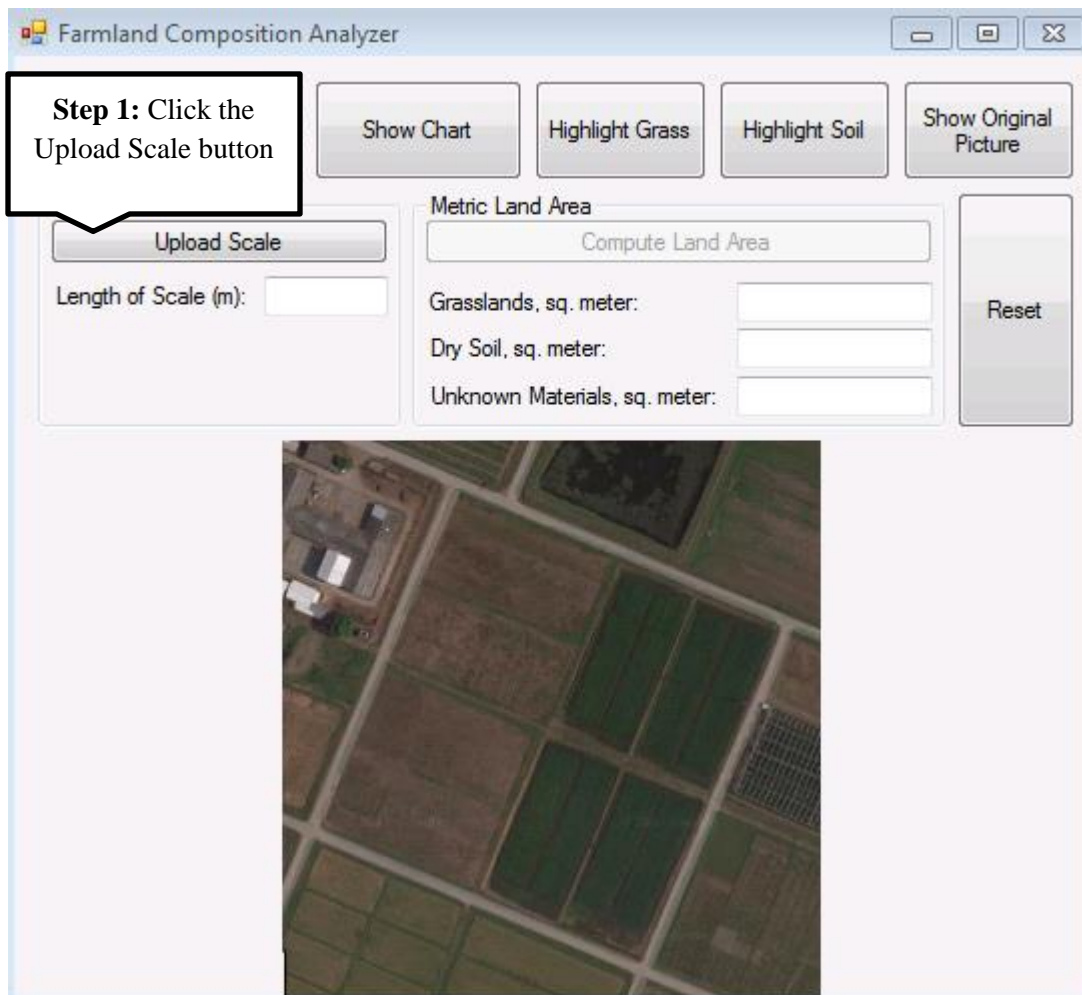


After processing the image, the Process Picture will be disabled, and the other buttons are now enabled. These only mean that the image has been analyzed.

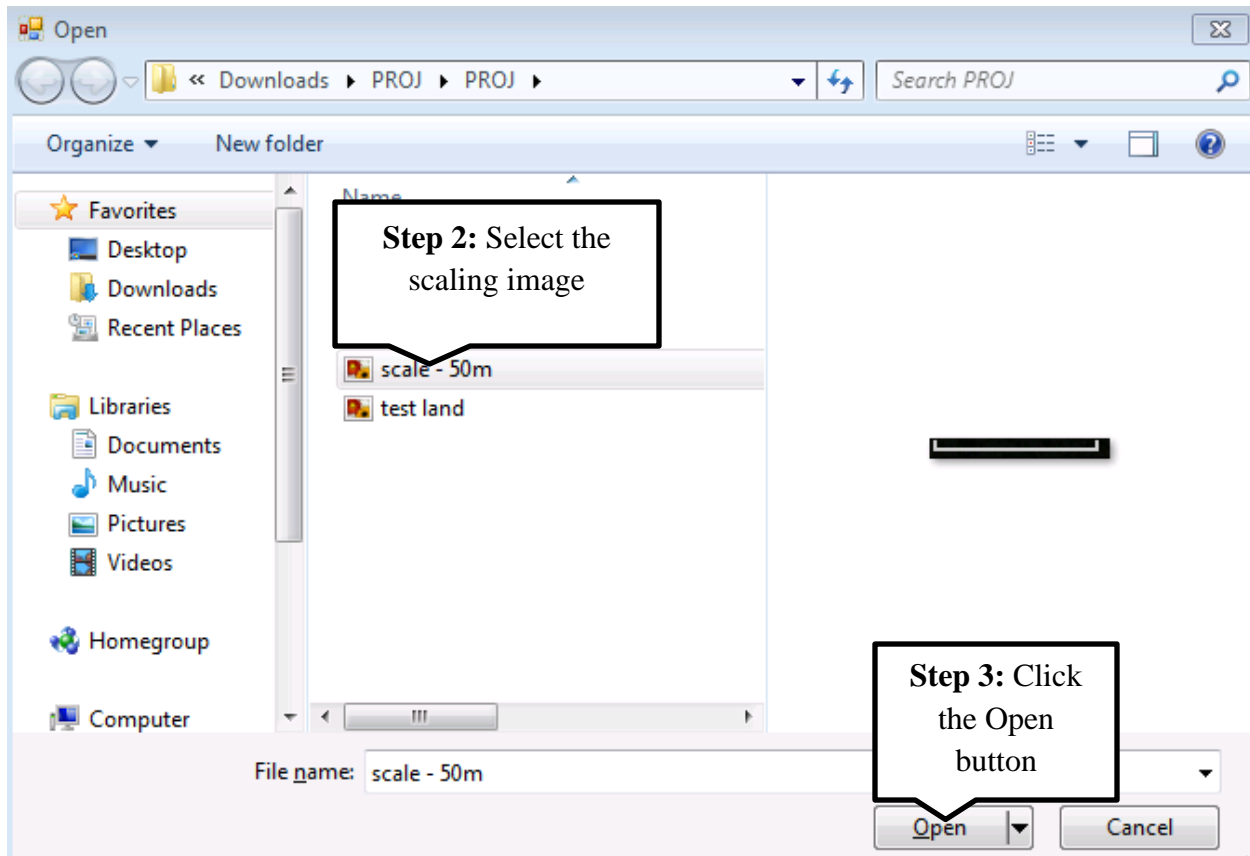
Features after Processing

A. Land Area Computation

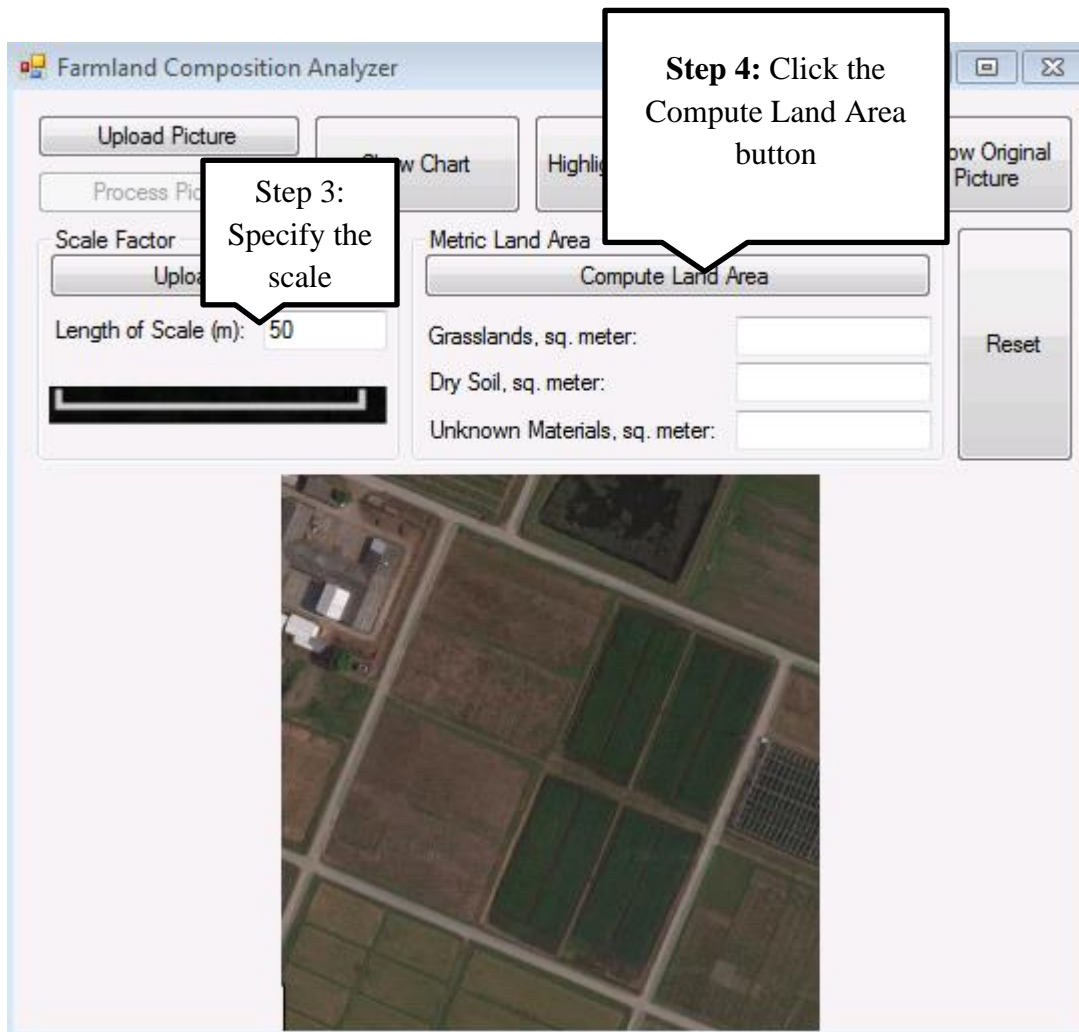
To enable the land area computation function, a scale must be specified. The following steps show how to compute the land area of each composition.



The screenshot displays the 'Farmland Composition Analyzer' window. A callout box labeled 'Step 1: Click the Upload Scale button' points to the 'Upload Scale' button. The interface includes several buttons: 'Show Chart', 'Highlight Grass', 'Highlight Soil', 'Show Original Picture', 'Upload Scale', 'Compute Land Area', and 'Reset'. Below the 'Upload Scale' button is a text input field for 'Length of Scale (m)'. To the right, under the 'Metric Land Area' section, there are three input fields for 'Grasslands, sq. meter:', 'Dry Soil, sq. meter:', and 'Unknown Materials, sq. meter:'. The 'Compute Land Area' button is positioned above these fields. A large aerial photograph of a farmland area is shown at the bottom of the window.



Once after it is done, the Compute Land Area button should have been enabled. The next thing to do is to specify the scale and to finally show the result

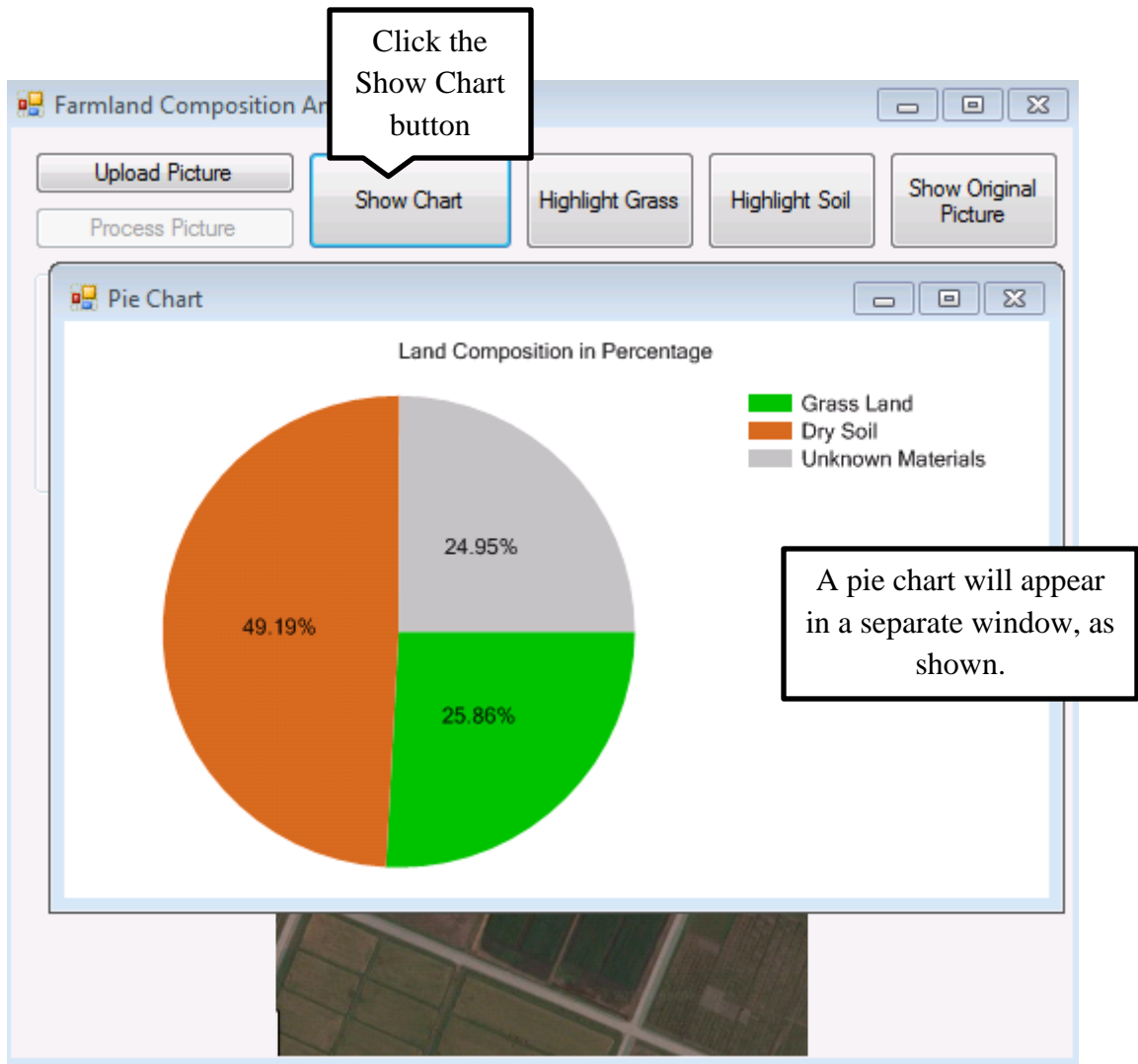


The screenshot shows the 'Farmland Composition Analyzer' application window. At the top, there are standard window controls (minimize, maximize, close). Below these are five buttons: 'Upload Picture' (highlighted in blue), 'Process Picture', 'Show Chart', 'Highlight Grass', and 'Highlight Soil'. To the right of these is a 'Show Original Picture' button. Below the buttons, there are two main sections. The 'Scale Factor' section on the left includes an 'Upload Scale' button, a text input for 'Length of Scale (m):' with the value '50', and a small thumbnail image of a field. The 'Metric Land Area' section on the right includes a 'Compute Land Area' button (highlighted in blue) and three rows of data: 'Grasslands, sq. meter:' with the value '29991.45', 'Dry Soil, sq. meter:' with the value '57047.14', and 'Unknown Materials, sq. meter:' with the value '28937.02'. A 'Reset' button is located to the right of these data rows. At the bottom of the window is a large rectangular area displaying an aerial photograph of a farmland with various colored overlays representing different land types.

Final Output

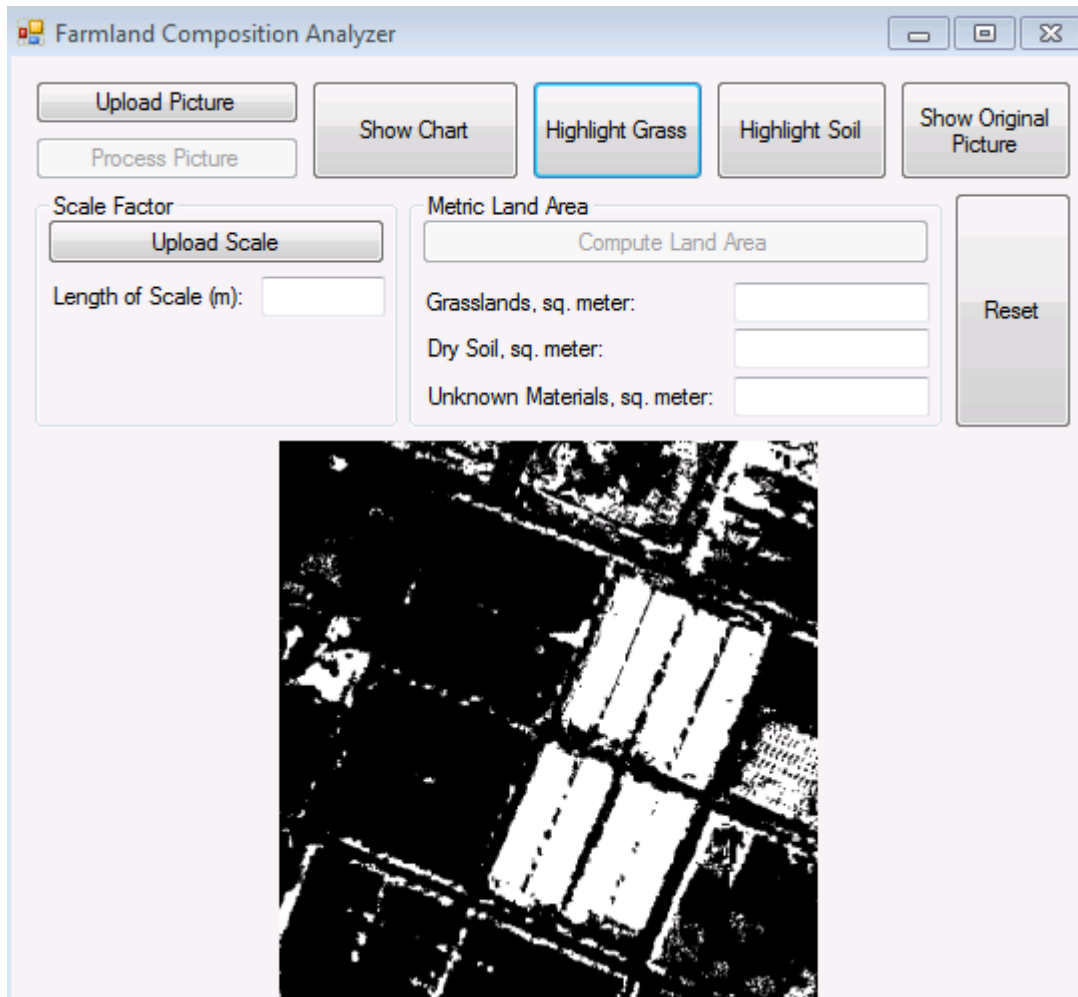
B. Show Pie Chart of Land Composition Percentages

After processing, the program has already determined how much of the land is composed of grass, dry soil, and other unknown materials. To view this by percent, a pie chart will be shown by clicking the Show Chart button.

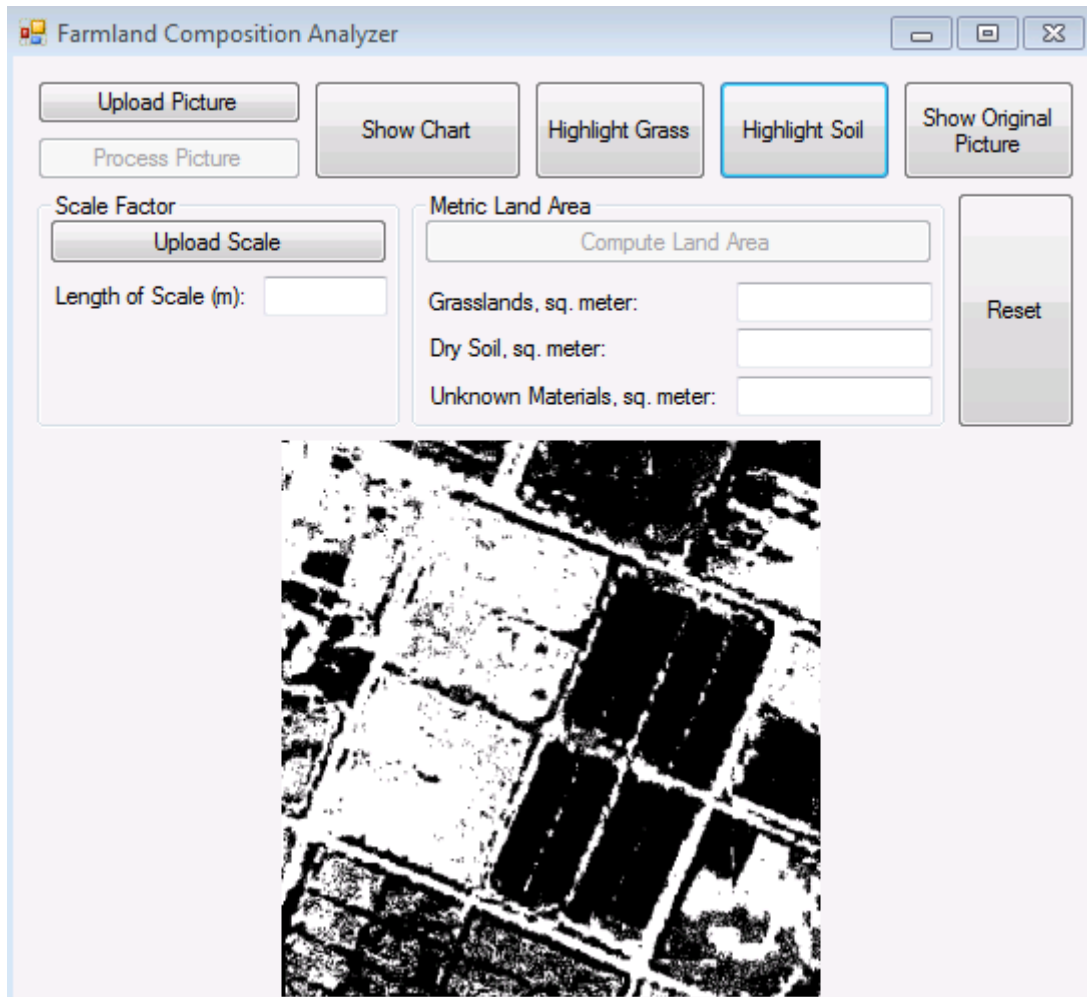


C. Highlight Grass and Soil Areas

To highlight the grass or the Soil areas, click on the Highlight Grass button or Highlight Soil button, respectively. The output will be a grayscale image, in which the highlighted areas are white, while the rest are in black.



Grass Areas are Highlighted



Soil Areas are Highlighted

Other Features

1. **Show Original Picture** button – If the displayed image highlights either the grass or soil area, clicking this button will display the original image
2. **Reset** button – clicking this button will return the program to the state when it was opened.

References

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