ANNTS USER'S MANUAL

This document contains information to help you run the ANNTS software program.

Background Information

What this program does. This software program is a proof of concept of using artificial neural networks to classify an image as an innocent image (containing no hidden message) or a stego image (containing a hidden message). Thus, this program has limitations, which we list below:

1. The software can check for messages hidden using one of three different types of embedding algorithms :
    a. Jsteg-jpeg at 50% of full capacity, or Jsteg-jpeg at 100% of full capacity;
    b. F5 at 50% of full capacity, or F5 at 100% of full capacity;
    c. A simple wavelet embedding algorithm, at 50% or 100% of full capacity.
2. Only one image at a time can be checked for hidden content.

"Full capacity" means the largest possible amount of data that can be embedded into the image using the prescribed algorithm. This varies from image to image due to the particular embedding algorithms used.

What this program does not do.
1. The program cannot extract the hidden message.
2. The program cannot analyze more than one image at a time; it cannot analyze a directory of images all at once, for example.
3. The program cannot analyze an image whose path name as appears in the "Selected Image to Analyze" has a space.

To start the program:

Double click on the icon labeled "steganalysis" on the desktop. The following window (called the "ANNTS window") should open on your screen:
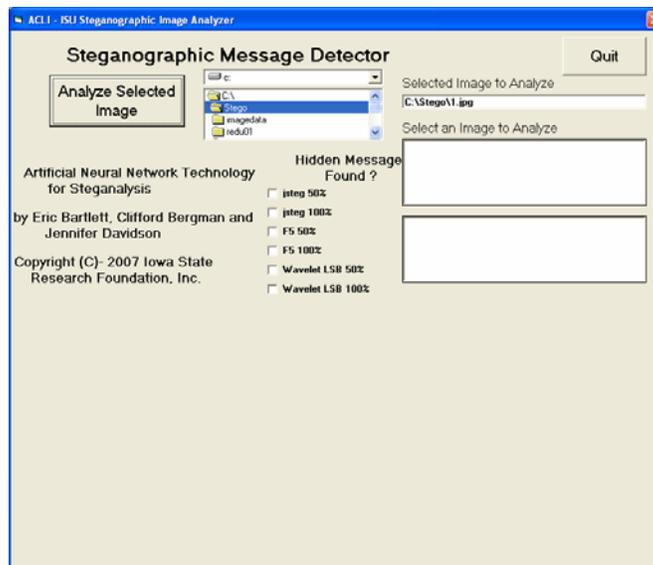
The next step is to select a single image to analyze. The folder in which the image is located must be known before proceeding.

1. First, select the drive that the image is on by selecting the correct drive on your computer using the pull-down menu located at the middle-top of the ANNTS window. In the screen shot below, the drive C: was chosen.
2. Then, double-click on the drive label, which is at the top of the second menu. This lists the current directories on your computer on that drive, and gets rid of the default directory C:\Stego.
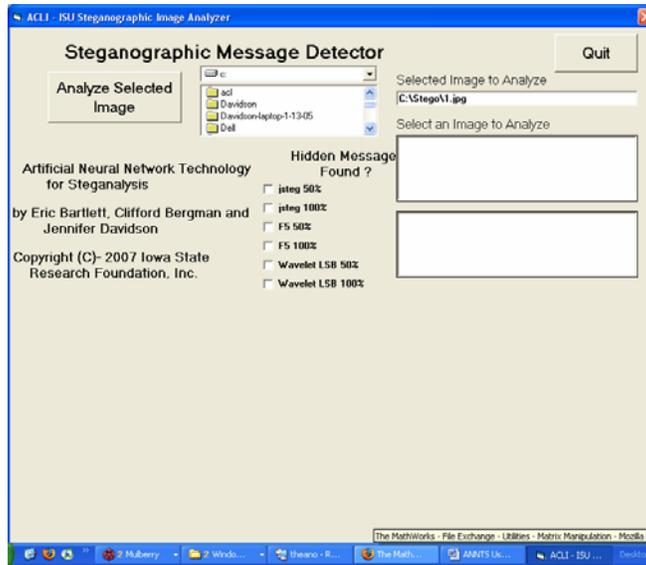

3. You can then select the path to your image of interest by double-clicking on successive folders until you see your image listed in one of the two boxes on the right-hand side of the ANNTS window. If no image names appear in the boxes, then that directory contains no images of the appropriate type that ANNTS can analyze. The top box contains jpeg-formatted images (type .jpg), and the lower box contains bitmap images (type .bmp). In this example of the screen shot shown below, the directory C:\Davidson\Image Data was selected.

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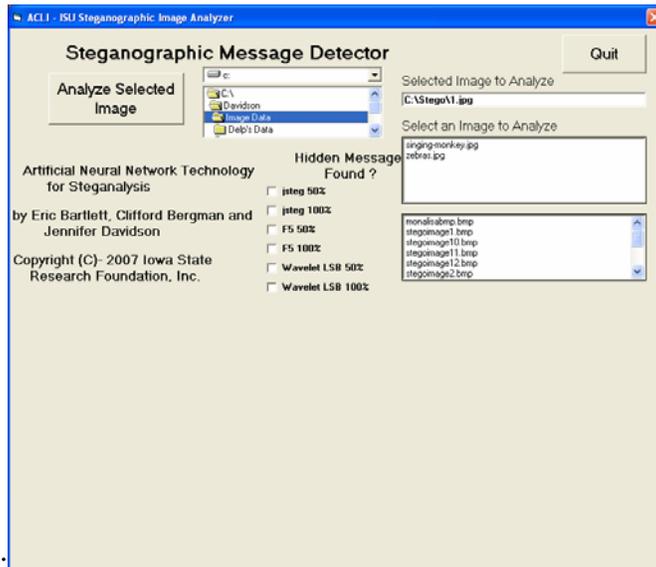
4. When the image name appears in the box, click once to bring that image name into the box labeled "Selected Image to Analyze." In this example, the image "singing-monkey.jpg" was selected.
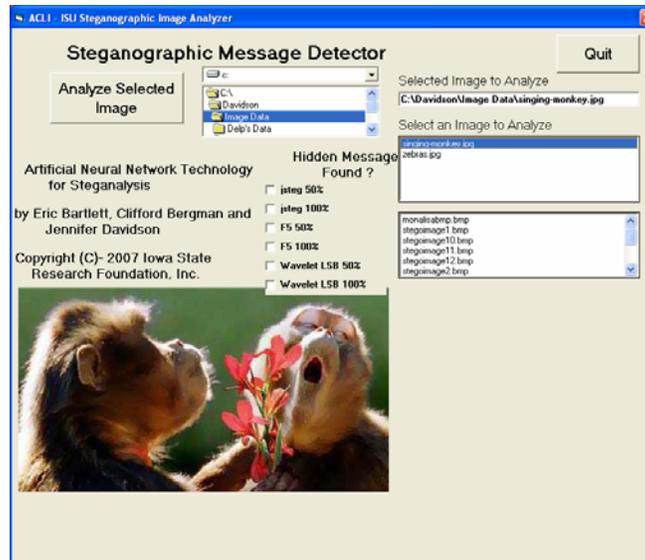
5. Once the image name is listed correctly under "Selected Image to Analyze," then click on the box labeled "Analyze Selected Image" (located on the left side of the ANNTS window).
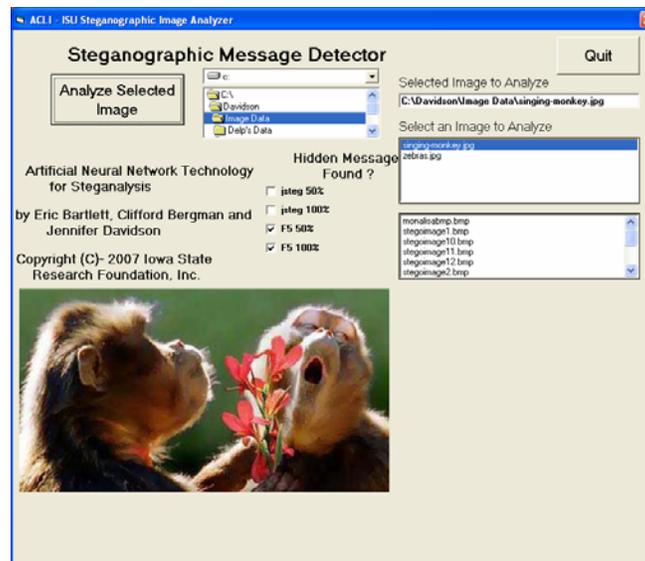
Results of the analysis. When the program is finished analyzing the image data and classifying it, one or more of the six classification boxes will be displayed in the center of the ANNTS window. If the suspicious image was a .jpg type, then there will be only four possible outcomes: jsteg 50%, jsteg 100%, F5 50% or F5 100%. If the suspicious image was of type .bmp, then there are only two possible outcomes: wavelet LSB 50%, or wavelet LSB 100%. Any boxes that are checked means that the ANNTS software suspects that the image contains data hidden with the corresponding embedding algorithm listed besides the checked box. In this example, both the boxes for F5 have been checked.

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Notes.
1. The first time that "Analyze Selected Image" is selected after the ANNTS window is run, the program must load up the C library of code to run the feature selection on the image data. It may take several minutes or more (depending on your computer's memory configuration) to analyze the first image. Subsequent analysis of images will not typically take as long, providing the window remains open during these analyses. Also, very large image data can take long to run (several minutes).
2. To analyze more than one image, go through steps 1 through 5 as described above to analyze the first image. Then, for subsequent images, **without restarting the ANNTS window**, simply click on a different image name (or change directories and choose another image in a different directory) so that its name appears in the dialog box "Selected Image to Analyze."
3. It is possible that two boxes can be checked, such as F5 50% and F5 100%.
4. If a box is checked, the ANNTS software has determined that the suspicious image meets the criterion for that embedding algorithm. However, it does not mean that the suspicious image is **guaranteed** to have hidden information in it, just a high likelihood.

Appendix

For further reference and details, please consult the following two publications.
1. Bergman, C. and Davidson, J. An Artificial Neural Network for Wavelet Steganalysis, final report, Midwest Forensics Resource Center, January, 2007.
2. Davidson, J., Bergman, C., and Bartlett, E. An artificial neural network for wavelet steganalysis, Proceedings of SPIE - The International Society for Optical Engineering, vol. 5916, Mathematical Methods in Pattern and Image Analysis, 2005, pp. 1-10.