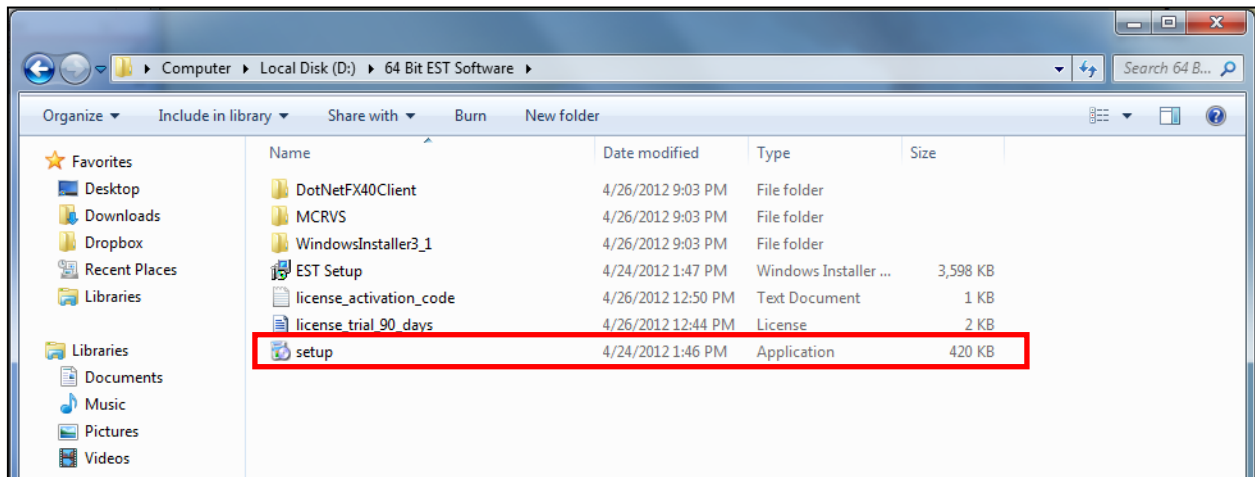


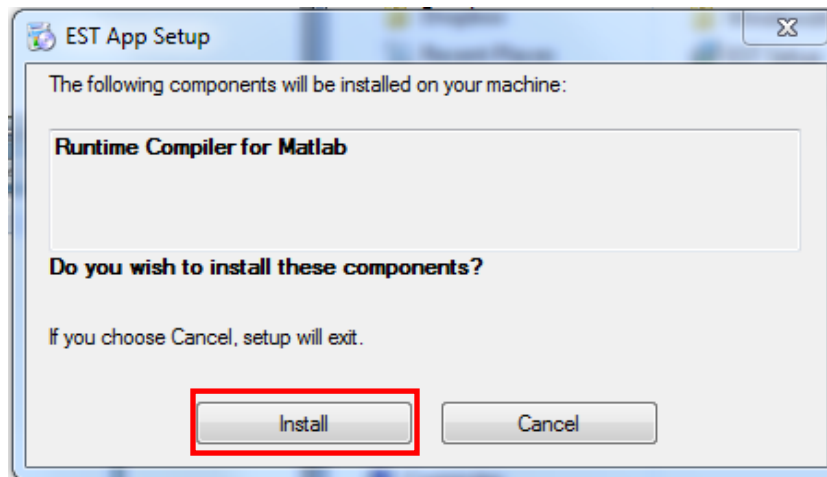
# Tutorials for the User-Friendly EST Software

## Installing the Program

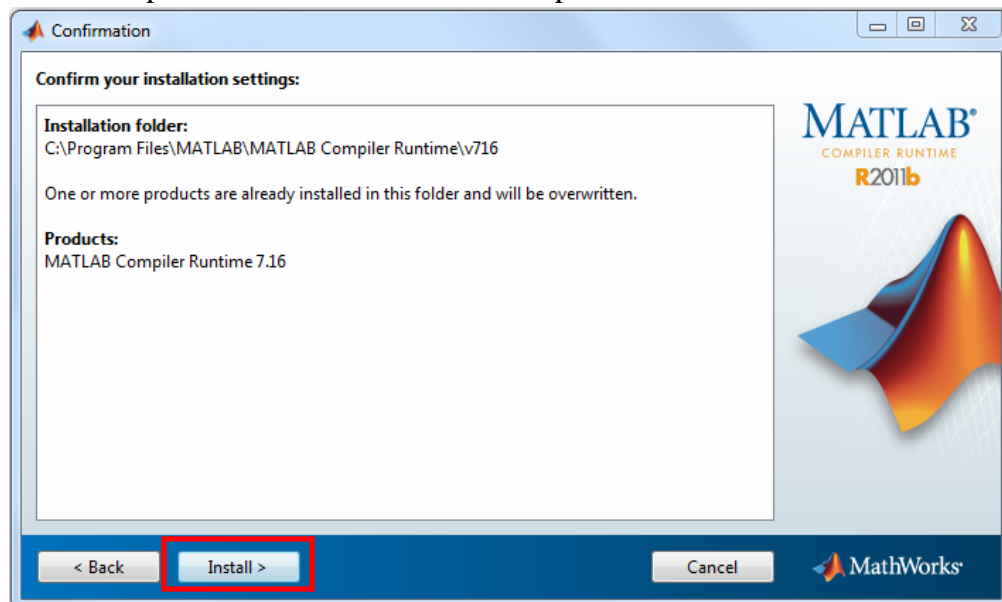
- 1) To begin installation, run the setup.exe file.



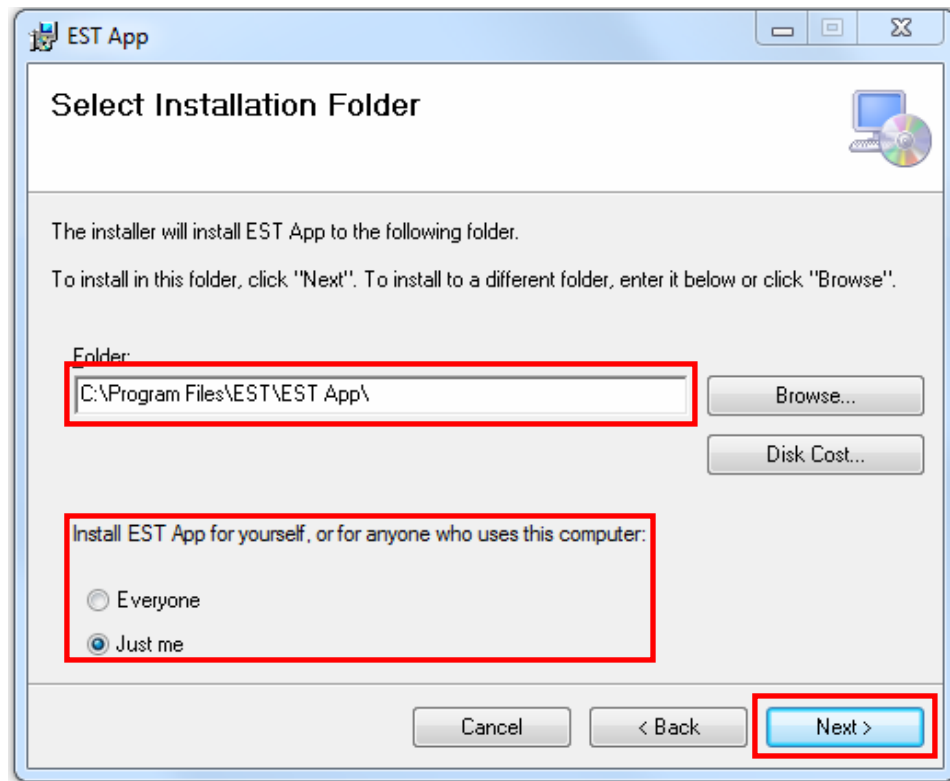
- 2) Agree to install the “Runtime Compiler for Matlab” as it is essential to running the program if you do not have Matlab



- 3) If prompted by Windows to allow the installer to run, click yes. Allow the installer to load and then proceed to install Runtime Compiler for Matlab

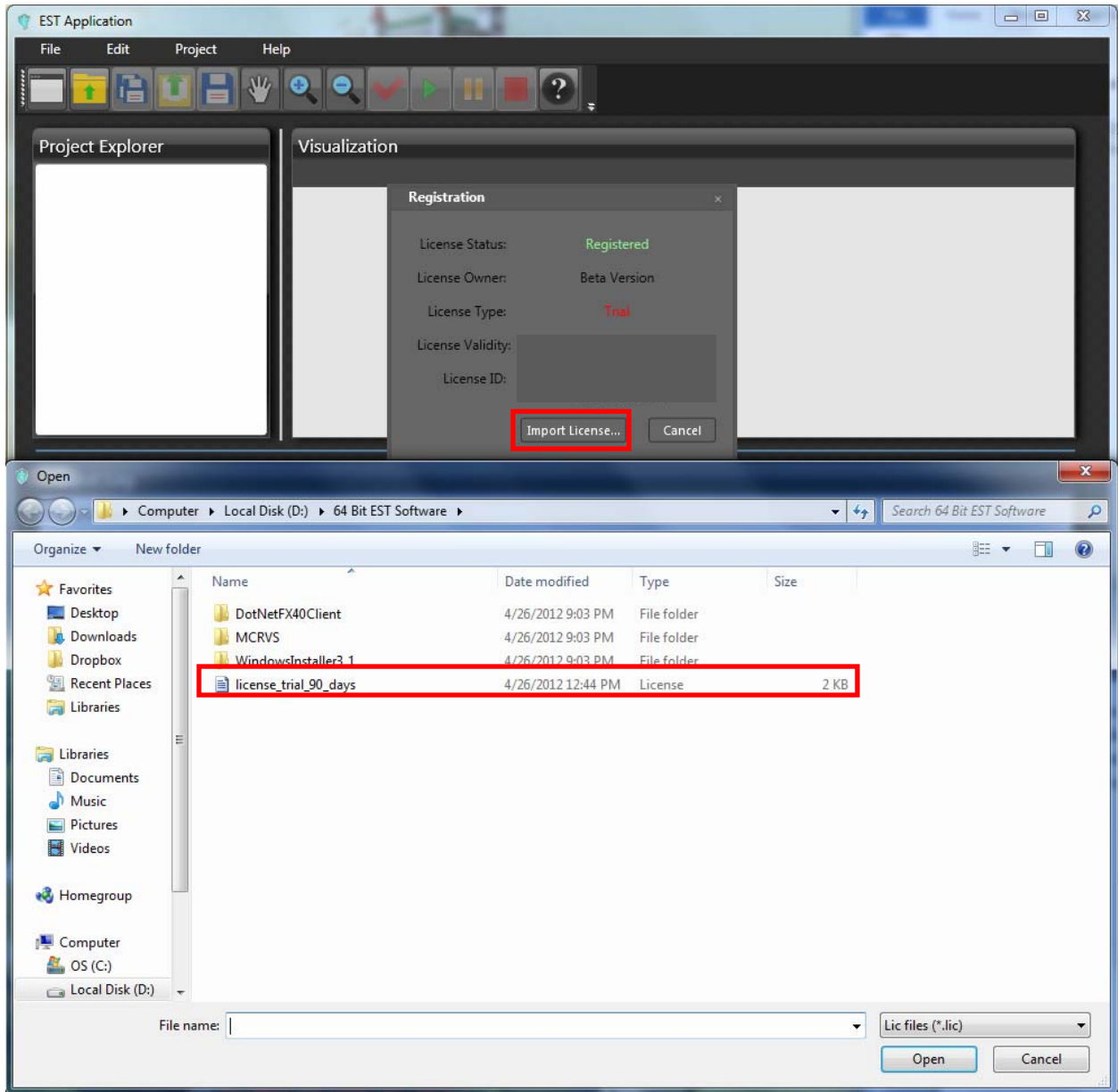


- 4) Once installation is complete for the Runtime Compiler for Matlab, the EST Application will begin installation. Proceed to choose the folder you would like to install it in and the permission options. Once you are finished, proceed to install the application by clicking next.

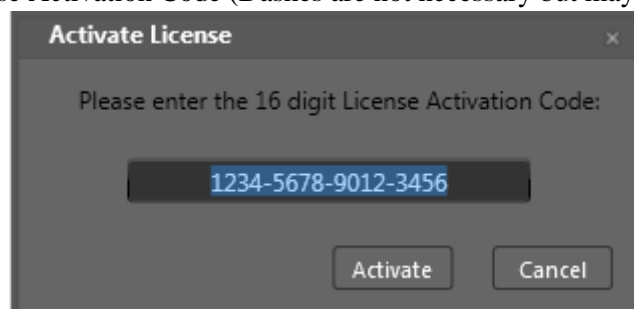


## Running for the First Time and Reconstructing a Sample Data Set

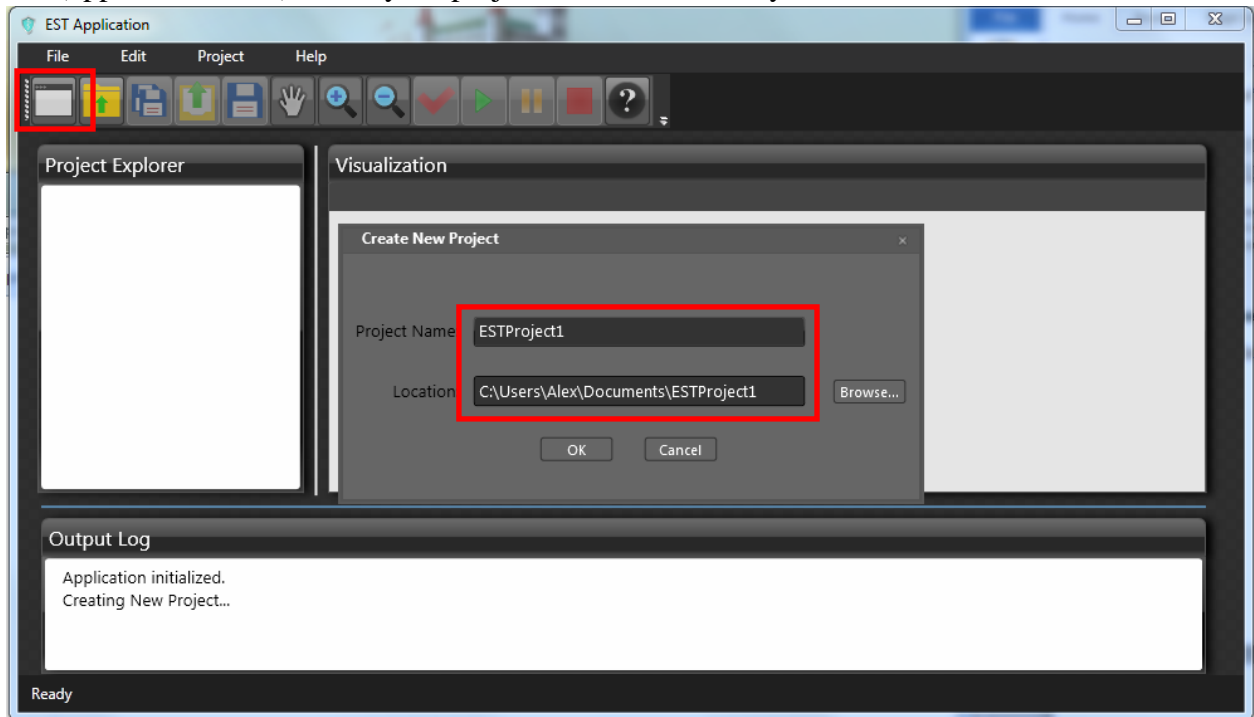
- 1) In the location where you installed the application, find and run ESTApp.exe or use the shortcut in your start menu or desktop. Allow the application to load (it may take a moment). If prompted for a license, click import license and choose the location of your license.



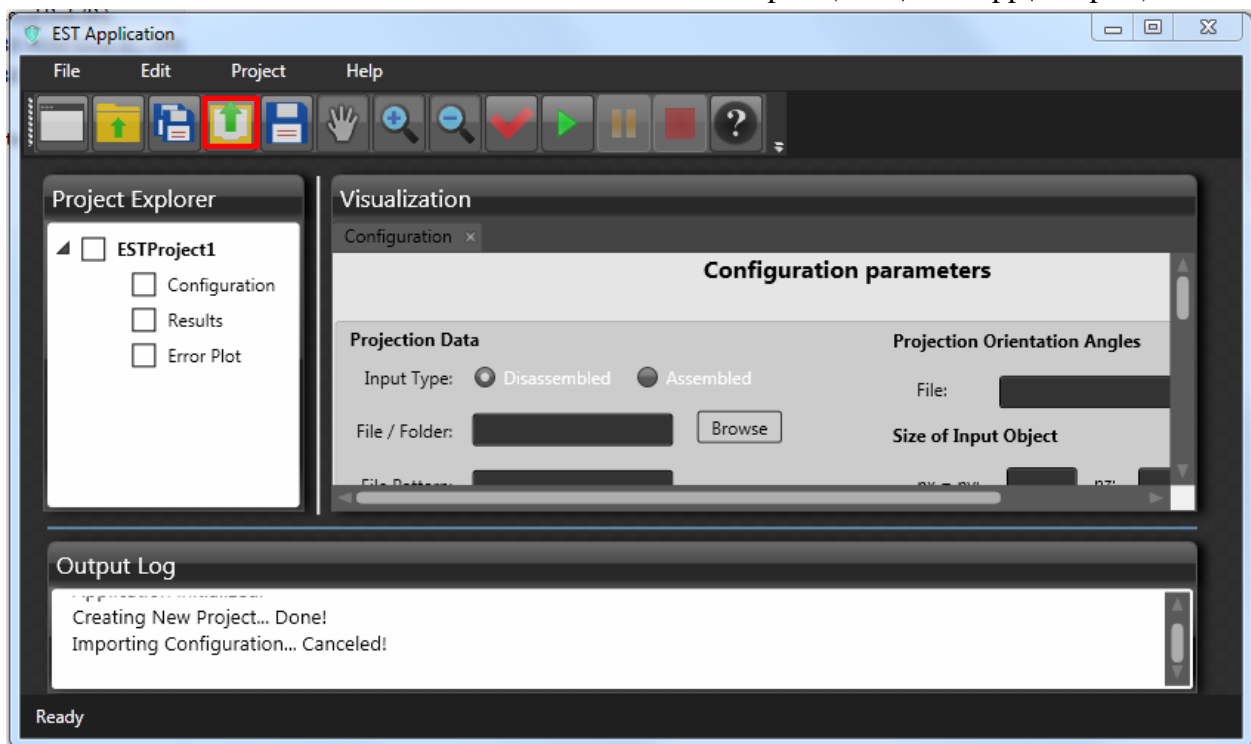
- 2) Enter your License Activation Code (Dashes are not necessary but may be entered).



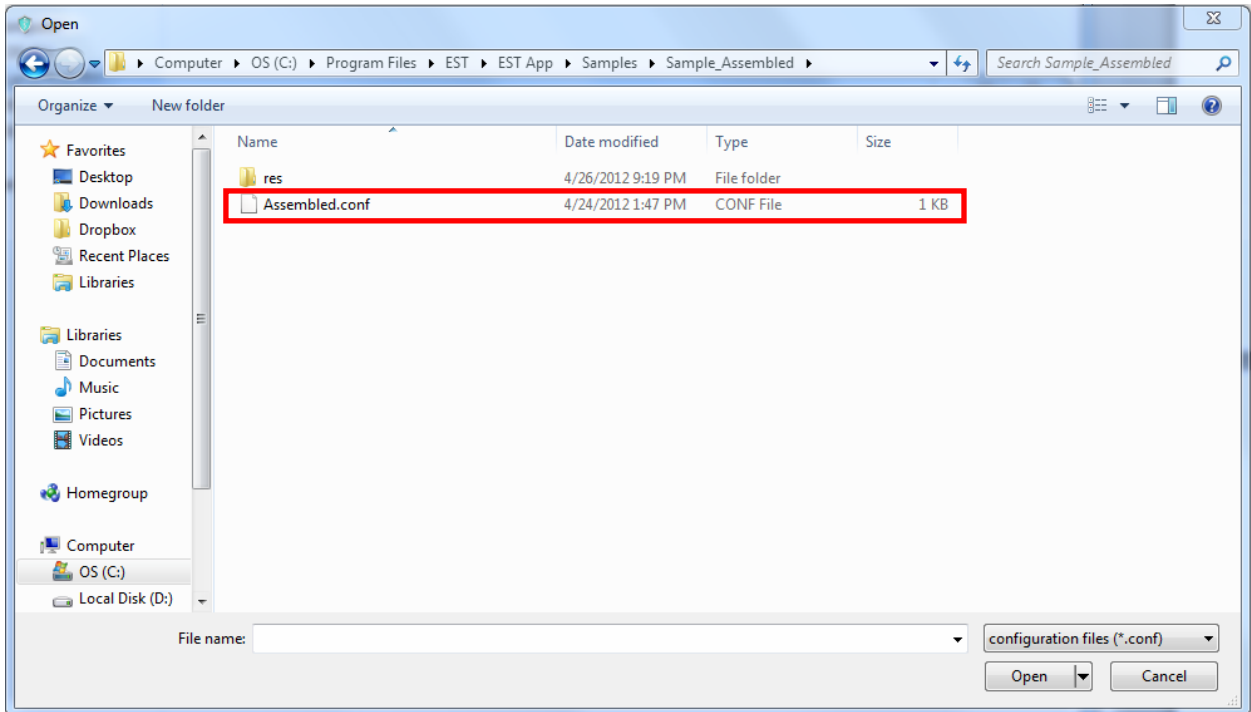
- 3) The EST Application comes with two sample data sets – one with the projections already assembled and the other with them disassembled. You will have the option later in the tutorial to select which of the two you would like to run. Click the New Project icon (upper left corner), name your project and select where you would like to save it.



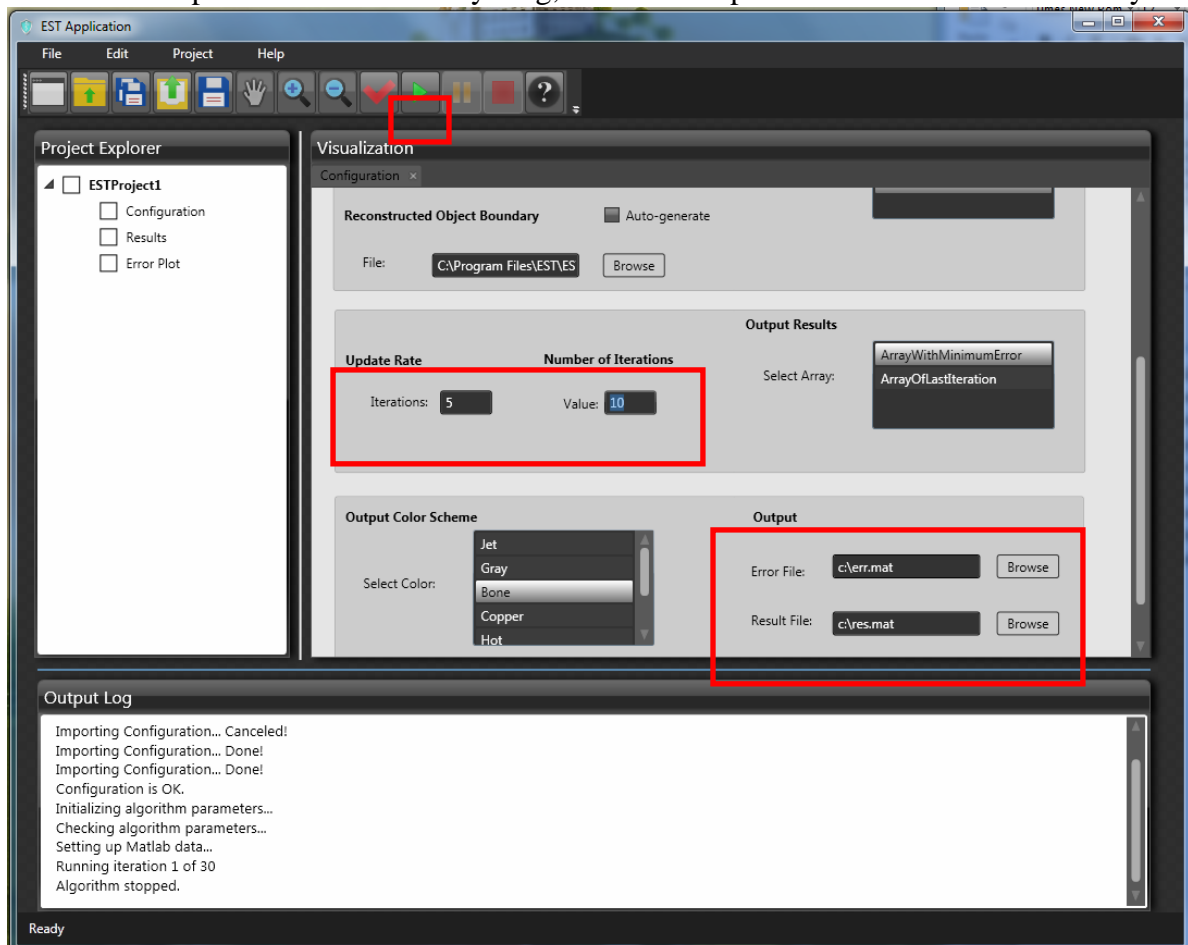
- 4) Once you have selected this click OK and continue to press the import configuration button which is the fourth from the left as shown in the image. The ESTApp should automatically open the folder with the two sample data sets, however if not, it will be stored in the installation folder in a folder named samples (EST\EST App\Samples).



Choose the Sample\_Assembled folder or the Sample\_Disassembled folder (depending on if you want an example of a reconstruction where the projections are already assembled into one file or not) and import the Assembled.conf, or Dissassembled.conf respectively.

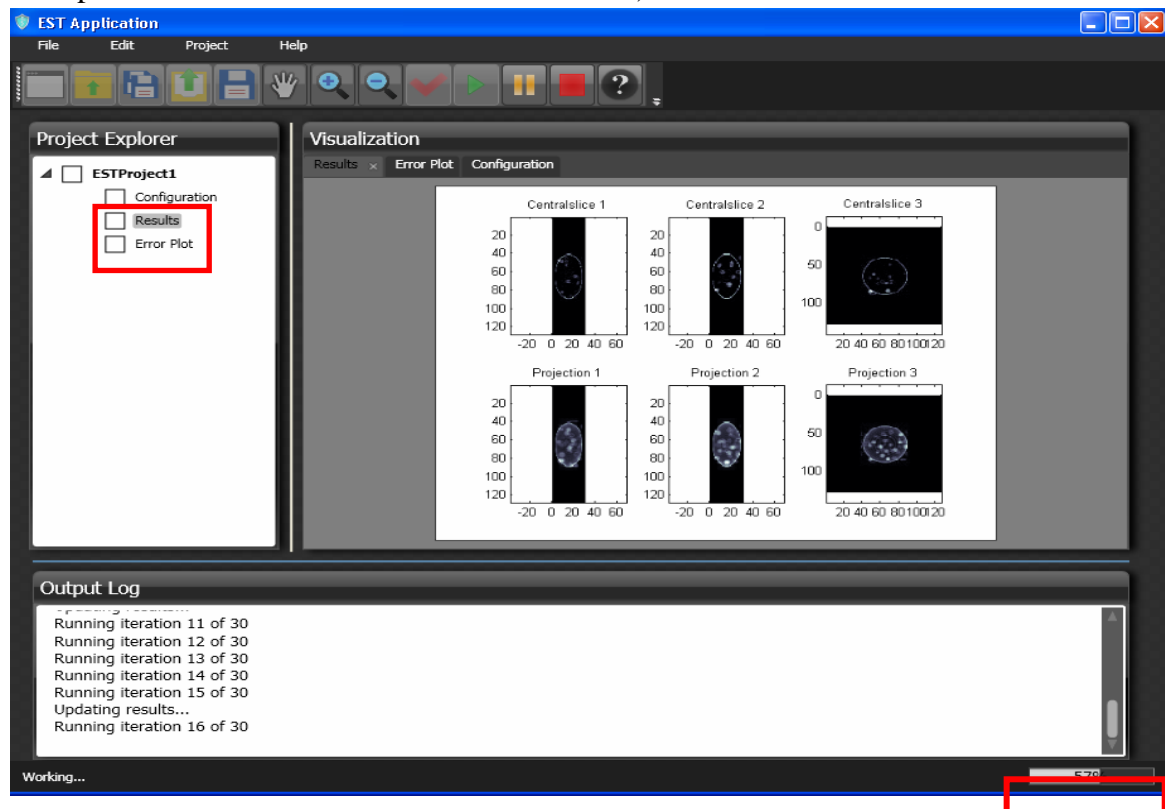


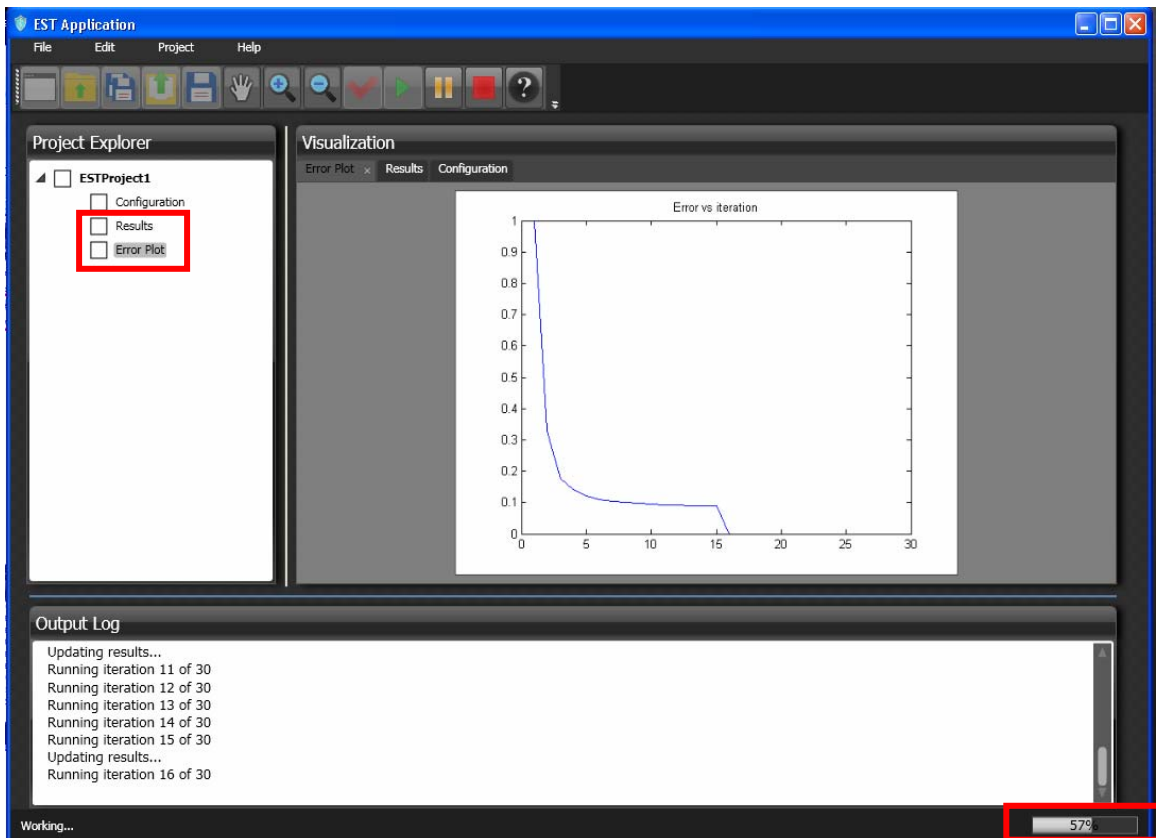
- 5) Allow the configuration to replace the current one and then observe the fields which have been filled in. You may want to alter the number of iterations (if you do not want to wait for this sample reconstruction very long, however keep in mind it must be divisible by the



update rate). The update rate 5 in the example here decides the user can visualize the reconstruction results every 5 iterations. Also Output fields for the Error File and the Result File can be changed to a location where you would like this sample run's results to be stored (note that the default may not work for computer).

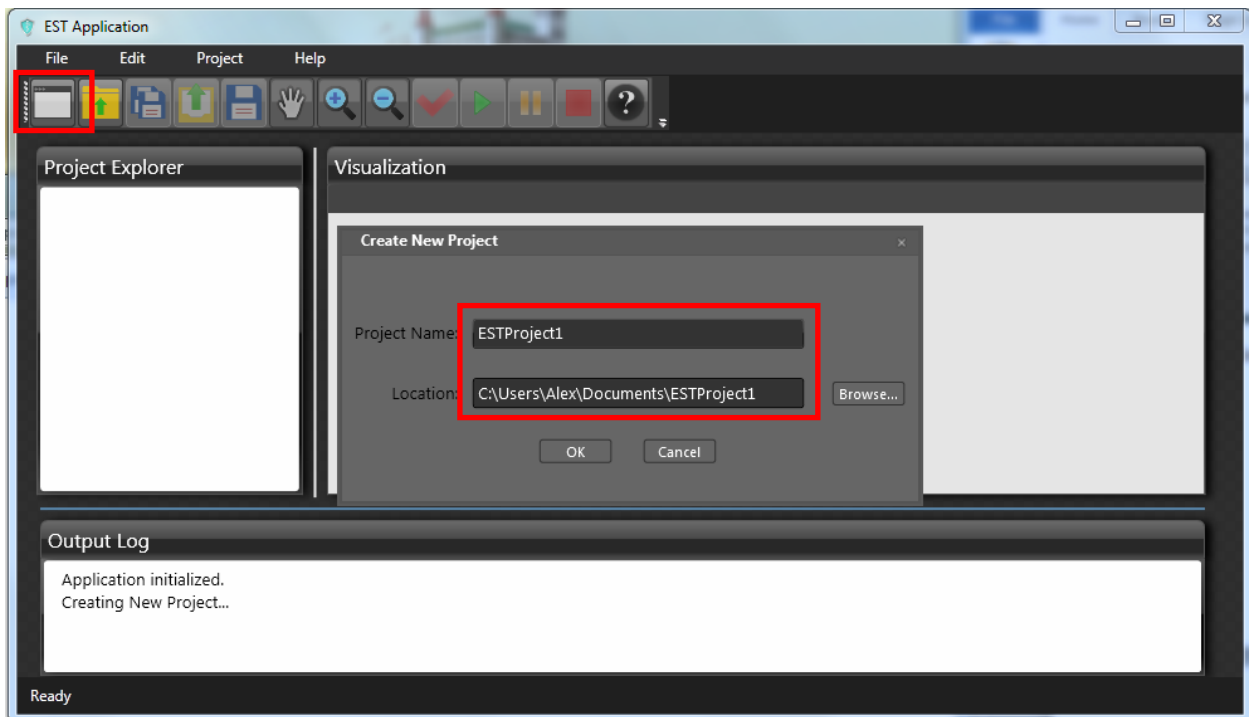
- 6) When finished, hit the green arrow (the fourth option from the right in the top icons) and allow the application to process the reconstruction. And on the bottom right corner, the bar shows the percentage of the completion of the whole reconstruction. The user may also observe the progress in the Output Log box. If at any time you would like to interrupt the process, hit the red square (for stop) icon at in the upper icons, two to the right of the play icon, or you can pause the process by click the pause button and continue the process later
- 7) As the process runs, you may double click in the left side menu Results or Error Plot to see an update of each (note that if the process has not reached a multiple of the update value you entered in iterations, this will still be blank). The user can zoom-in or zoom-out the results by clicking the zoom-in/out buttons in the top icons. Once the Output Log has shown "Algorithm stopped", the process has completed and you may observe the results in the same way (left side menu, double click results for the reconstruction or error plot for a plot of the error versus the iteration number).



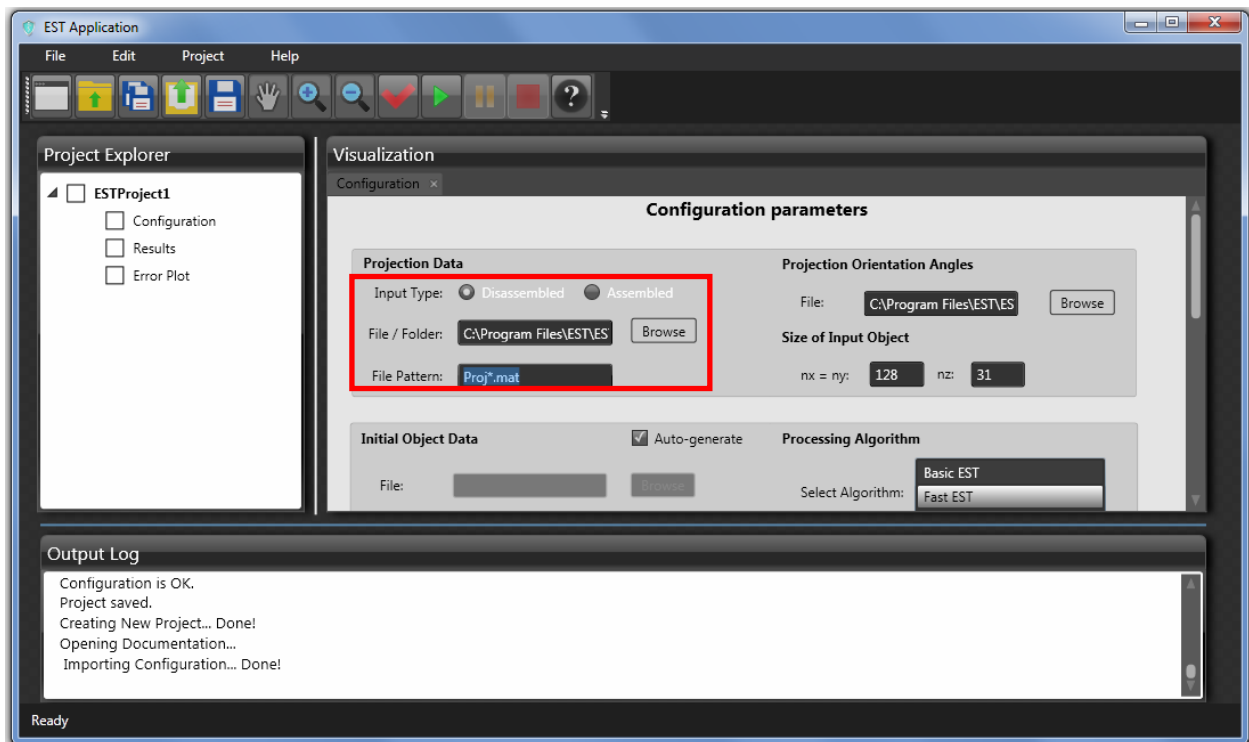


## Reconstructing Your Own Data Set

- 1) As in the reconstruction of the sample data set, you will want to begin by clicking the upper left icon to create a new project (unless you have already started one and want to continue in which case you can open it with the second icon).



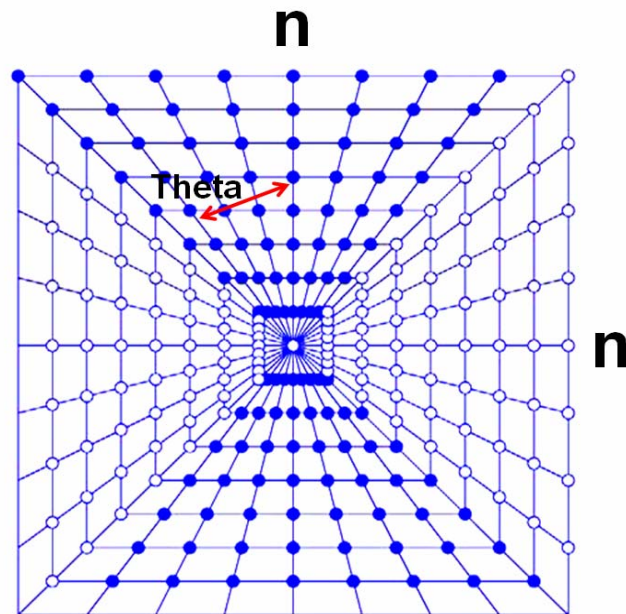
- 2) You will now need to setup the configuration with your own data set and settings. Begin by selecting the file/folder with your projections.
  - a. If you have a disassembled set of projections, click disassembled and select the folder containing them. Next you must fill in the “File Pattern” with the format



under which each projection is saved with a \* for the varying numbers (ex: your projections are Proj1.mat, Proj2.mat, Proj3.mat..., you will enter Proj\*.mat). For the disassembled option, the input projections need to be in the format of \*.mat or image like \*.tif.

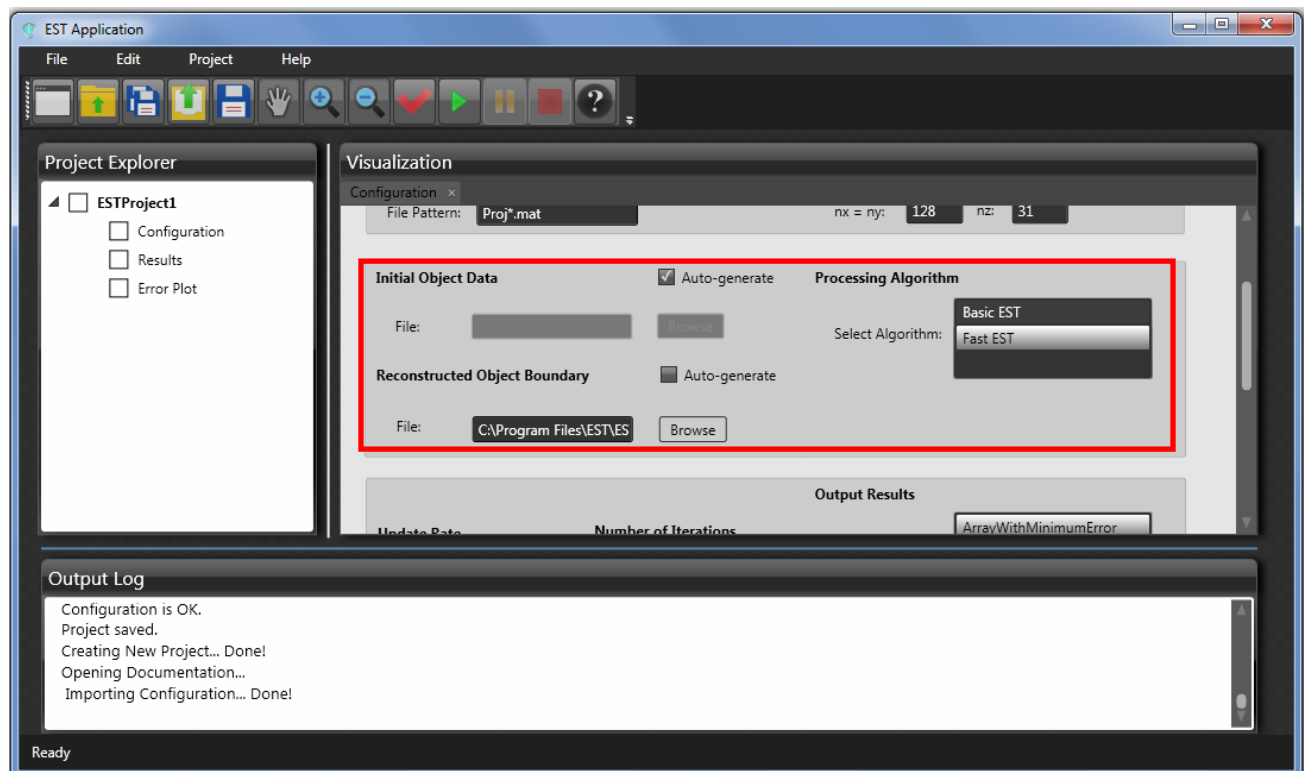
- b. If you have your projections assembled into one file, select assembled and choose the file in which they are stored. For the assemble case, the input projection needs to be \*.mat format.
- 3) To the right select your file with the projection angles of orientation. It should be noticed that the input angles should be  $-90 < \text{Theta} \leq 90$  and should follows the equally sloped angels. The input angles needs to be \*.mat or \*.txt format. If the experiment is in equally-angled acquisition, interpolation or approximation needs to be performed on the original data set to follow the equally-sloped acquisition.
- 4) Below that, enter the size of your reconstruction ( $n_x=n_y=n$  is the size of reconstructed image in the left field and  $n_z$  is the size of the data along the rotation axis in the right as specified by the program. For the Pseudopolar grid configuration, the slope increment is  $2/n$ ).





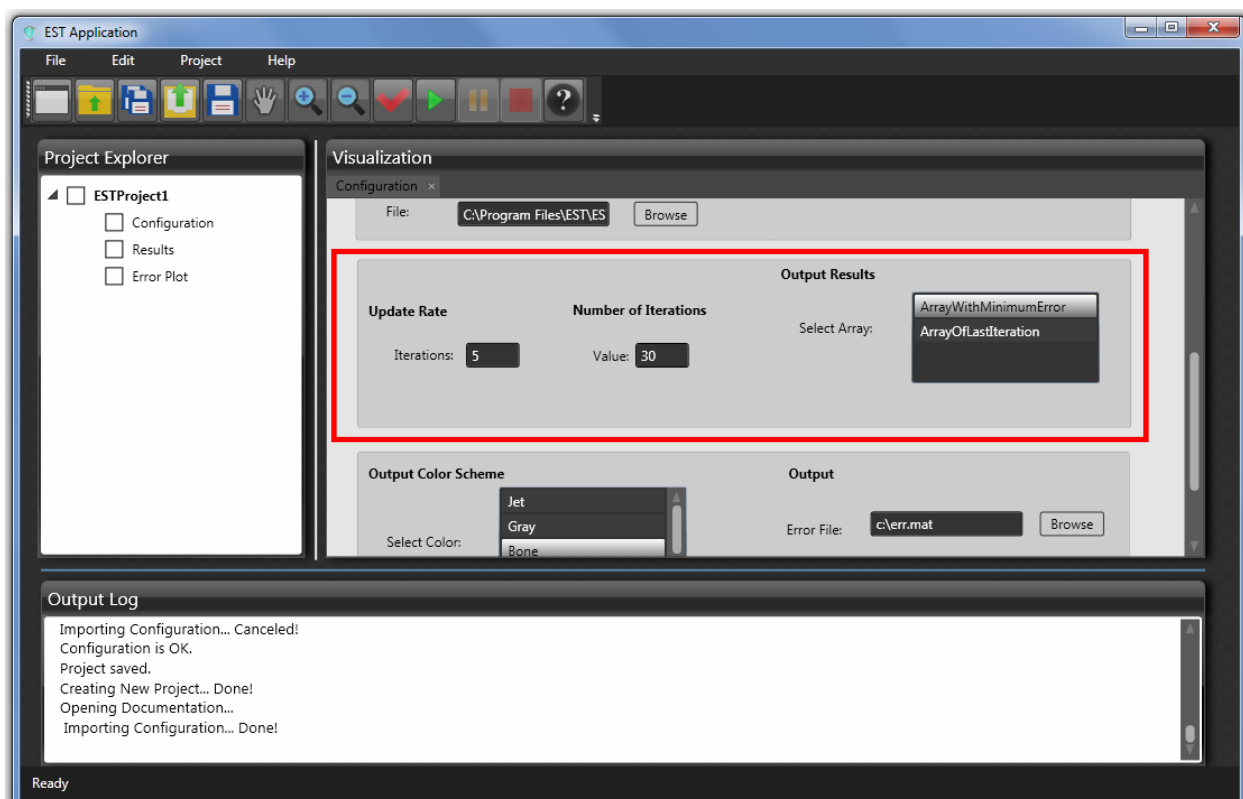
5) In the next darker shaded area, you have the option of whether or not to enter your own Initial Object Data or to Auto-generate it. The auto-generated initial object is an all zero matrix with size  $n_x \times n_y \times n_z$ . Otherwise the user can select his/her own initial object file location.

6) Another option is the reconstruction “support” in the EST algorithm. The user can choose



to either upload his/her own support in the “Reconstructed Object Boundary” field or generate a  $n_x \times n_y \times n_z$  all ones matrix by ticking the “Auto-generate” option.

- 7) To the right, you have the option of whether you want a basic (slow) EST reconstruction or a Fast one. Select the desired option. The basic EST reconstruction uses original iteration process and converges slower while the fast one utilize gradient decent method and converge faster.
- 8) In the next shaded region, in the first field, you choose after how many iterations you would like to see an update (if you are doing a very long reconstruction this may be very useful). The second field is the total number of iterations you would like to perform in your reconstruction. Note that the total number of iterations must be an integer multiple of the update rate for the application to run.



- 9) In the final shaded region user can choose the Output Color Scheme for the visualization purpose. To the right the user need to choose where to save the output reconstructed data as well as the error file. Note that if these paths are invalid the application will provide an error after the reconstructions is completed.

