Instructions on data processing and analysis MATLAB scripts

There are 3 scripts that can be used to automate the data crunching and analysis. In addition to these 3 scripts, there is a 4th script that is a *function* script Which does not *need* to be opened. However, it *MUST* be in the same folder as the 3 other scripts. It will be discussed in further detail later.

These scripts prove helpful when dealing with a large number of files. They are user friendly input in the script itself, but rather generate dialog boxes for user input. Once they are loaded into MATLAB simply hit the run button at the top as seen below:

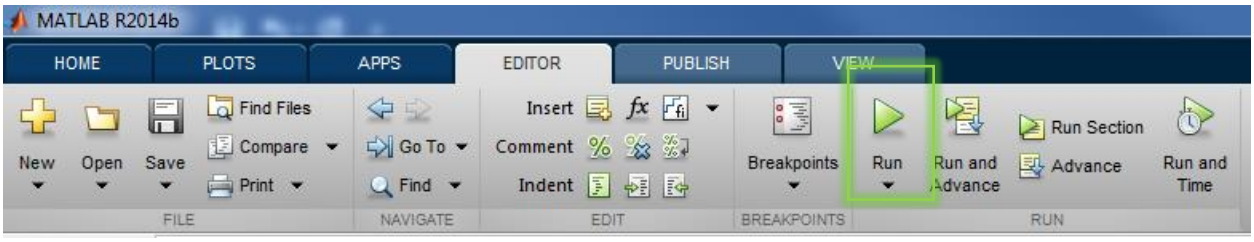

Figure 1: Run button under the EDITOR tab in MATLAB

The four scripts are called:

Analysis_Script.m
Data_Processing_Script.m
Large_Data_Processing_Script.m
letters.m

Data_Processing_Script

This script is meant to process the raw data and give you parameters such as the amplitude, unwrapped phase, group delay, and more for the S21 and S11 signals (just to name a few!). This script makes individual excel(.xlsx) files for each s2p files and also generates one large summary excel(.xlsx) file with N (number of s2p) tab or sheet at the bottom for each s2p file. It currently has a limit of processing 4000 files. This limit can be adjusted by changing the Array1 vector as seen in figure 2.

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81
82 -    Array1 = 1:4000;
83 -    newLabels = letters(Array1);
84
```

Figure 2: Column index limit.

This limit is meant (and the newLabels vector above) for creating the letter column index in excel. For example, 'A' corresponds to column 1, 'AE' corresponds to column 31, and 'EWV' corresponds to column 4,000. Excel does have a column limit of 16,384. Therefore, this script can theoretically only process a maximum of 16,384 (s2p) files. This script however should only be used to process less than ~750 files. Simply because as the summary file gets

"too large", the time it takes to open it, add another sheet of data, and close it begins to exponentially increase.

The script will begin by generating a dialog box for the user to input the folder address where the raw s2p files that the user wants to process are. As seen in figure 5. The second dialog box will appear asking the user to name their summary file. As see in figure 3. There is no need to include ".xlsx" in the name.

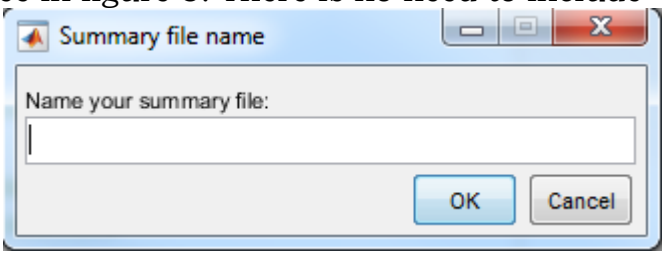

Figure 3: Name the summary dialog box.

Large_Data_Processing_Script.m

This script produces the same crunched parameters, individual .xlsx files and summary folder(s) as the *Analysis_Script.m.* However, this processing script is meant for processing a large number of files. The difference is that this code will ask the user how many files they would like per summary folder and then determine how many summary folders to make based of the amount there is to process. For example. If there are 3,828 s2p files to process. The following dialog box will appear:

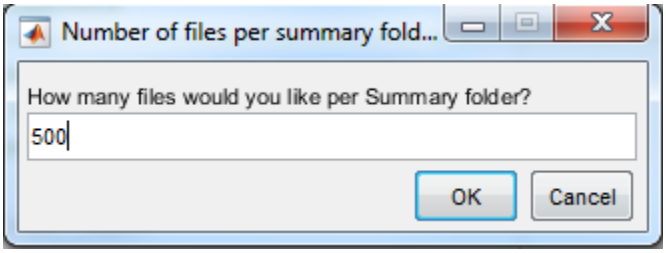

Figure 4: Dialog box for the number of files per summary folder

If the user selects 500 files(sheets/tabs) per summary folder, MATLAB will create 7 summary folders with 500 files in each* folder and the remaining 328 files in the last summary folder (folder 7). In order for this algorithm to work, there must be more files to process than there are selected files per summary folder.

Analysis_Script.m

This script is meant to aid the analysis of the data. It will allow the user to select the desired parameters you would like to look at and at what frequencies. It will then transpose the data into an .xlsx file where it will be ready for the user to copy and paste into another plotting program. Once you run the script, a dialog box will ask you to enter the address of the summary folder of which you would like to pull from. An example of this process is seen in figure 5.

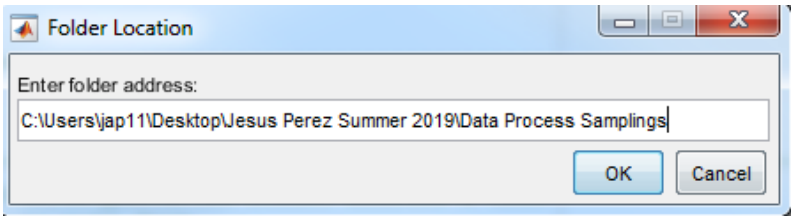

Figure 5: Dialog box for the user to enter folder address.

MATALB will then open the folder address and the user can select ONE summary sheet to pull from. As seen in figure 6.

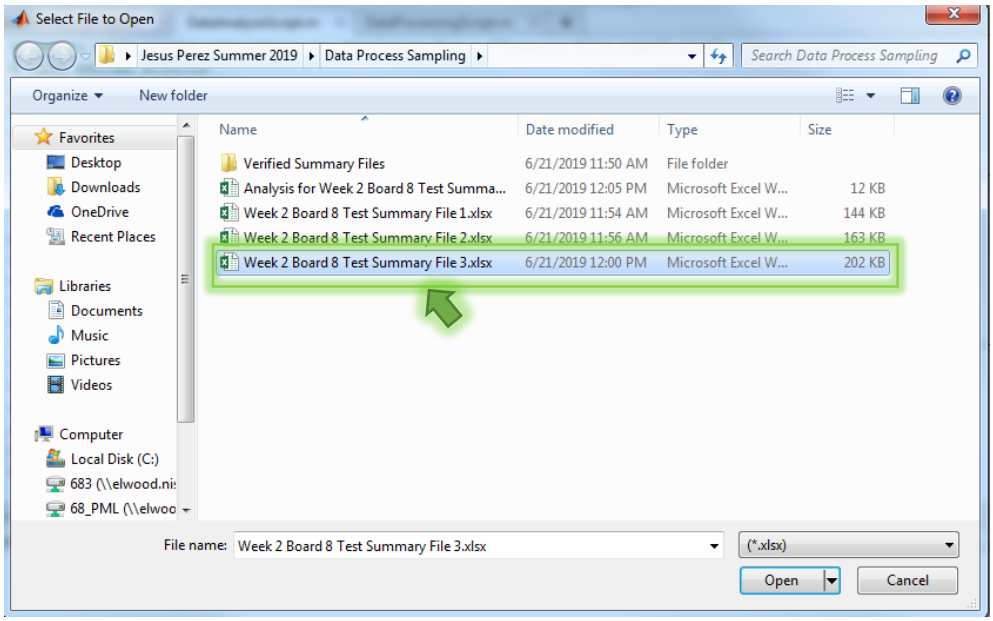

Figure 6: Window prompted by MATLAB to select a summary folder.

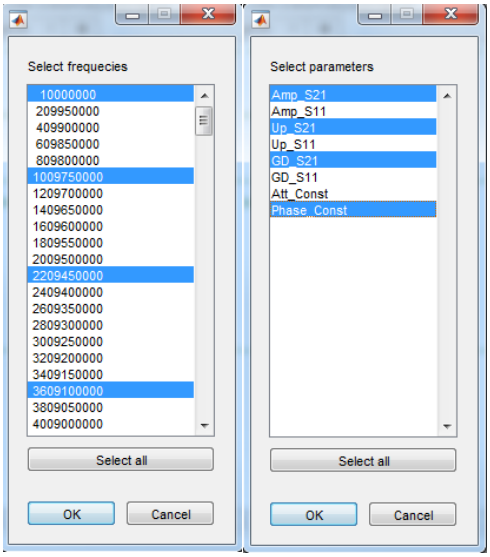

Figure 7: List boxes generated by MATLAB to allow the user to select the parameters they'd like to work with(right) and the frequencies they like see them at (left).

Once the user selects the summary file they would like to pull from, MATLAB will generate lists of the parameters the user would like to work with and at what frequencies they would like to see them at. As seen in figure 5.

letters.m

This MATLAB script is a *function*. It converts numbers to its corresponding letter representation in excels column indexing. For example, A' corresponds to column 1, 'AE' corresponds to column 31, and 'EWV' corresponds to column 4,000. This script does NOT need to be opened. It MUST simply be in the same folder/location as the data processing scripts listed above. The analysis script does not utilize the letters function.

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These codes have been made available @ https://github.com/perez244/Batch-data-processing