User Manual

For python executable "Persistency Tool **1 Variable with Plot**"

Background: The goal of this tool is to output a time series plot of a chosen variable over time and an excel table of the monthly and yearly persistency values based on an inputted weather window and boundary limit. This script can handle any CVS file that has the first column dedicated to a date/time range. This is important because the header of the date/time column will be used by the code as the index to organize the rest of the data.

Persistency: In this program, persistency is defined as the valid percentage of occurrences where the chosen variable is constantly less than (or greater than) and equal to the specified limit during a period equal to or longer than the weather window. For the persistency calculation without a weather window, set the weather window to the sampling rate, which is given on the 2nd input window during running of the code. The total persistency over the entire data range will be provided in the GUI output along with in the first line of the persistency table. Persistency can also be analyzed for a certain monthly range, in this case the persistency percentage over all the yearly ranges will be provided, along with the mean persistency for the chosen range.

Overlapping and Non-overlapping weather windows: For an overlapping weather window, the code will do a rolling calculation in the script, where the weather window will be analyzed on the start of every timestep throughout the entire time range. For example, if the timestep of the CSV data is one hour, then the code will test if the weather window will be valid on the start of every hour. For an non-overlapping weather window, the code will begin a new calculation of a weather window, only after the completion of a successful weather window. This is useful if you are investigating one certain task that can only be completed adjacent to each other, with no overlap in working time. If non-overlapping weather window is specified, the total occurrences, mean yearly occurrence, and mean monthly occurrence will be provided.

Persistency Table: The persistency table will provide the user with the persistency percentage for every month within the provided data set. These values will be colored by a heatmap which ranges from the color red equal to zero percent, yellow equal to fifty percent, and green equal to 100 percent. The mean yearly values and monthly values will be provided as well, but without the heatmap. The standard deviation (%) for each month is also provided, along with P-Values of 20, 50, and 80. The user can input their own P-Value ranging from 0 to 100 to be calculated and appended to the table as well. These P-Values are calculated by an inverse of the normal cumulative distribution. For more information on the distribution, read the page for the excel function NORM.INV provided in excel.

Inputs: The inputs are as follows:

1. Column header with the chosen variable to investigate
2. Boundary limit
3. Greater than and equal to or less than and equal to sign
4. Weather window duration

5. Extra P-Value (optional)
6. Start month and end month (optional)

Outputs

1. Persistency figure.html
2. Monthly persistency table.xlsx

Instructions

1. Download Persistency Tool 1 Variable with Plot.exe application from SharePoint folder
2. Click to open executable. Note: It may take 30 seconds or longer for the first output window to open.
3. In the first window, browse for specified csv file that has one column for date/time and then click next.
4. In the second window, choose the column you wish to investigate and enter the boundary limit.
5. Choose to calculate greater than and equal to or less than and equal to the boundary limit
6. Enter a weather window duration in either minutes or hours depending on the displayed sample rate.
7. Choose weather window type to be overlapping or non-overlapping. (Default is overlapping).
8. If desired, enter another P-Value integer besides the given 20, 50, and 80. This is completely optional and does not need to be filled in for the code to run.
9. Choose yes or no to investigate a certain monthly range. If yes, then fill in the start month and end month. The end month will be included in the calculation. Default is no.
10. Click “plot”
11. At the end a final GUI window will appear stating the total persistency and then the monthly mean persistency. The persistency figure will be opened as an html and the monthly_persistency_table will be opened as an excel file. Both of these files will be saved in the same directory as the executable file. Note, if you would like to keep these files it is recommended to rename them as they will be overwritten if the code is ran again.
12. Code is now finished and can be ran again with the same or different variables.

Troubleshooting

- A common error may be that the wrong row is being used for the headers. In this case open the excel sheet and delete any rows before the correct header row.
- Make sure that there is only one row for the headers. If there are more than one, delete the other lines and combine them so that there is only one row for headers
- **The singular date/time column must be in the first row.** This is extremely important otherwise the code will not work
- If there is still a date/time issue, try rearranging the time data so that the day comes first.
- If the table is not be generated correctly in excel, make sure that excel is using a period for the decimal place rather than a comma.
- Smaller files will run quicker, if there are speed issues, try deleting columns that are not needed or try using less years.