WX Automator

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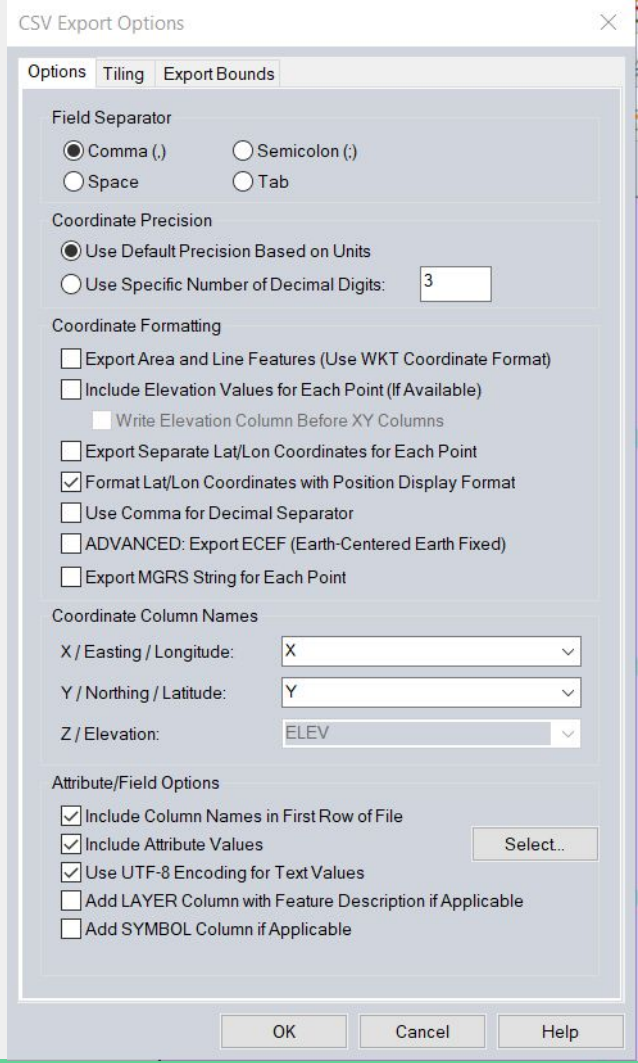
What is WX Automator?

- **WX Automator** is a Python program I wrote to automate the collection of weather data at each utility pole.

- To run WX Automator, you need the following three files:
  - CSV of time points (.dxf file exported to .csv file)
  - CSV of pole points
  - CSV/XLSX of weather data

How do I use WX Automator?

- Time points CSV
  - Open the .dbf file in Global Mapper (probably called export mission.dbf)
  - Export it as a CSV file and make sure your export options match the image (File > Export > Export Vector/Lidar Format > CSV)
  - Must have columns X, Y, and TIME
- Pole points CSV
  - You should be given this, it is just a list of poles in PNEZD format
  - Must have columns Northing and Easting
- Weather data file
  - This is a file containing detailed weather data recorded every minute



Running WX Automator

1. **Run the file.** Open up a terminal, and type python `'path/to/wx_automator_v1.py'`, then hit enter. Read the start menu then press enter to proceed.
2. **Select files.** Once you press enter you will be asked to select the files. First, open your `'time_points.csv'` file then select your `'poles.csv'`.
    - *This may not be the actual file names, make sure you don't have either file open when you run the program.*
3. **Select time range.** Use the sliders and information on the display to select your desired time range to use for the nearest neighbor algorithm.
    - *This can help improve the accuracy by ignoring unnecessary parts of the path.*
4. **Select the weather data file.** Select the file containing your weather data (*.xlsx,*.csv). Make sure the file contains columns: Time, Temp Out, Wind Speed, and Wind Dir
5. **Analyze the output.** Read the final output. Check for error messages. Inspect the three output files and make sure the data appears consistent.

Step 1: Run the file

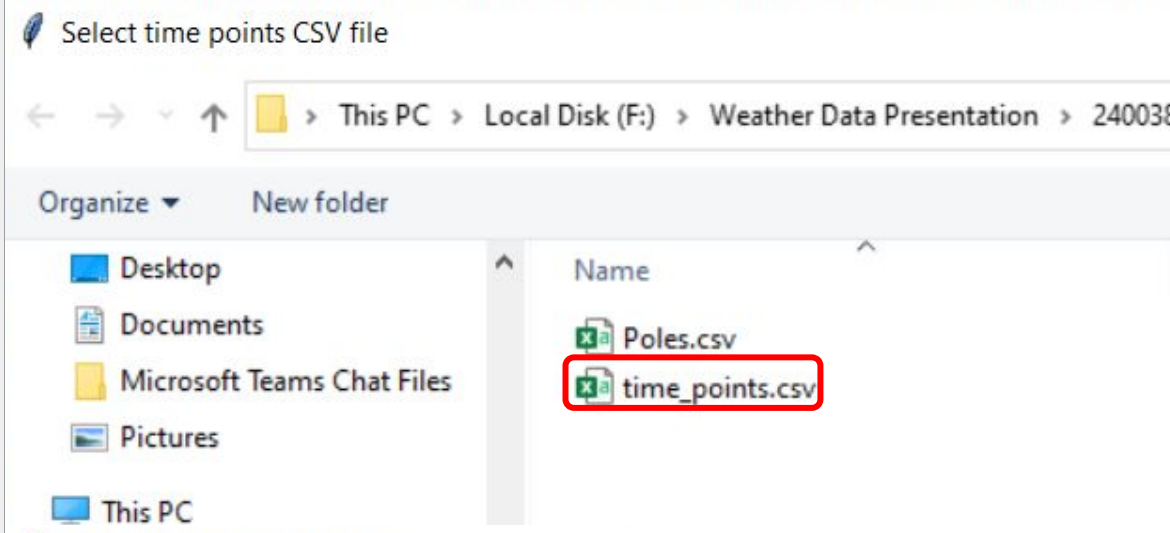
```
> cd "path/to/wx_automator_v1.py"

> python wx_automator_v1.py
```

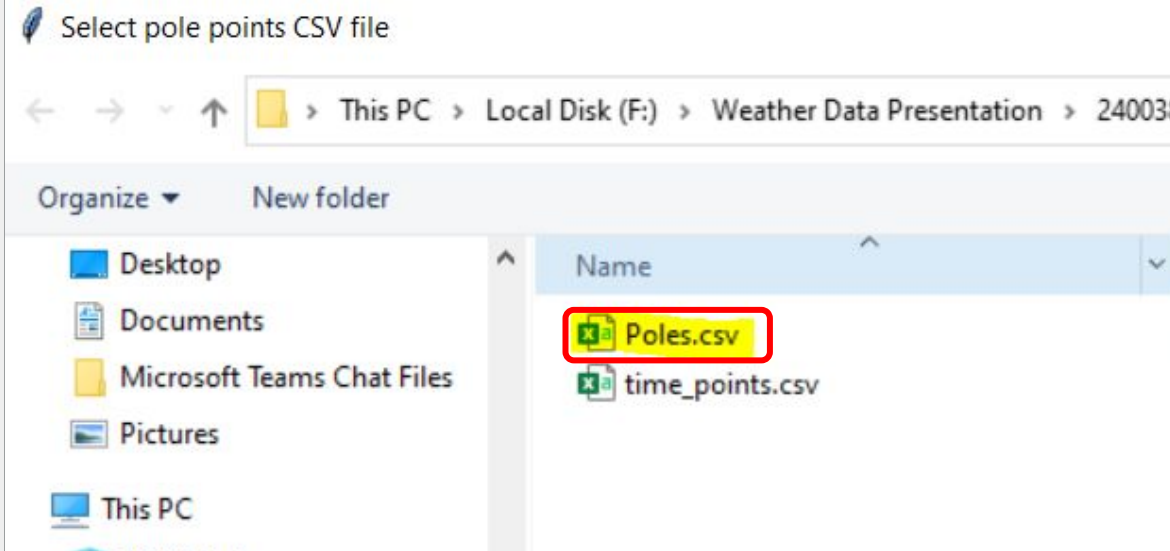
Step 2: Select files

Time points, pole points

1.



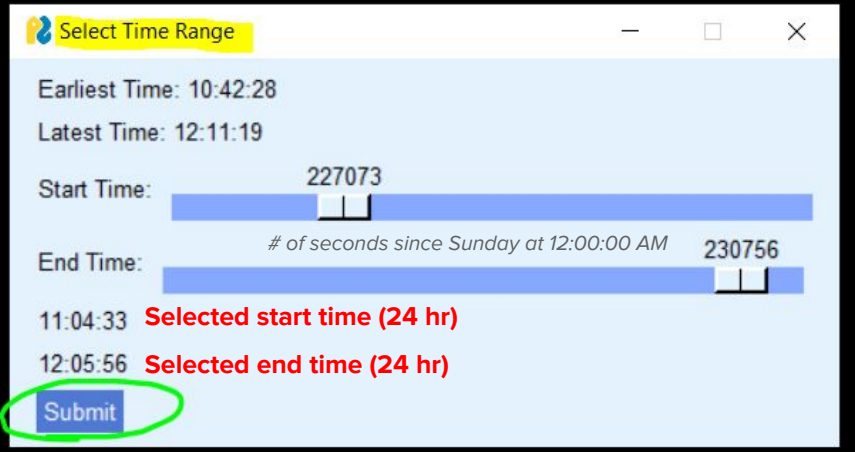
2.



Step 3: Select time range

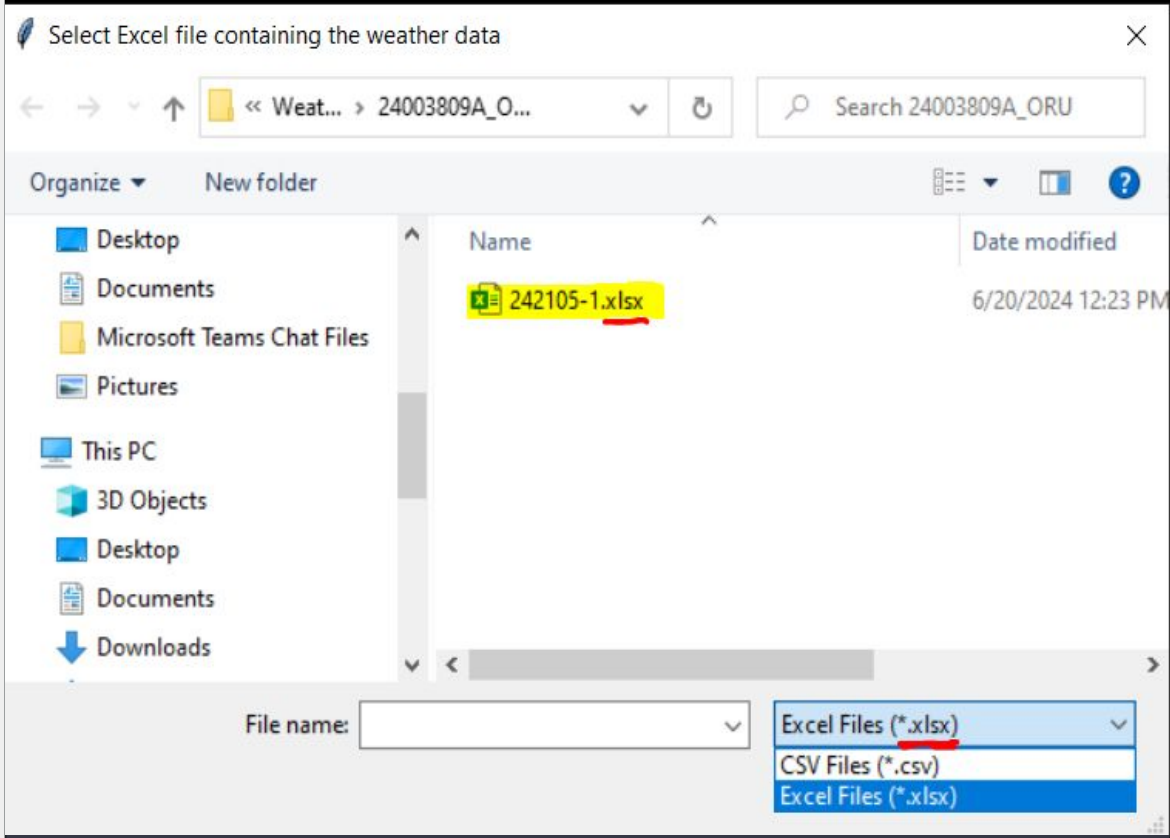
Earliest/Latest = Minimum/Maximum possible time

```
d Poles.csv, columns ['Easting', 'Northing', 'Point Number']
g [134/134]
d time_points.csv, columns ['X', 'Y', 'TIME']
g [50000/1067242]
g [100000/1067242]
g [150000/1067242]
g [200000/1067242]
g [250000/1067242]
g [300000/1067242]
g [350000/1067242]
g [400000/1067242]
g [450000/1067242]
g [500000/1067242]
g [550000/1067242]
g [600000/1067242]
g [650000/1067242]
g [700000/1067242]
g [750000/1067242]
g [800000/1067242]
g [850000/1067242]
g [900000/1067242]
g [950000/1067242]
g [1000000/1067242]
g [1050000/1067242]
g [1067242/1067242]
```



Step 4: Select weather data

Time, Temperature, Wind Speed, and Wind Direction required columns (*.xlsx, *.csv)



Step 5: Analyze output

Check the output files and verify data consistency

```
        Time Out (F)  Speed (mph)  Dir
0    10:12 a     ---          0.0  ---
1    10:13 a     ---          0.0  ---
2    10:14 a    75.2          1.0    W
3    10:15 a    75.3          2.0    S
4    10:16 a    75.5          3.0  SSW
..       ...     ...          ...  ...
121  12:13 p    83.5          2.0   SE
122  12:14 p    83.5          2.0  SSE
123  12:15 p    83.6          4.0  WNW
124  12:16 p    83.6          2.0   SW
125  12:17 p    83.6          2.0    W

[126 rows x 4 columns]
Could not convert string, could not convert string to float: '---', to float, skipping row...

> _____________________________
> ........  COMPLETE  ........
> _____________________________
>
> ....Previewing dataframe....
>
>      point number   northing    easting  elevation       time_x formatted_time   out  speed dir
0          115000  934143.73  576426.71        0.0  11;31;37 AM       11:31 AM  81.5    2.0  SW
1          115001  934164.37  576429.77        0.0  11;31;37 AM       11:31 AM  81.5    2.0  SW
2          115007  933358.90  576316.55        0.0  11;31;29 AM       11:31 AM  81.5    2.0  SW
3          115008  933158.50  576291.69        0.0  11;31;27 AM       11:31 AM  81.5    2.0  SW
4          115009  932965.84  576268.80        0.0  11;31;25 AM       11:31 AM  81.5    2.0  SW
..             ...        ...        ...        ...          ...           ...   ...    ...  ..
120        115121  914689.35  576191.30        0.0  11;51;19 AM       11:51 AM  82.4    2.0  NE
121        115131  914146.24  576450.99        0.0  11;51;12 AM       11:51 AM  82.4    2.0  NE
122        115128  918639.42  573005.50        0.0  11;45;22 AM       11:45 AM  82.0    2.0  NW
123        115129  918595.72  572488.64        0.0  11;45;16 AM       11:45 AM  82.0    2.0  NW
124        115130  918549.00  571946.86        0.0  11;45;09 AM       11:45 AM  82.0    2.0  NW

[125 rows x 9 columns]
>
```

Input File Format

Time points: Header with ***at least*** X, Y, and TIME

	A	B	C	D	E	F	G	H	I	J
1	X	Y	TIME	NORTH_VE	EAST_VEL	DOWN_VEL	ROLL	PITCH	HEADING	ELEVATION
2	600595.6	969116.52	225748.01	2.3098	-2.0347	0.8792	-1.6581	0.1588	143.2147	428.545
3	600595.64	969116.49	225748.01	2.2808	-2.0793	0.8739	-1.652	0.1447	144.5669	428.56
4	600595.32	969115.9	225748.02	2.2411	-2.1267	0.8631	-1.6472	0.1264	146.1066	428.48
5	600595.35	969115.87	225748.02	2.2496	-2.1222	0.8569	-1.6226	0.1142	146.0994	428.494

Pole points: Header with ***at least*** Northing and Easting

	A	B	C	D	E
1	Point Number	Northing	Easting	Point Elevation	Raw Description
2	115000	934160.6997	576311.3581	388.6509	TOP
3	115001	934185.3221	576288.1816	387.2827	TOP
4	115002	934047.8185	576146.5725	406.903	TOP
5	115003	934026.9803	576169.3256	394.246	TOP
6	115004	933883.349	576015.4146	422.2539	TOP

Ideal WX Formatting (eg. 24003809 - ORU)

Weather data (WX): The program is reading columns 1, 2, 7, and 8 by default. These columns **MUST** be Time, Temp Out, Wind Speed, and Wind Direction.

- "Time" column must be named as such (ignores case)
- All other column names do not matter as long as the data is in the aforementioned columns

	0	**1**	**2**	3	4	5	6	**7**	**8**
	A	B	C	D	E	F	G	H	I
1			Temp	Hi	Low	Out	Dew	Wind	Wind
2	Date	Time	Out	Temp	Temp	Hum	Pt.	Speed	Dir
3	10/3/2023	12:04 PM	22	22	22	69	16	0.4	SSE

All acceptable time formats:

- ***H:M** [24 hour]*
- ***H:M:S** [24 hour]*
- ***H:M am/pm***
- ***H:Mam/pm***
- ***H:M:S am/pm***
- ***H:M:Sam/pm***
- ***H:M a/p***
- ***H:Ma/p***

Some more notes:

- Notice the time column format. This is fine, the program will parse it and read it as a time
- Notice the blank/null values in the Temp and Wind Dir columns (---). This is also fine, the program ignores values of the wrong type.

	A	B	C	D	E	F	G	H	I
1	Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9
2			Temp	Hi	Low	Out	Dew	Wind	Wind
3	Date	Time	Out (F)	Temp (F)	Temp (F)	Hum	Pt.	Speed (mph)	Dir
4	05/21/24	10:12 a	---	---	---	---	---	0.0	---
5	05/21/24	10:13 a	---	---	---	---	---	0.0	---
6	05/21/24	10:14 a	75.2	75.2	75.2	---	---	1.0	W
7	05/21/24	10:15 a	75.3	75.3	75.2	67	63.6	2.0	S

Bad WX Formatting (eg. 23012083 - Georgia Power)

- File headers are completely different than expected
- Columns are also not in the correct positions in the Excel file

1	2023040091_Grady_Klondike_WX					
2						
3	From Structure I	From Structure	From Easting	From Northing	To Structure ID	To Structure Number
4	185676	331	2240482.19	1349908.33		
5	10953	102B	2240578.27	1349781.71		
6	227280	102C	2240593.46	1349742.92		
7	10969	102A	2240629.46	1349745.84		
8	10908	102	2240709.23	1349675.37	227280	102C

	0	1	2	3	4	5	6	7	8	
	A	B	C	D	E	F	G	H	I	J
1	2023040091_Grady_Klondike_WX									
2										
3	From Structure I	From Structure	From Easting	From Northing	To Structure ID	To Structure Number	To Easting	To Northing	DATE CST	TIME CST
4	185676	331	2240482.19	1349908.33					9/30/2023	13:05
5	10953	102B	2240578.27	1349781.71					9/30/2023	13:04
6	227280	102C	2240593.46	1349742.92					9/30/2023	13:04

Point Popper

What is point popper?

- **Point popper** is another Python program I wrote to chop down the trajectory data and organize it into a CAD points file
- When you run it, select your full trajectory CSV file then specify the interval at which to take rows
- To run point popper all you need is the CSV file of the trajectory data

Common Issues

WX Automator

- Make sure your poles file has a header with columns Easting, Northing, and Point Number
- Make sure the time points file has a header with columns X, Y, and TIME
- In order to make this program as useful as possible we should try to standardize the format of the data files

Point Popper

- Make sure there is a header row
- Make sure the Excel file is closed before running

Demonstration