SEATWORK 7.1 Data Wrangling and Notebook Demonstration

Name: Calingo, Christian Lei S.

Section: CPE22S3

Course: Computational Thinking With Python

Course Code : CPE311

7.3 (RESHAPING DATA)

Setup

We need to import pandas and read in the long-format data to get started

+ Code + Text

```
import pandas as pd
long_df = pd.read_csv(
'data/long_data.csv',
usecols=['date', 'datatype', 'value']
).rename(
columns={
'value' : 'temp_C'
}
).assign(
date=lambda x: pd.to_datetime(x.date),
temp_F=lambda x: (x.temp_C * 9/5) + 32
)
long_df.head()
```

	datatype	date	temp_C	temp_F
0	TMAX	2018-10-01	21.1	69.98
1	TMIN	2018-10-01	8.9	48.02
2	TOBS	2018-10-01	13.9	57.02
3	TMAX	2018-10-02	23.9	75.02
4	TMIN	2018-10-02	13.9	57.02

Next steps: View recommended plots

Transposing

Transposing swaps the rows and the columns. We use the T attribute to do so

```
long_df.head().T # transposing the table means the columns will become the rows and the rows wil become the columns
```

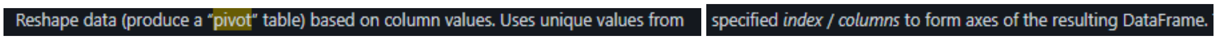
	0	1	2	3	4
datatype	TMAX	TMIN	TOBS	TMAX	TMIN
date	2018-10-01 00:00:00	2018-10-01 00:00:00	2018-10-01 00:00:00	2018-10-02 00:00:00	2018-10-02 00:00:00
temp_C	21.1	8.9	13.9	23.9	13.9
temp_F	69.98	48.02	57.02	75.02	57.02

Next steps: View recommended plots

Pivoting

Going from long to wide format

`pivot()`



Reshape data (produce a "pivot" table) based on column values. Uses unique values from specified *index / columns* to form axes of the resulting DataFrame.

We can restructure our data by picking a column to go in the index (index), a column whose unique values will become column names (columns), and the values to place in those columns (values). The pivot() method can be used when we don't need to perform any aggregation in addition to our restructuring (when our index is unique); if this is not the case, we need the pivot_table() method which we will cover in future modules.Out[1]:In [2]: long_df.head().TOut[2]:

```
pivoted_df = long_df.pivot(
index='date', columns='datatype', values='temp_C' # pivot is almost the same as creating a new table. However, we can use unique values
)                                                 # in this case, we will the use the values in temp_C
pivoted_df.head()
```

datatype	TMAX	TMIN	TOBS
date			
2018-10-01	21.1	8.9	13.9
2018-10-02	23.9	13.9	17.2
2018-10-03	25.0	15.6	16.1
2018-10-04	22.8	11.7	11.7
2018-10-05	23.3	11.7	18.9

Next steps: View recommended plots

Trying pivot() on temp_F

```
pivoted_df = long_df.pivot(
index='date', columns='datatype', values='temp_F' # creating a pivoted table with temp_F as values
)
pivoted_df.head()
```

datatype	TMAX	TMIN	TOBS
date			
2018-10-01	69.98	48.02	57.02
2018-10-02	75.02	57.02	62.96
2018-10-03	77.00	60.08	60.98
2018-10-04	73.04	53.06	53.06
2018-10-05	73.94	53.06	66.02

Next steps: View recommended plots

Using the pd.pivot function gives you the same results

```
pd.pivot(
data =long_df, index = 'date', columns = 'datatype', values = 'temp_C' # trying pd.pvot() which gives the same result above
).head()
```

datatype	TMAX	TMIN	TOBS
date			
2018-10-01	21.1	8.9	13.9
2018-10-02	23.9	13.9	17.2
2018-10-03	25.0	15.6	16.1
2018-10-04	22.8	11.7	11.7
2018-10-05	23.3	11.7	18.9

Trying pd.pvot() on temp_F

```
pd.pivot(
data =long_df, index = 'date', columns = 'datatype', values = 'temp_F' # trying pd.pvot() which gives the same result above
).head()
```

datatype	TMAX	TMIN	TOBS
date			
2018-10-01	69.98	48.02	57.02
2018-10-02	75.02	57.02	62.96
2018-10-03	77.00	60.08	60.98
2018-10-04	73.04	53.06	53.06
2018-10-05	73.94	53.06	66.02

Grabbing the summary results with describe()

```
pivoted_df.describe()
```

datatype	TMAX	TMIN	TOBS
count	31.000000	31.000000	31.000000
mean	16.829032	7.561290	10.022581
std	5.714962	6.513252	6.596550
min	7.800000	-1.100000	-1.100000
25%	12.750000	2.500000	5.550000
50%	16.100000	6.700000	8.300000
75%	21.950000	13.600000	16.100000
max	26.700000	17.800000	21.700000

We can also provide multiple values to pivot on, which will result in a hierarchical index:

```
pivoted_df = long_df.pivot(
index='date', columns='datatype', values=['temp_C', 'temp_F']
)
pivoted_df.head()

# since pivting a table allows us to create a new table for unique values
# having 2 values in the values parameter is like concatenating 2 pivoted tables
```

	temp_C			temp_F		
datatype	TMAX	TMIN	TOBS	TMAX	TMIN	TOBS
date						
2018-10-01	21.1	8.9	13.9	69.98	48.02	57.02
2018-10-02	23.9	13.9	17.2	75.02	57.02	62.96
2018-10-03	25.0	15.6	16.1	77.00	60.08	60.98
2018-10-04	22.8	11.7	11.7	73.04	53.06	53.06
2018-10-05	23.3	11.7	18.9	73.94	53.06	66.02

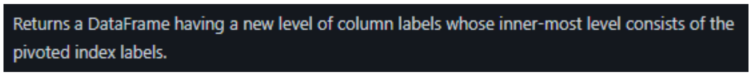
Next steps: View recommended plots

Selecting TMIN of temp_F

```
pivoted_df['temp_F']['TMIN'].head() #selecting TMIN of the temp_F column
```

```
date
2018-10-01    48.02
2018-10-02    57.02
2018-10-03    60.08
2018-10-04    53.06
2018-10-05    53.06
Name: TMIN, dtype: float64
```

`unstack()`



Returns a DataFrame having a new level of column labels whose inner-most level consists of the pivoted index labels.

We have been working with a single index throughout this chapter; however, we can create an index from any number of columns with set_index() . This gives us a MultiIndex where the outermost level corresponds to the first element in the list provided to set_index() :

```
multi_index_df = long_df.set_index(['date', 'datatype'])
multi_index_df.index
```

```
                 ('2018-10-11', 'TMAX'),
                 ('2018-10-11', 'TMIN'),
                 ('2018-10-11', 'TOBS'),
                 ('2018-10-12', 'TMAX'),
                 ('2018-10-12', 'TMIN'),
                 ('2018-10-12', 'TOBS'),
                 ('2018-10-23', 'TMIN'),
                 ('2018-10-23', 'TOBS'),
                 ('2018-10-24', 'TMAX'),
                 ('2018-10-24', 'TMIN'),
                 ('2018-10-24', 'TOBS'),
                 ('2018-10-25', 'TMAX'),
                 ('2018-10-25', 'TMIN'),
                 ('2018-10-25', 'TOBS'),
                 ('2018-10-26', 'TMAX'),
                 ('2018-10-26', 'TMIN'),
                 ('2018-10-26', 'TOBS'),
                 ('2018-10-27', 'TMAX'),
                 ('2018-10-27', 'TMIN'),
                 ('2018-10-27', 'TOBS'),
                 ('2018-10-28', 'TMAX'),
                 ('2018-10-28', 'TMIN'),
                 ('2018-10-28', 'TOBS'),
                 ('2018-10-29', 'TMAX'),
                 ('2018-10-29', 'TMIN'),
                 ('2018-10-29', 'TOBS'),
                 ('2018-10-30', 'TMAX'),
                 ('2018-10-30', 'TMIN'),
```

Notice there are now 2 index sections of the dataframe

```
multi_index_df #this table shows the different TMAX, TMIN, TOBS of days from October 1 to October 31
```

		temp_C	temp_F
date	**datatype**		
2018-10-01	**TMAX**	21.1	69.98
	TMIN	8.9	48.02
	TOBS	13.9	57.02
2018-10-02	**TMAX**	23.9	75.02
	TMIN	13.9	57.02
...	**...**	...	...
2018-10-30	**TMIN**	2.2	35.96
	TOBS	5.0	41.00
2018-10-31	**TMAX**	12.2	53.96
	TMIN	0.0	32.00
	TOBS	0.0	32.00

93 rows × 2 columns

Next steps: View recommended plots

With the MultiIndex , we can no longer use pivot() . We must now use unstack() , which by default moves the innermost index onto the columns:

```
unstacked_df = multi_index_df.unstack()
unstacked_df.head() #unstackinga multi_index df gives us the same results with the pivoted df
```

	temp_C			temp_F		
datatype	**TMAX**	**TMIN**	**TOBS**	**TMAX**	**TMIN**	**TOBS**
date						
2018-10-01	21.1	8.9	13.9	69.98	48.02	57.02
2018-10-02	23.9	13.9	17.2	75.02	57.02	62.96
2018-10-03	25.0	15.6	16.1	77.00	60.08	60.98
2018-10-04	22.8	11.7	11.7	73.04	53.06	53.06
2018-10-05	23.3	11.7	18.9	73.94	53.06	66.02

Next steps: View recommended plots

The unstack() method also provides the fill_value parameter, which let's us fill-in any NaN values that might arise from this restructuring of the data. Consider the case that we have data for the average temperature on October 1, 2018, but no other date:

```
extra_data = long_df.append(
[{'datatype' : 'TAVG', 'date': '2018-10-01', 'temp_C': 10, 'temp_F': 50}]
).set_index(['date', 'datatype']).sort_index()
extra_data.head(8)
```

```
<ipython-input-24-0babc9bf7ca2>:1: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future ver
  extra_data = long_df.append(
<ipython-input-24-0babc9bf7ca2>:3: FutureWarning: Inferring datetime64[ns] from data containing strings is deprecated and will be remov
  ).set_index(['date', 'datatype']).sort_index()
```

		temp_C	temp_F
date	datatype		
2018-10-01	TAVG	10.0	50.00
	TMAX	21.1	69.98
	TMIN	8.9	48.02
	TOBS	13.9	57.02
2018-10-02	TMAX	23.9	75.02
	TMIN	13.9	57.02
	TOBS	17.2	62.96
2018-10-03	TMAX	25.0	77.00

Next steps: View recommended plots

If we use unstack() in this case, we will have NaN for the TAVG columns every day but October 1, 2018

```
extra_data.unstack().head() #the following days were NaN values since in the extra_data, we only specifude the TAVG for October 1, 2018
```

	temp_C				temp_F			
datatype	TAVG	TMAX	TMIN	TOBS	TAVG	TMAX	TMIN	TOBS
date								
2018-10-01	10.0	21.1	8.9	13.9	50.0	69.98	48.02	57.02
2018-10-02	NaN	23.9	13.9	17.2	NaN	75.02	57.02	62.96
2018-10-03	NaN	25.0	15.6	16.1	NaN	77.00	60.08	60.98
2018-10-04	NaN	22.8	11.7	11.7	NaN	73.04	53.06	53.06
2018-10-05	NaN	23.3	11.7	18.9	NaN	73.94	53.06	66.02

Trying different day and unstacking it

```
extra_data2 = long_df.append(
[{'datatype' : 'TAVG', 'date': '2018-10-02', 'temp_C': 10, 'temp_F': 50}]
).set_index(['date', 'datatype']).sort_index()
extra_data2.head(8)
```

```
<ipython-input-26-cd1d1619fd22>:1: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future ver
  extra_data2 = long_df.append(
<ipython-input-26-cd1d1619fd22>:3: FutureWarning: Inferring datetime64[ns] from data containing strings is deprecated and will be remov
  ).set_index(['date', 'datatype']).sort_index()
```

		temp_C	temp_F
date	datatype		
2018-10-01	**TMAX**	21.1	69.98
	TMIN	8.9	48.02
	TOBS	13.9	57.02
2018-10-02	**TAVG**	10.0	50.00
	TMAX	23.9	75.02
	TMIN	13.9	57.02
	TOBS	17.2	62.96
2018-10-03	**TMAX**	25.0	77.00

Next steps: View recommended plots

```
extra_data2.unstack() #as you can see, since we specified on the October 2nd, the October 1st become NaN along with the rest
```

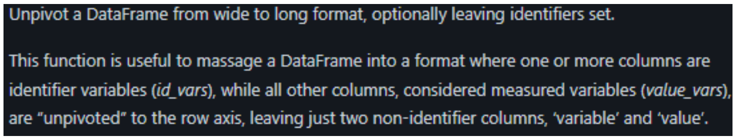
	temp_C				temp_F			
datatype	TAVG	TMAX	TMIN	TOBS	TAVG	TMAX	TMIN	TOBS
date								
2018-10-01	NaN	21.1	8.9	13.9	NaN	69.98	48.02	57.02
2018-10-02	10.0	23.9	13.9	17.2	50.0	75.02	57.02	62.96
2018-10-03	NaN	25.0	15.6	16.1	NaN	77.00	60.08	60.98
2018-10-04	NaN	22.8	11.7	11.7	NaN	73.04	53.06	53.06
2018-10-05	NaN	23.3	11.7	18.9	NaN	73.94	53.06	66.02
2018-10-06	NaN	20.0	13.3	16.1	NaN	68.00	55.94	60.98
2018-10-07	NaN	20.0	16.1	20.0	NaN	68.00	60.98	68.00
2018-10-08	NaN	26.7	17.8	17.8	NaN	80.06	64.04	64.04
2018-10-09	NaN	18.9	17.2	17.8	NaN	66.02	62.96	64.04
2018-10-10	NaN	24.4	17.2	18.3	NaN	75.92	62.96	64.94
2018-10-11	NaN	26.1	17.8	21.7	NaN	78.98	64.04	71.06
2018-10-12	NaN	22.8	14.4	15.6	NaN	73.04	57.92	60.08
2018-10-13	NaN	15.6	7.2	8.3	NaN	60.08	44.96	46.94
2018-10-14	NaN	13.3	5.6	6.7	NaN	55.94	42.08	44.06
2018-10-15	NaN	13.3	6.7	10.0	NaN	55.94	44.06	50.00
2018-10-16	NaN	18.9	7.8	7.8	NaN	66.02	46.04	46.04
2018-10-17	NaN	13.3	3.3	5.0	NaN	55.94	37.94	41.00
2018-10-18	NaN	16.1	4.4	5.0	NaN	60.98	39.92	41.00
2018-10-19	NaN	10.0	-1.1	0.0	NaN	50.00	30.02	32.00
2018-10-20	NaN	15.0	-0.6	10.6	NaN	59.00	30.92	51.08
2018-10-21	NaN	16.7	7.8	7.8	NaN	62.06	46.04	46.04
2018-10-22	NaN	7.8	-1.1	-1.1	NaN	46.04	30.02	30.02
2018-10-23	NaN	15.6	-1.1	10.0	NaN	60.08	30.02	50.00
2018-10-24	NaN	16.7	4.4	6.7	NaN	62.06	39.92	44.06
2018-10-25	NaN	11.7	2.8	2.8	NaN	53.06	37.04	37.04
2018-10-26	NaN	9.4	-0.6	-0.6	NaN	48.92	30.92	30.92
2018-10-27	NaN	8.9	-0.6	6.1	NaN	48.02	30.92	42.98
2018-10-28	NaN	8.3	5.0	7.2	NaN	46.94	41.00	44.96
2018-10-29	NaN	10.6	6.7	8.3	NaN	51.08	44.06	46.94
2018-10-30	NaN	13.3	2.2	5.0	NaN	55.94	35.96	41.00
2018-10-31	NaN	12.2	0.0	0.0	NaN	53.96	32.00	32.00

To address this, we can pass in an appropriate fill_value . However, we are restricted to passing in a value for this, not a strategy (like we saw with fillna()), so while -40 is definitely not be the best value, we can use it to illustrate how this works, since this is the temperature at which Fahrenheit and Celsius are equal:

```
extra_data.unstack(fill_value=-40)
```

	temp_C				temp_F			
datatype	TAVG	TMAX	TMIN	TOBS	TAVG	TMAX	TMIN	TOBS
date								
2018-10-01	10.0	21.1	8.9	13.9	50.0	69.98	48.02	57.02
2018-10-02	-40.0	23.9	13.9	17.2	-40.0	75.02	57.02	62.96
2018-10-03	-40.0	25.0	15.6	16.1	-40.0	77.00	60.08	60.98
2018-10-04	-40.0	22.8	11.7	11.7	-40.0	73.04	53.06	53.06
2018-10-05	-40.0	23.3	11.7	18.9	-40.0	73.94	53.06	66.02
2018-10-06	-40.0	20.0	13.3	16.1	-40.0	68.00	55.94	60.98
2018-10-07	-40.0	20.0	16.1	20.0	-40.0	68.00	60.98	68.00
2018-10-08	-40.0	26.7	17.8	17.8	-40.0	80.06	64.04	64.04
2018-10-09	-40.0	18.9	17.2	17.8	-40.0	66.02	62.96	64.04
2018-10-10	-40.0	24.4	17.2	18.3	-40.0	75.92	62.96	64.94
2018-10-11	-40.0	26.1	17.8	21.7	-40.0	78.98	64.04	71.06
2018-10-12	-40.0	22.8	14.4	15.6	-40.0	73.04	57.92	60.08
2018-10-13	-40.0	15.6	7.2	8.3	-40.0	60.08	44.96	46.94
2018-10-14	-40.0	13.3	5.6	6.7	-40.0	55.94	42.08	44.06
2018-10-15	-40.0	13.3	6.7	10.0	-40.0	55.94	44.06	50.00
2018-10-16	-40.0	18.9	7.8	7.8	-40.0	66.02	46.04	46.04
2018-10-17	-40.0	13.3	3.3	5.0	-40.0	55.94	37.94	41.00
2018-10-18	-40.0	16.1	4.4	5.0	-40.0	60.98	39.92	41.00
2018-10-19	-40.0	10.0	-1.1	0.0	-40.0	50.00	30.02	32.00
2018-10-20	-40.0	15.0	-0.6	10.6	-40.0	59.00	30.92	51.08
2018-10-21	-40.0	16.7	7.8	7.8	-40.0	62.06	46.04	46.04
2018-10-22	-40.0	7.8	-1.1	-1.1	-40.0	46.04	30.02	30.02
2018-10-23	-40.0	15.6	-1.1	10.0	-40.0	60.08	30.02	50.00
2018-10-24	-40.0	16.7	4.4	6.7	-40.0	62.06	39.92	44.06
2018-10-25	-40.0	11.7	2.8	2.8	-40.0	53.06	37.04	37.04
2018-10-26	-40.0	9.4	-0.6	-0.6	-40.0	48.92	30.92	30.92
2018-10-27	-40.0	8.9	-0.6	6.1	-40.0	48.02	30.92	42.98
2018-10-28	-40.0	8.3	5.0	7.2	-40.0	46.94	41.00	44.96
2018-10-29	-40.0	10.6	6.7	8.3	-40.0	51.08	44.06	46.94
2018-10-30	-40.0	13.3	2.2	5.0	-40.0	55.94	35.96	41.00
2018-10-31	-40.0	12.2	0.0	0.0	-40.0	53.96	32.00	32.00

Melting



Unpivot a DataFrame from wide to long format, optionally leaving identifiers set.

This function is useful to massage a DataFrame into a format where one or more columns are identifier variables (*id_vars*), while all other columns, considered measured variables (*value_vars*), are "unpivoted" to the row axis, leaving just two non-identifier columns, 'variable' and 'value'.

Setup

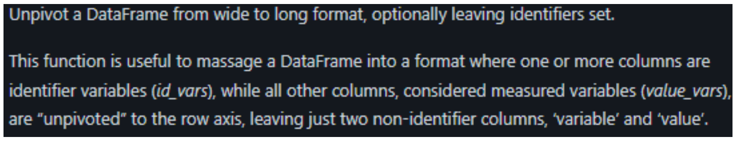
Going from wide to long format.

```
wide_df2 = pd.read_csv('data/wide_data.csv')
wide_df2
```

	date	TMAX	TMIN	TOBS
0	2018-10-01	21.1	8.9	13.9
1	2018-10-02	23.9	13.9	17.2
2	2018-10-03	25.0	15.6	16.1
3	2018-10-04	22.8	11.7	11.7
4	2018-10-05	23.3	11.7	18.9
5	2018-10-06	20.0	13.3	16.1
6	2018-10-07	20.0	16.1	20.0
7	2018-10-08	26.7	17.8	17.8
8	2018-10-09	18.9	17.2	17.8
9	2018-10-10	24.4	17.2	18.3
10	2018-10-11	26.1	17.8	21.7
11	2018-10-12	22.8	14.4	15.6
12	2018-10-13	15.6	7.2	8.3
13	2018-10-14	13.3	5.6	6.7
14	2018-10-15	13.3	6.7	10.0
15	2018-10-16	18.9	7.8	7.8
16	2018-10-17	13.3	3.3	5.0
17	2018-10-18	16.1	4.4	5.0
18	2018-10-19	10.0	-1.1	0.0
19	2018-10-20	15.0	-0.6	10.6
20	2018-10-21	16.7	7.8	7.8
21	2018-10-22	7.8	-1.1	-1.1
22	2018-10-23	15.6	-1.1	10.0
23	2018-10-24	16.7	4.4	6.7
24	2018-10-25	11.7	2.8	2.8
25	2018-10-26	9.4	-0.6	-0.6
26	2018-10-27	8.9	-0.6	6.1
27	2018-10-28	8.3	5.0	7.2
28	2018-10-29	10.6	6.7	8.3
29	2018-10-30	13.3	2.2	5.0
30	2018-10-31	12.2	0.0	0.0

Next steps: View recommended plots

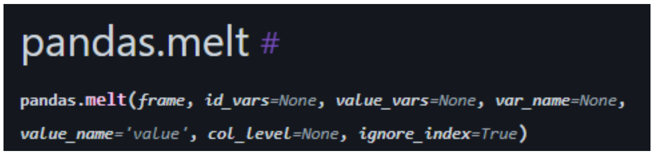
melt()



Unpivot a DataFrame from wide to long format, optionally leaving identifiers set.

This function is useful to massage a DataFrame into a format where one or more columns are identifier variables (*id_vars*), while all other columns, considered measured variables (*value_vars*), are "unpivoted" to the row axis, leaving just two non-identifier columns, 'variable' and 'value'.

In order to go from wide format to long format, we use the melt() method. We have to specify



pandas.melt #

```
pandas.melt(frame, id_vars=None, value_vars=None, var_name=None,
value_name='value', col_level=None, ignore_index=True)
```

- which column contains the unique identifier for each row (date , here) to id_vars
- The column(s) that contain the values (TMAX , TMIN , and TOBS , here) to value_vars
- value_name : what to call the column that will contain all the values once melted
- var_name : what to call the column that will contain the names of the variables being measured

```
melted_df = wide_df2.melt(
id_vars='date',
value_vars=['TMAX', 'TMIN', 'TOBS'],
value_name='temp_C',
var_name='measurement'
)
melted_df
```

	date	measurement	temp_C
0	2018-10-01	TMAX	21.1
1	2018-10-02	TMAX	23.9
2	2018-10-03	TMAX	25.0
3	2018-10-04	TMAX	22.8
4	2018-10-05	TMAX	23.3
...	...	...	...
88	2018-10-27	TOBS	6.1
89	2018-10-28	TOBS	7.2
90	2018-10-29	TOBS	8.3
91	2018-10-30	TOBS	5.0
92	2018-10-31	TOBS	0.0

93 rows × 3 columns

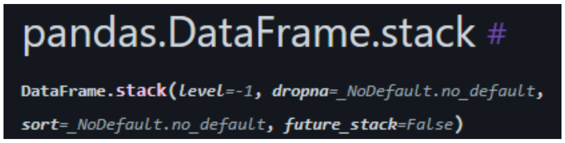
Next steps: View recommended plots

Just as we also had pd.pivot() there is a pd.melt()

```
pd.melt(
wide_df2,
id_vars='date',
value_vars=['TMAX', 'TMIN', 'TOBS'],
value_name='temp_C',
var_name='measurement'
).head()
```

	date	measurement	temp_C
0	2018-10-01	TMAX	21.1
1	2018-10-02	TMAX	23.9
2	2018-10-03	TMAX	25.0
3	2018-10-04	TMAX	22.8
4	2018-10-05	TMAX	23.3

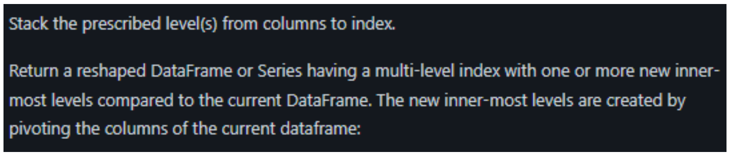
stack()



pandas.DataFrame.stack #

```
DataFrame.stack(level=-1, dropna=_NoDefault.no_default,
sort=_NoDefault.no_default, future_stack=False)
```

Another option is stack() which will pivot the columns of the dataframe into the innermost level of a MultiIndex . To illustrate this, let's set our index to be the date column



Stack the prescribed level(s) from columns to index.

Return a reshaped DataFrame or Series having a multi-level index with one or more new inner-most levels compared to the current DataFrame. The new inner-most levels are created by pivoting the columns of the current dataframe:

```
wide_df2.set_index('date', inplace=True)
wide_df2
```

```
            TMAX  TMIN  TOBS
      date
2018-10-01  21.1   8.9  13.9
2018-10-02  23.9  13.9  17.2
2018-10-03  25.0  15.6  16.1
2018-10-04  22.8  11.7  11.7
2018-10-05  23.3  11.7  18.9
2018-10-06  20.0  13.3  16.1
2018-10-07  20.0  16.1  20.0
2018-10-08  26.7  17.8  17.8
2018-10-09  18.9  17.2  17.8
2018-10-10  24.4  17.2  18.3
2018-10-11  26.1  17.8  21.7
2018-10-12  22.8  14.4  15.6
2018-10-13  15.6   7.2   8.3
2018-10-14  13.3   5.6   6.7
2018-10-15  13.3   6.7  10.0
2018-10-16  18.9   7.8   7.8
2018-10-17  13.3   3.3   5.0
2018-10-18  16.1   4.4   5.0
2018-10-19  10.0  -1.1   0.0
2018-10-20  15.0  -0.6  10.6
2018-10-21  16.7   7.8   7.8
2018-10-22   7.8  -1.1  -1.1
2018-10-23  15.6  -1.1  10.0
2018-10-24  16.7   4.4   6.7
2018-10-25  11.7   2.8   2.8
2018-10-26   9.4  -0.6  -0.6
2018-10-27   8.9  -0.6   6.1
2018-10-28   8.3   5.0   7.2
2018-10-29  10.6   6.7   8.3
2018-10-30  13.3   2.2   5.0
2018-10-31  12.2   0.0   0.0
```

Next steps: View recommended plots

By running stack() now, we will create a second level in our index which will contain the column names of our dataframe (TMAX , TMIN , TOBS). This will leave us with a Series containing the values

```
stacked_series = wide_df2.stack()
stacked_series
```

```
date
2018-10-01  TMAX    21.1
            TMIN     8.9
            TOBS    13.9
2018-10-02  TMAX    23.9
            TMIN    13.9
                    ... 
2018-10-30  TMIN     2.2
            TOBS     5.0
2018-10-31  TMAX    12.2
            TMIN     0.0
            TOBS     0.0
Length: 93, dtype: float64
```

We can use the to_frame() method on our Series object to turn it into a DataFrame . Since the series doesn't have a name at the moment, we will pass in the name as an argument:

```
stacked_df = stacked_series.to_frame('values')
stacked_df
```

		values
date		
2018-10-01	**TMAX**	21.1
	TMIN	8.9
	TOBS	13.9
2018-10-02	**TMAX**	23.9
	TMIN	13.9
...	**...**	...
2018-10-30	**TMIN**	2.2
	TOBS	5.0
2018-10-31	**TMAX**	12.2
	TMIN	0.0