oasis-as-req-dam-and-fuel-prc

October 2, 2019

1 OASIS AS_REQ DAM *and* FUEL_PRC

OASIS AS_REQ Day Ahead Market Report(s) and OASIS FUEL_PRC Report(s)

1.1 Load the data

```
In [16]: import sqlite3
         import pandas as pd
         import matplotlib.pyplot as plt
         plt.rcParams['figure.figsize'] = [15, 5]
         from pandasql import sqldf
         # Create the connections
         cnx1 = sqlite3.connect(r'./data-oasis-as-req-dam_00.db')
         cnx2 = sqlite3.connect(r'./data-oasis-prc-fuel-all_00.db')
```

1.2 Preview the schema of data-oasis-as-req-dam

```
In [17]: for table in ['disclaimer_item','messagepayload','report_data','report_item','messagel
             print("-------------------------------------------------")
             print("table: %s" % table)
             print("-------------------------------------------------")
             for info in cnx1.execute("PRAGMA table_info([%s]);" % table):
                 print(info)
```

```
-------------------------------------------------
table: disclaimer_item
-------------------------------------------------
(0, 'id', 'TEXT', 0, None, 1)
(1, 'disclaimer', 'TEXT', 0, None, 0)
(2, 'rto_id', 'TEXT', 0, None, 0)
-------------------------------------------------
table: messagepayload
-------------------------------------------------
(0, 'id', 'TEXT', 0, None, 1)
(1, 'oasisreport_id', 'TEXT', 0, None, 0)
-------------------------------------------------
table: report_data
```

```
--------------------------------------------------
(0, 'id', 'TEXT', 0, None, 1)
(1, 'interval_end_gmt', 'TEXT', 0, None, 0)
(2, 'interval_start_gmt', 'TEXT', 0, None, 0)
(3, 'opr_date', 'TEXT', 0, None, 0)
(4, 'value', 'REAL', 0, None, 0)
(5, 'resource_name', 'TEXT', 0, None, 0)
(6, 'interval_num', 'INTEGER', 0, None, 0)
(7, 'data_item', 'TEXT', 0, None, 0)
(8, 'report_item_id', 'TEXT', 0, None, 0)
--------------------------------------------------
table: report_item
--------------------------------------------------
(0, 'id', 'TEXT', 0, None, 1)
(1, 'rto_id', 'TEXT', 0, None, 0)
--------------------------------------------------
table: messageheader
--------------------------------------------------
(0, 'id', 'TEXT', 0, None, 1)
(1, 'version', 'TEXT', 0, None, 0)
(2, 'source', 'TEXT', 0, None, 0)
(3, 'timedate', 'TEXT', 0, None, 0)
(4, 'oasisreport_id', 'TEXT', 0, None, 0)
--------------------------------------------------
table: oasisreport
--------------------------------------------------
(0, 'id', 'TEXT', 0, None, 1)
--------------------------------------------------
table: report_header
--------------------------------------------------
(0, 'id', 'TEXT', 0, None, 1)
(1, 'report', 'TEXT', 0, None, 0)
(2, 'uom', 'TEXT', 0, None, 0)
(3, 'sec_per_interval', 'INTEGER', 0, None, 0)
(4, 'tz', 'TEXT', 0, None, 0)
(5, 'mkt_type', 'TEXT', 0, None, 0)
(6, 'system', 'TEXT', 0, None, 0)
(7, 'interval', 'TEXT', 0, None, 0)
(8, 'report_item_id', 'TEXT', 0, None, 0)
--------------------------------------------------
table: rto
--------------------------------------------------
(0, 'id', 'TEXT', 0, None, 1)
(1, 'name', 'TEXT', 0, None, 0)
(2, 'messagepayload_id', 'TEXT', 0, None, 0)
```

In [18]: *## Preview the schema of data-oasis-prc-fuel-all*

```
In [19]: for table in ['disclaimer_item','messagepayload','report_data','report_item','messageh
             print("-------------------------------------------------")
             print("table: %s" % table)
             print("-------------------------------------------------")
             for info in cnx2.execute("PRAGMA table_info([%s]);" % table):
                  print(info)

-------------------------------------------------
table: disclaimer_item
-------------------------------------------------
(0, 'disclaimer', 'TEXT', 0, None, 0)
(1, 'id', 'TEXT', 0, None, 1)
(2, 'rto_id', 'TEXT', 0, None, 0)
-------------------------------------------------
table: messagepayload
-------------------------------------------------
(0, 'id', 'TEXT', 0, None, 1)
(1, 'oasisreport_id', 'TEXT', 0, None, 0)
-------------------------------------------------
table: report_data
-------------------------------------------------
(0, 'resource_name', 'TEXT', 0, None, 0)
(1, 'id', 'TEXT', 0, None, 1)
(2, 'value', 'REAL', 0, None, 0)
(3, 'interval_start_gmt', 'TEXT', 0, None, 0)
(4, 'interval_end_gmt', 'TEXT', 0, None, 0)
(5, 'data_item', 'TEXT', 0, None, 0)
(6, 'opr_date', 'TEXT', 0, None, 0)
(7, 'interval_num', 'INTEGER', 0, None, 0)
(8, 'report_item_id', 'TEXT', 0, None, 0)
-------------------------------------------------
table: report_item
-------------------------------------------------
(0, 'id', 'TEXT', 0, None, 1)
(1, 'rto_id', 'TEXT', 0, None, 0)
-------------------------------------------------
table: messageheader
-------------------------------------------------
(0, 'source', 'TEXT', 0, None, 0)
(1, 'id', 'TEXT', 0, None, 1)
(2, 'version', 'TEXT', 0, None, 0)
(3, 'timedate', 'TEXT', 0, None, 0)
(4, 'oasisreport_id', 'TEXT', 0, None, 0)
-------------------------------------------------
table: oasisreport
-------------------------------------------------
(0, 'id', 'TEXT', 0, None, 1)
-------------------------------------------------
```

```
table: report_header
-------------------------------------------------
(0, 'uom', 'TEXT', 0, None, 0)
(1, 'tz', 'TEXT', 0, None, 0)
(2, 'system', 'TEXT', 0, None, 0)
(3, 'id', 'TEXT', 0, None, 1)
(4, 'sec_per_interval', 'INTEGER', 0, None, 0)
(5, 'interval', 'TEXT', 0, None, 0)
(6, 'report', 'TEXT', 0, None, 0)
(7, 'report_item_id', 'TEXT', 0, None, 0)
-------------------------------------------------
table: rto
-------------------------------------------------
(0, 'id', 'TEXT', 0, None, 1)
(1, 'name', 'TEXT', 0, None, 0)
(2, 'messagepayload_id', 'TEXT', 0, None, 0)
```

1.3 Preview the available reports

```
In [20]: for row in cnx1.execute("select distinct report from report_header"):
             print(row)
```

```
('AS_REQ',)
```

```
In [21]: for row in cnx2.execute("select distinct report from report_header"):
             print(row)
```

```
('PRC_FUEL',)
```

1.4 Preview the data_item(s)

```
In [22]: for row in cnx1.execute("select distinct data_item from report_data;"):
             print(row)
```

```
('NS_REQ_MAX_MW',)
('NS_REQ_MIN_MW',)
('RD_REQ_MAX_MW',)
('RD_REQ_MIN_MW',)
('RU_REQ_MAX_MW',)
('RU_REQ_MIN_MW',)
('SP_REQ_MAX_MW',)
('SP_REQ_MIN_MW',)
('RMD_REQ_MAX_MW',)
('RMD_REQ_MIN_MW',)
('RMU_REQ_MAX_MW',)
('RMU_REQ_MIN_MW',)
```

```
In [23]: for row in cnx2.execute("select distinct data_item from report_data;"):
             print(row)

('FUEL_PRC',)
```

1.5 Load a dataframes

```
In [27]: df1 = pd.read_sql("select rh.report, rd.data_item, rd.value, rh.uom, rd.interval_start
         df1['ts'] = pd.to_datetime(df1['interval_start_gmt'])
         df1 = df1.set_index('ts')
         df1.drop(['interval_start_gmt'], axis=1, inplace=True)
         df1[0:5]
```

Out[27]:

ts	report	data_item	value	uom
2016-03-08 07:00:00+00:00	AS_REQ	NS_REQ_MAX_MW	0.00	MW
2016-03-08 07:00:00+00:00	AS_REQ	NS_REQ_MIN_MW	407.59	MW
2016-03-08 07:00:00+00:00	AS_REQ	RD_REQ_MAX_MW	500.00	MW
2016-03-08 07:00:00+00:00	AS_REQ	RD_REQ_MIN_MW	10.00	MW
2016-03-08 07:00:00+00:00	AS_REQ	RU_REQ_MAX_MW	0.00	MW

```
In [36]: df2= pd.read_sql("select rd.resource_name, rh.report, rd.data_item, rd.value, rh.uom,
         df2['ts'] = pd.to_datetime(df2['interval_start_gmt'])
         df2 = df2.set_index('ts')
         df2.drop(['interval_start_gmt'], axis=1, inplace=True)
         df2[0:5]
```

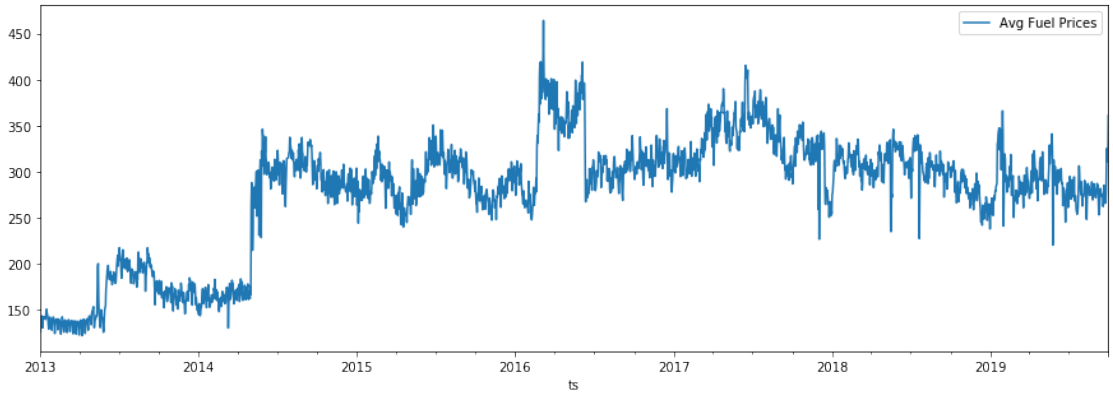
Out[36]:

ts	resource_name	report	data_item	value	uom
2016-03-08 07:00:00+00:00	AS_CAISO	AS_REQ	NS_REQ_MAX_MW	0.00	MW
2016-03-08 07:00:00+00:00	AS_CAISO	AS_REQ	NS_REQ_MIN_MW	407.59	MW
2016-03-08 07:00:00+00:00	AS_CAISO	AS_REQ	RD_REQ_MAX_MW	500.00	MW
2016-03-08 07:00:00+00:00	AS_CAISO	AS_REQ	RD_REQ_MIN_MW	10.00	MW
2016-03-08 07:00:00+00:00	AS_CAISO	AS_REQ	RU_REQ_MAX_MW	0.00	MW

1.6 Avg Daily Fuel Prices

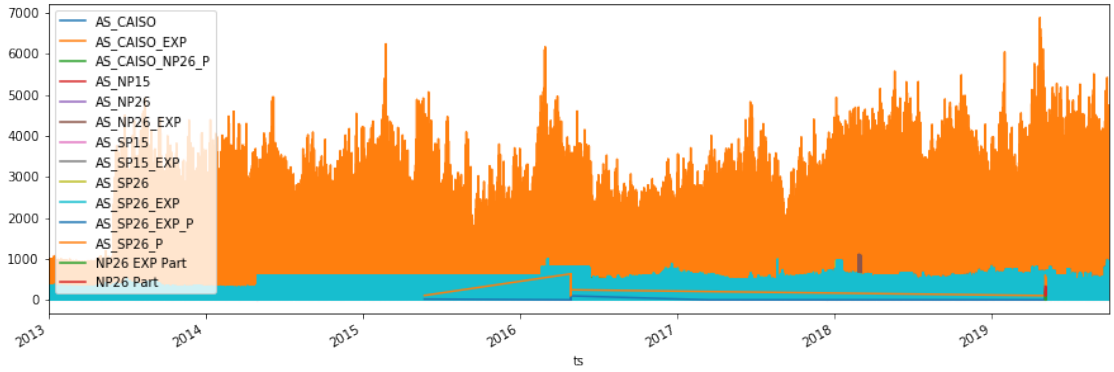
```
In [37]: df2daily = df2.resample('D').mean()
         df2daily.plot(y='value', label='Avg Fuel Prices')
```

```
Out[37]: <matplotlib.axes._subplots.AxesSubplot at 0x7f14b0facb70>
```



1.7 Avg Daily Fuel Prices by Name

```
In [38]: fig, ax = plt.subplots()
         for name, grp in df2.groupby(['resource_name']):
             ax = grp.plot(ax=ax, y='value', label=name)
```



1.8 Fuel Prices compared with AS_REQ DAM

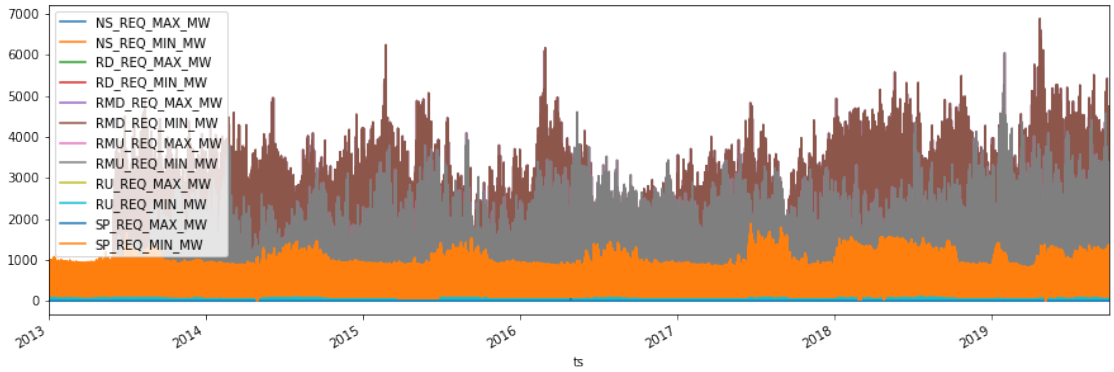
```
In [39]: df3 = df1.append(df2)
         fig, ax = plt.subplots()
         for name, grp in df3.groupby(['data_item']):
             if name == "FUEL_PRC":
                 ax = grp.plot(ax=ax, y='value', label=name, secondary_y=True)
             else:
                 ax = grp.plot(ax=ax, y='value', label=name)
```

```
/home/toddg/bin/anaconda3/lib/python3.7/site-packages/pandas/core/frame.py:6692: FutureWarning
of pandas will change to not sort by default.
```

```
To accept the future behavior, pass 'sort=False'.

To retain the current behavior and silence the warning, pass 'sort=True'.

  sort=sort)
```



1.9 Summary

This notebook shows how to:

- load mutiple datasets into dataframes
- append two different dataframes
- convert timestamps to dataframe time series
- display a single graph composed of data from multiple sources