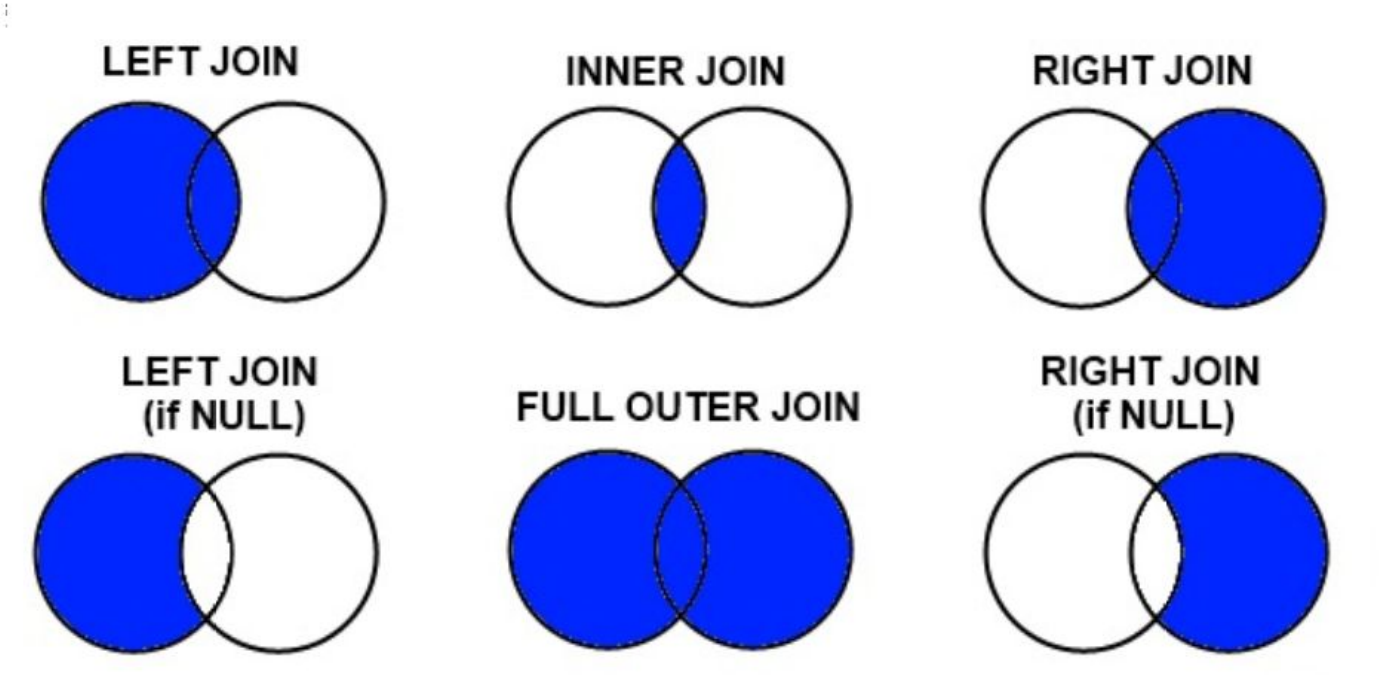
T5 - Data analysis techniques and methodologies



- Merging on Dataframes Columns

We can merge Dataframes N:1 and N:N
pandas.merge(<Dataframe_1>, ..., <Dataframe_n>) -> Looks for strictly coincidences index and labels
pandas.merge(<Dataframes>, on= <ColumnLabels>) -> Label exact coincidence values, not indexes.
pandas.merge(<dfs>, on = <CoLabels>, how= {'inner', 'right', 'left', 'outer' }) -> Order to merge:
    inner: for labels, after indexes df1, …, after indexes dfn. Default value for merge
    right: for Colabels, after labels dfn, …, after labels df1. NaN not permitted on right dfs labels
    left: for CoLabels, after labels df1, …, after labels dfn. NaN not permitted on left dfs labels
    outer: same as inned, but permits NaN for any non combination.
pandas.merge(…., suffixes=<suffix list for labels not in CoLabels>)

- Merging on DataFrames Indexes

Merge index to index -> **left_index = True, right_index = True**
Merge label with index -> left_on = < list of labels>, right_index = True
                |-> right_on=< list of labels>, left_index = True

- Joining Dataframes with same indexes

Joining dataframe to other dataframe: adding combinations and columns for items:

Example1: **df1.join(df2)**

df1	**data**	**df2**	**profit**	**df1.j(df2)**	**data**	**profit**
O	0	**O**	10	**L**	2	NaN
U	1	**O**	20	**O**	0	10.0
L	2	**U**	20	**O**	0	20.0
O	3			**O**	3	10.0
U	4			**O**	3	20.0
				U	1	20.0
				U	4	20.0

- Concatenation of Series

Concatenate/link them along specific access: **axis = 0** -> rows, **axis = 1** -> columns (generates Dataframe)
For new behaviour (not sort by default) on **axis = 1** -> **sort = False**
Label indexes by **names=**
Set subindexes by **keys=**

```
# Concatenate/link numpy arrays
print '--- Concatenate a1, b1 rows(axis=0)'
print npconcat([a1, b1], axis=0)

print '--- Concatenate a1, b1 columns(axis=1)'
print npconcat([a1, b1], axis=1)

# Create Series
s1 = Series([100, 200, 300], index=['A', 'B', 'C'])
s2 = Series([400, 500], index=['D', 'E'])
print '--- s1 ---'
print s1
print '--- s2 ---'
print s2
# Concatenate/link Series
print '--- concat(s1,s2) axis = 0---'
print pdconcat([s1, s2])
print '--- concat(s2, s1) axis = 0---'
print pdconcat([s2, s1])
print '--- series concat(s1,s2) axis = 0---'
s= pdconcat([s1, s2], axis=0,
            keys=['s1', 's2'],
            names=['idx_s', 'idx'])
print s

print '--- series concat(s1,s2) axis = 1---'
s= pdconcat([s1, s2], axis=1, sort=False,
            keys=['s1', 's2'],
            names=['idx'])
print s
```

```
--- concat(s1,s2) axis = 0---
A    100
B    200
C    300
D    400
E    500
dtype: int64
--- concat(s2,s1) axis = 0---
D    400
E    500
A    100
B    200
C    300
dtype: int64
--- series concat(s1,s2) axis = 0--
idx_s  idx
s1     A      100
       B      200
       C      300
s2     D      400
       E      500
dtype: int64
--- series concat(s1,s2) axis = 1--
idx     s1     s2
A    100.0    NaN
B    200.0    NaN
C    300.0    NaN
D      NaN  400.0
E      NaN  500.0
```

- Concatenation of dataframes

pandas.concat([df1, df2, axis = 0/1, sort=False, ignore_index=True)
Same as pandas.Series, but for recreate continuous index use **ignore_index=True**.
Cell values not assigned were filled with NaN.

```
print '--- concat(s1,s2) axis = 0---'
print pdconcat([s1, s2])
print '--- concat(s2, s1) axis = 0---'
print pdconcat([s2, s1])
print '--- series concat(s1,s2) axis = 0---'
s = pdconcat([s1, s2], axis=0,
             keys=['s1', 's2'],
             names=['idx_s', 'idx'])
print s

print '--- series concat(s1,s2) axis = 1---'
s = pdconcat([s1, s2], axis=1, sort=False,
             keys=['s1', 's2'],
             names=['idx'])
print s

# Create Dataframes
df1 = DataFrame(random.randn(4, 3),
                columns=['A', 'B', 'C'])
df2 = DataFrame(random.randn(3, 3),
                columns=['B', 'D', 'A'])
print '--- df1 ---'
print df1

print '--- df2 ---'
print df2
# Concatenate/link Dataframes
print '--- df concat(df1, df2) axis=0 ---'
print pdconcat([df1, df2], axis=0, sort=False)
print '--- df concat(df1, df2) axis=0 ignore_index ---'
print pdconcat([df1, df2], axis=0, sort=False,
               ignore_index=True)
print '--- df concat(df1, df2) axis=1 ---'
print pdconcat([df1, df2], axis=1, sort=False)
```

```
--- df1 ---
          A         B         C
0  0.904843  0.013675 -1.758741
1  0.607929  0.753118 -1.182747
2 -0.120983  1.201189  0.981723
3  1.009936  0.680958 -1.351300
--- df2 ---
          B         D         A
0  0.124771 -1.821855 -1.395193
1 -1.247934  2.219757 -1.057643
2 -2.446749  0.557201  0.168668
--- df concat(df1, df2) axis=0 ---
          A         B         C         D
0  0.904843  0.013675 -1.758741       NaN
1  0.607929  0.753118 -1.182747       NaN
2 -0.120983  1.201189  0.981723       NaN
3  1.009936  0.680958 -1.351300       NaN
0 -1.395193  0.124771       NaN -1.821855
1 -1.057643 -1.247934       NaN  2.219757
2  0.168668 -2.446749       NaN  0.557201
--- df concat(df1, df2) axis=0 ignore_index ---
          A         B         C         D
0  0.904843  0.013675 -1.758741       NaN
1  0.607929  0.753118 -1.182747       NaN
2 -0.120983  1.201189  0.981723       NaN
3  1.009936  0.680958 -1.351300       NaN
4 -1.395193  0.124771       NaN -1.821855
5 -1.057643 -1.247934       NaN  2.219757
6  0.168668 -2.446749       NaN  0.557201
--- df concat(df1, df2) axis=1 ---
          A         B         C         B         D         A
0  0.904843  0.013675 -1.758741  0.124771 -1.821855 -1.395193
1  0.607929  0.753118 -1.182747 -1.247934  2.219757 -1.057643
2 -0.120983  1.201189  0.981723 -2.446749  0.557201  0.168668
3  1.009936  0.680958 -1.351300       NaN       NaN       NaN
```

- Combining Series and Dataframes

Example combining series if values are NaN:

```
from numpy import nan, float64, arange, where
from pandas import Series, DataFrame, isnull

s1=Series([5, nan, 6, nan], index=['A', 'B', 'C', 'D'])
print '--- s1 ---'
print s1

s2=Series(arange(4), dtype=float64, index=s1.index)
print '--- s2 ---'
print s2

# Substitution values for NaN with where
# isnull() selects choice s1 or s2 values
s3 = Series(where(isnull(s1), s2, s1), index=s1.index)
print '- combine s2 values if s1 value is NaN - '
print s3

# The same with combine_first function
s4 = s1.combine_first(s2)
print '---- Same with combine_first method ---'
print s4
```

```
--- s1 ---
A    5.0
B    NaN
C    6.0
D    NaN
dtype: float64
--- s2 ---
A    0.0
B    1.0
C    2.0
D    3.0
dtype: float64
- combine s2 values if s1 value is NaN -
A    5.0
B    1.0
C    6.0
D    3.0
dtype: float64
---- Same with combine_first method ---
A    5.0
B    1.0
C    6.0
D    3.0
dtype: float64
```