Exercise 1

1) Load the breast_cancer dataset from skelarn (from sklearn.datasets import load_breast_cancer). Split the dataset into training and test datasets. Scale the dataset using minmaxscaler. Use KNeighborsClassifier classifier and report the score on the test dataset.

In [1]:

```
from sklearn.datasets import load_breast_cancer
from sklearn.model_selection import train_test_split, cross_val_score
from sklearn.preprocessing import MinMaxScaler
from sklearn.neighbors import KNeighborsClassifier
```

In [2]:

```
#load breast cancer data
cancer = load_breast_cancer()
X_train, X_test, y_train, y_test = train_test_split(cancer.data, cancer.target, ran
dom_state=4)
```

In [3]:

```
scaler = MinMaxScaler()
scaler.fit(X_train)
X_train_scaled = scaler.transform(X_train)
clf =  KNeighborsClassifier(n_neighbors=3).fit(X_train_scaled, y_train)

X_test_scaled = scaler.transform(X_test)
print("MinMaxScaled Test score: {:.4f}".format(clf.score(X_test_scaled, y_test)))
```

```
MinMaxScaled Test score: 0.9860
```

2) Repeat Step 1 using pipelines and report the score.

In [4]:

```
from sklearn.pipeline import make_pipeline
pipe = make_pipeline(MinMaxScaler(), KNeighborsClassifier(n_neighbors=3))
pipe.fit(X_train, y_train)
print("Train score: {:.4f}".format(pipe.score(X_train, y_train)))
print("Test score: {:.4f}".format(pipe.score(X_test, y_test)))
```

```
Train score: 0.9812
Test score: 0.9860
```

3) Use the pipeline object from Step 2 and make a grid search on parameter of number of neighbor.

In [6]:

```
from sklearn.model_selection import GridSearchCV

Neigh_pipe = make_pipeline(MinMaxScaler(), KNeighborsClassifier())
from sklearn.model_selection import GridSearchCV
import numpy as np

param_grid = {'kneighborsclassifier__n_neighbors':  np.arange(1, 30, 2)}
grid = GridSearchCV(Neigh_pipe, param_grid=param_grid, cv=10,return_train_score=True)
grid.fit(X_train, y_train)
print("best mean cross-validation score: {:.3f}".format(grid.best_score_))
print("best parameters: {}".format(grid.best_params_))

print("test-set score: {:.3f}".format(grid.score(X_test, y_test)))
```

```
best mean cross-validation score: 0.962
best parameters: {'kneighborsclassifier__n_neighbors': 7}
test-set score: 0.993
```

5) Import bike_day_raw.csv. Create a pipeline using ColumnTransformer, Scaling, and KNeighborsRegressor.

`from sklearn.neighbors import KNeighborsRegressor'

In [7]:

```
import pandas as pd

# Read the data from the file
data = pd.read_csv("bike_day_raw.csv")

data.head()
# Get all the features assigned to X except cnt
X = data.drop('cnt', axis=1)
#Get cnt asssigned to output/target variable
y = data.iloc[:, 10]
```

In [8]:

```
data.head()
```

Out[8]:

	season	mnth	holiday	weekday	workingday	weathersit	temp	atemp	hum	wind
0	1	1	0	6	0	2	0.344167	0.363625	0.805833	0.1
1	1	1	0	0	0	2	0.363478	0.353739	0.696087	0.2
2	1	1	0	1	1	1	0.196364	0.189405	0.437273	0.2
3	1	1	0	2	1	1	0.200000	0.212122	0.590435	0.1
4	1	1	0	3	1	1	0.226957	0.229270	0.436957	0.1

In [9]:

```
data.dtypes
```

Out[9]:

```
season          int64
mnth            int64
holiday         int64
weekday         int64
workingday      int64
weathersit      int64
temp          float64
atemp         float64
hum           float64
windspeed     float64
cnt             int64
dtype: object
```

In [20]:

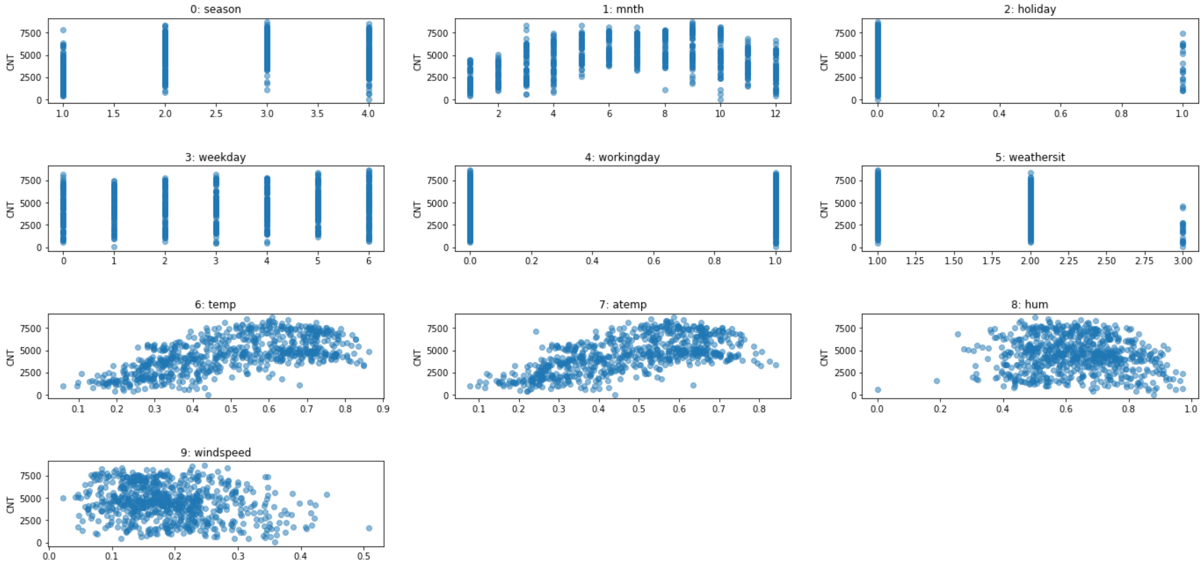
```
X.columns
```

Out[20]:

```
Index(['season', 'mnth', 'holiday', 'weekday', 'workingday', 'weathersi
t',
       'temp', 'atemp', 'hum', 'windspeed'],
      dtype='object')
```

In [24]:

```
import numpy as np
import matplotlib.pyplot as plt
fig, axes = plt.subplots(4, 3, figsize=(20, 10))
fig.tight_layout(pad=5.0)
for i, ax in enumerate(axes.ravel()):
    if i > 9:
        ax.set_visible(False)
        continue
    ax.plot(X.iloc[:, i], y, 'o', alpha=.5)
    ax.set_title("{}: {}".format(i, X.columns[i]))
    ax.set_ylabel("CNT")
```



In [25]:

```
from sklearn.compose import ColumnTransformer, make_column_transformer
from sklearn.impute import SimpleImputer
from sklearn.pipeline import make_pipeline
data.shape
```

Out[25]:

```
(731, 11)
```

In [26]:

```
from sklearn.preprocessing import StandardScaler, OneHotEncoder
from sklearn.compose import ColumnTransformer, make_column_transformer
from sklearn.neighbors import KNeighborsRegressor
from sklearn.model_selection import cross_val_score,train_test_split,GridSearchCV
numerical_features = X.dtypes == 'float'
categorical_features = X.dtypes != 'float'
```

In [13]:

```
#make_pipeline(SimpleImputer(), StandardScaler())

preprocess1 = make_column_transformer((make_pipeline(SimpleImputer(), StandardScale
r()), numerical_features),
                                     (OneHotEncoder(categories='auto'), categorical
_features))
```

In [14]:

```
model1 = make_pipeline(preprocess1, KNeighborsRegressor())
```

In [15]:

```
X_train, X_test, y_train, y_test = train_test_split(X, y, random_state=132)
model1.fit(X_train, y_train)
print("KNeighborsRegressor regression score: %f" % model1.score(X_test, y_test))
```

```
KNeighborsRegressor regression score: 0.537128
```

In [16]:

```
data.columns
```

Out[16]:

```
Index(['season', 'mnth', 'holiday', 'weekday', 'workingday', 'weathersi
t',
       'temp', 'atemp', 'hum', 'windspeed', 'cnt'],
      dtype='object')
```

In [17]:

```
from sklearn.pipeline import Pipeline
from sklearn.impute import SimpleImputer
numeric_features = ['temp', 'atemp', 'hum', 'windspeed']
numeric_transformer = Pipeline(steps=[
    ('imputer', SimpleImputer(strategy='median')),
    ('scaler', StandardScaler())])

categorical_features = ['season', 'mnth', 'holiday', 'weekday', 'workingday', 'weat
hersit']
categorical_transformer = Pipeline(steps=[('onehot', OneHotEncoder(handle_unknown=
'ignore'))])
```

In [18]:

```
preprocessor2 = ColumnTransformer(
    transformers=[
        ('num', numeric_transformer, numeric_features),
        ('cat', categorical_transformer, categorical_features)])

# Append classifier to preprocessing pipeline.
# Now we have a full prediction pipeline.
model2 = Pipeline(steps=[('preprocessor2', preprocessor2),
                      ('regressor', KNeighborsRegressor())])

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2)

model2.fit(X_train, y_train)
print("model score: %.3f" % model2.score(X_test, y_test))
```

```
model score: 0.427
```

In [ ]: