Kaggle 대회

In [1]:

```
from IPython.display import display, Image
```

Data Fields

필드명	설명
datetime	hourly date + timestamp
season	1 = spring, 2 = summer, 3 = fall, 4 = winter
holiday	whether the day is considered a holiday
workingday	whether the day is neither a weekend nor holiday
weather	1: Clear, Few clouds, Partly cloudy, Partly cloudy 2: Mist + Cloudy, Mist + Broken clouds, Mist + Few clouds, Mist 3: Light Snow, Light Rain + Thunderstorm + Scattered clouds, Light Rain + Scattered clouds 4: Heavy Rain + Ice Pallets + Thunderstorm + Mist, Snow + Fog
temp	temperature in Celsius (온도)
atemp	"feels like" temperature in Celsius (체감온도)
humidity	relative humidity (습도)
windspeed	wind speed (바람속도)
casual	number of non-registered user rentals initiated (비가입자 사용유저)
registered	number of registered user rentals initiated (가입자 사용유저)
count	number of total rentals (전체 렌탈 대수)

In [1]:

```
import pandas as pd
```

1-1 데이터 준비하기

In [2]:

```
## train 데이터 셋 , test 데이터 셋
## train 은 학습을 위한 데이터 셋
## test 은 예측을 위한 데이터 셋(평가)
## parse_dates : datetime 컬럼을 시간형으로 불러올 수 있음
train = pd.read_csv("bike/train.csv", parse_dates=['datetime'])
test = pd.read_csv("bike/test.csv", parse_dates=['datetime'])
```

In [3]:

```
print(train.shape)   # : 행과 열 갯수 확인
print(test.shape)
```

```
(10886, 12)
(6493, 9)
```

In [4]:

```
train.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10886 entries, 0 to 10885
Data columns (total 12 columns):
 #   Column      Non-Null Count  Dtype         
---  ------      --------------  -----         
 0   datetime    10886 non-null  datetime64[ns]
 1   season      10886 non-null  int64         
 2   holiday     10886 non-null  int64         
 3   workingday  10886 non-null  int64         
 4   weather     10886 non-null  int64         
 5   temp        10886 non-null  float64       
 6   atemp       10886 non-null  float64       
 7   humidity    10886 non-null  int64         
 8   windspeed   10886 non-null  float64       
 9   casual      10886 non-null  int64         
 10  registered  10886 non-null  int64         
 11  count       10886 non-null  int64         
dtypes: datetime64[ns](1), float64(3), int64(8)
memory usage: 1020.7 KB
```

In [5]:

```
import matplotlib.pyplot as plt ## seaborn 보다 고급 시각화 가능. but 코드 복잡
import seaborn as sns           ## seaborn은 matplotlib보다 간단하게 사용 가능
```

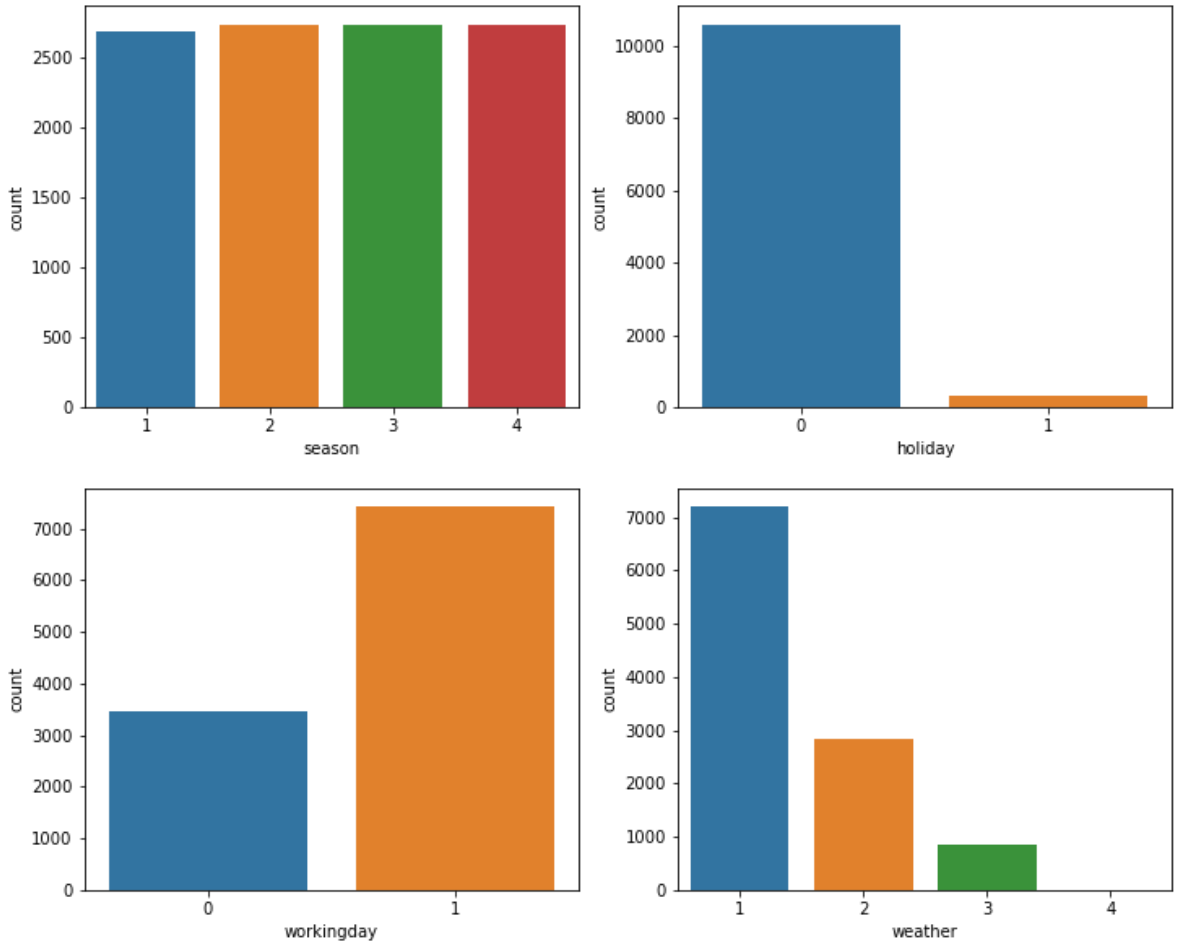
1-2 데이터 탐색해 보기 - 시각화

- 범주형 데이터 : 'season', 'holiday', 'workingday', 'weather'

In [6]:

```
col_names = [ 'season', 'holiday', 'workingday', 'weather'  ]
i = 0
plt.figure(figsize=(12,10))  # 전체 그래프의 크기 지정

for name in col_names:        # 컬럼명을 전달 리스트 수 만큼 반복 -> 4회
    i = i + 1                 # 숫자를 1씩 증가.
    plt.subplot(2,2,i)        # 2행 2열에 i번째 그래프 선택
    sns.countplot(name, data=train)  # i번째 그래프에 sns.countplot를 그리겠다.

plt.show()  # 주피터에서 보여주지만, 다른곳(editor, pycharm)에서는 이걸 실행시켜야 한다.
```

```
C:₩Users₩toto₩anaconda3₩lib₩site-packages₩seaborn₩_decorators.py:36: FutureWarning:
Pass the following variable as a keyword arg: x. From version 0.12, the only valid p
ositional argument will be `data`, and passing other arguments without an explicit k
eyword will result in an error or misinterpretation.
  warnings.warn(
C:₩Users₩toto₩anaconda3₩lib₩site-packages₩seaborn₩_decorators.py:36: FutureWarning:
Pass the following variable as a keyword arg: x. From version 0.12, the only valid p
ositional argument will be `data`, and passing other arguments without an explicit k
eyword will result in an error or misinterpretation.
  warnings.warn(
C:₩Users₩toto₩anaconda3₩lib₩site-packages₩seaborn₩_decorators.py:36: FutureWarning:
Pass the following variable as a keyword arg: x. From version 0.12, the only valid p
ositional argument will be `data`, and passing other arguments without an explicit k
eyword will result in an error or misinterpretation.
  warnings.warn(
C:₩Users₩toto₩anaconda3₩lib₩site-packages₩seaborn₩_decorators.py:36: FutureWarning:
Pass the following variable as a keyword arg: x. From version 0.12, the only valid p
ositional argument will be `data`, and passing other arguments without an explicit k
eyword will result in an error or misinterpretation.
  warnings.warn(
```



수치형 데이터 선택

In [7]:

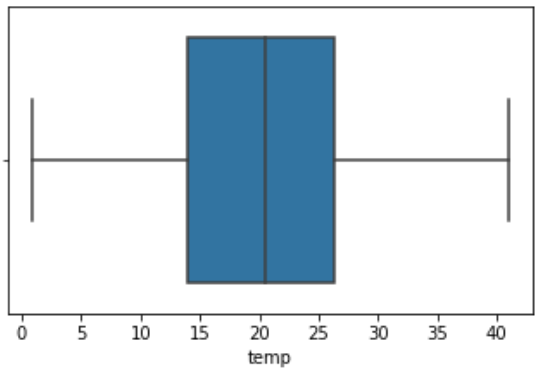
```
### temp, atemp, humidity, windspeed

num_names = ['temp', 'atemp', 'humidity', 'windspeed']
train.columns
```

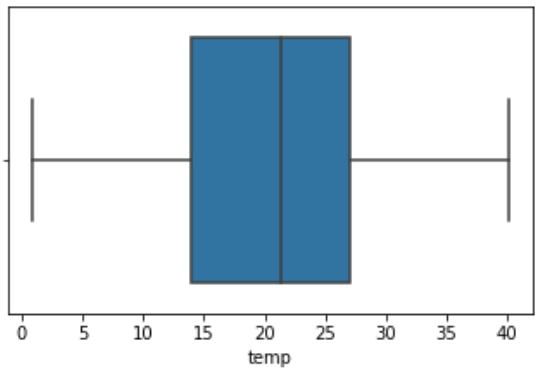
Out[7]:

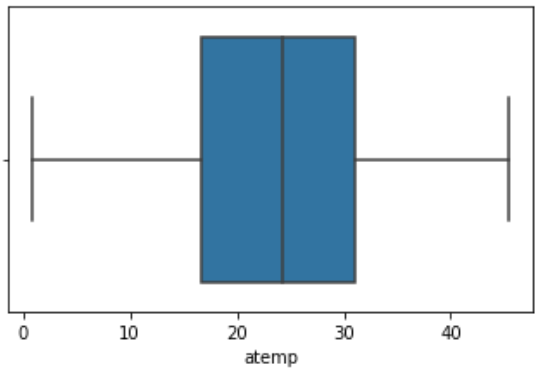
```
Index(['datetime', 'season', 'holiday', 'workingday', 'weather', 'temp',
       'atemp', 'humidity', 'windspeed', 'casual', 'registered', 'count'],
      dtype='object')
```

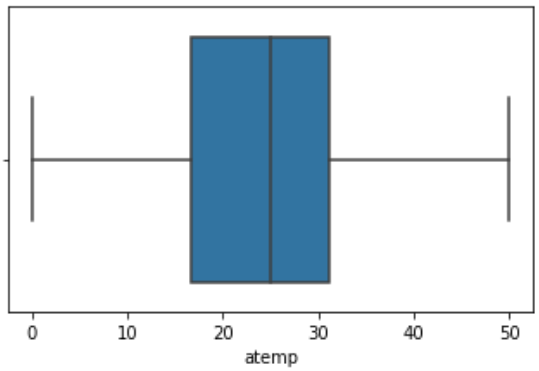
In [10]:

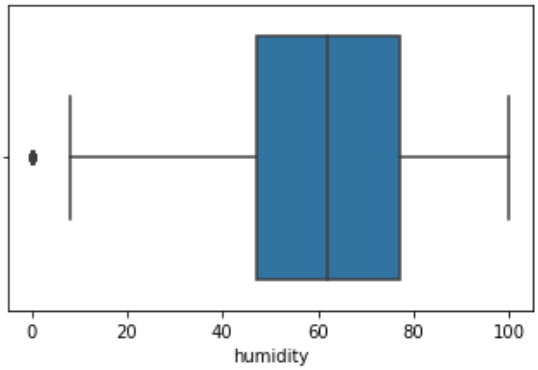
```
# par(mfrow=c(2,2)) -> R

i = 0
plt.figure(figsize=(12,15))   # 전체 그래프의 크기 지정 (가로, 세로)

for name in num_names:         # 컬럼명을 전달 리스트 수 만큼 반복 -> 4회
    i = i + 1                  # 숫자를 1씩 증가.
    plt.subplot(4,2,i*2-1)       # 2행 2열에 i번째 그래프 선택
    sns.boxplot(x = name, data=train)  # i번째 그래프에 sns.countplot를 그리겠다.
    plt.subplot(4,2,i*2)         # 2행 2열에 i번째 그래프 선택
    sns.boxplot(x = name, data=test)  # i번째 그래프에 sns.countplot를 그리겠다.

plt.show()
```

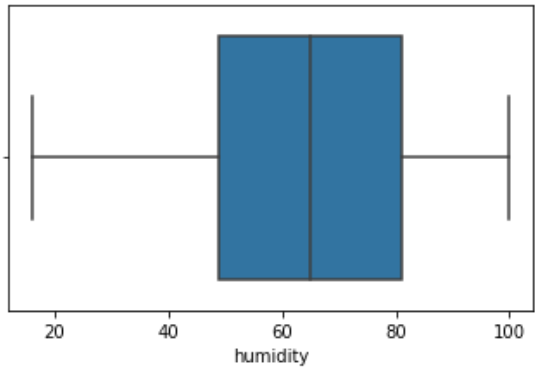


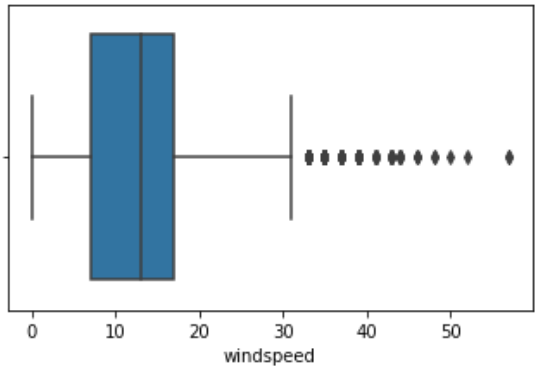


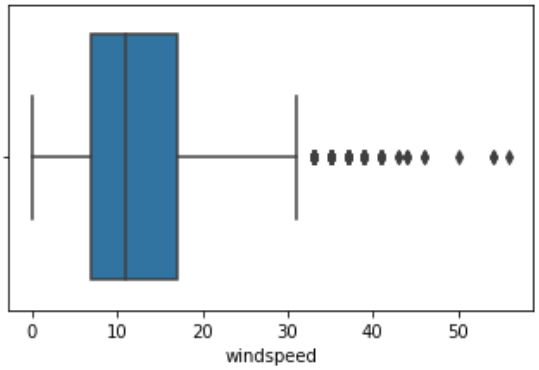












In [11]:

```
new_tr = train.copy()   # 데이터 백업
new_test = test.copy()
new_tr.columns
```

Out[11]:

```
Index(['datetime', 'season', 'holiday', 'workingday', 'weather', 'temp',
       'atemp', 'humidity', 'windspeed', 'casual', 'registered', 'count'],
      dtype='object')
```

1-3 파생변수(더미변수) 생성

In [12]:

```
## 더미변수, 파생변수 생성
new_tr['year'] = new_tr['datetime'].dt.year
new_tr.head()
```

Out[12]:

	datetime	season	holiday	workingday	weather	temp	atemp	humidity	windspeed	casual
0	2011-01-01 00:00:00	1	0	0	1	9.84	14.395	81	0.0	3
1	2011-01-01 01:00:00	1	0	0	1	9.02	13.635	80	0.0	8
2	2011-01-01 02:00:00	1	0	0	1	9.02	13.635	80	0.0	5
3	2011-01-01 03:00:00	1	0	0	1	9.84	14.395	75	0.0	3
4	2011-01-01 04:00:00	1	0	0	1	9.84	14.395	75	0.0	0

In [13]:

```
new_tr['month'] = new_tr['datetime'].dt.month
new_tr['day'] = new_tr['datetime'].dt.day
new_tr['hour'] = new_tr['datetime'].dt.hour
new_tr['minute'] = new_tr['datetime'].dt.minute
new_tr['second'] = new_tr['datetime'].dt.second
new_tr['dayofweek'] = new_tr['datetime'].dt.dayofweek
new_tr.head()
```

Out[13]:

	datetime	season	holiday	workingday	weather	temp	atemp	humidity	windspeed	casual
0	2011-01-01 00:00:00	1	0	0	1	9.84	14.395	81	0.0	3
1	2011-01-01 01:00:00	1	0	0	1	9.02	13.635	80	0.0	8
2	2011-01-01 02:00:00	1	0	0	1	9.02	13.635	80	0.0	5
3	2011-01-01 03:00:00	1	0	0	1	9.84	14.395	75	0.0	3
4	2011-01-01 04:00:00	1	0	0	1	9.84	14.395	75	0.0	0

In [14]:

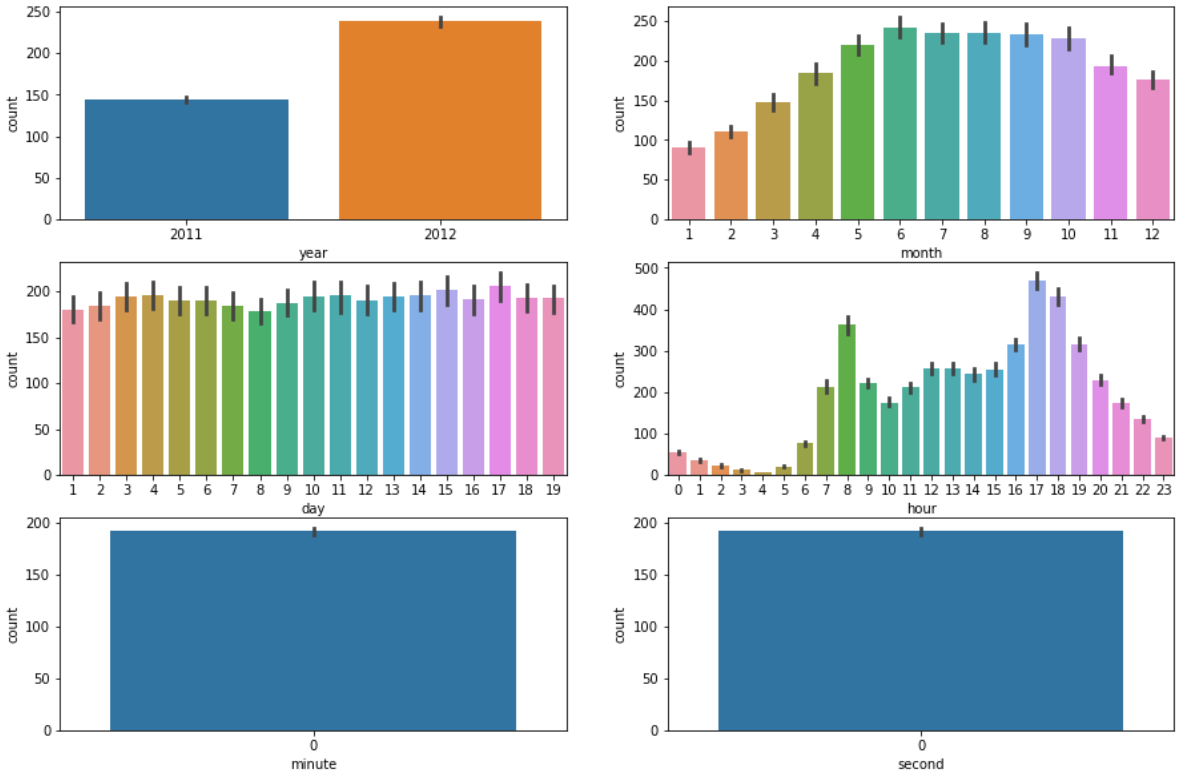
```
train.columns
```

Out[14]:

```
Index(['datetime', 'season', 'holiday', 'workingday', 'weather', 'temp',
       'atemp', 'humidity', 'windspeed', 'casual', 'registered', 'count'],
      dtype='object')
```

In [15]:

```
datetime_names = ['year', 'month', 'day', 'hour', 'minute', 'second']

i=0
plt.figure(figsize=(15,10))
for name in datetime_names:
    i = i + 1
    plt.subplot(3,2,i)
    sns.barplot(x=name, y='count', data=new_tr)

plt.show()
```



확인

- 2011년, 2012년이 더 많다. (성장했는가?)

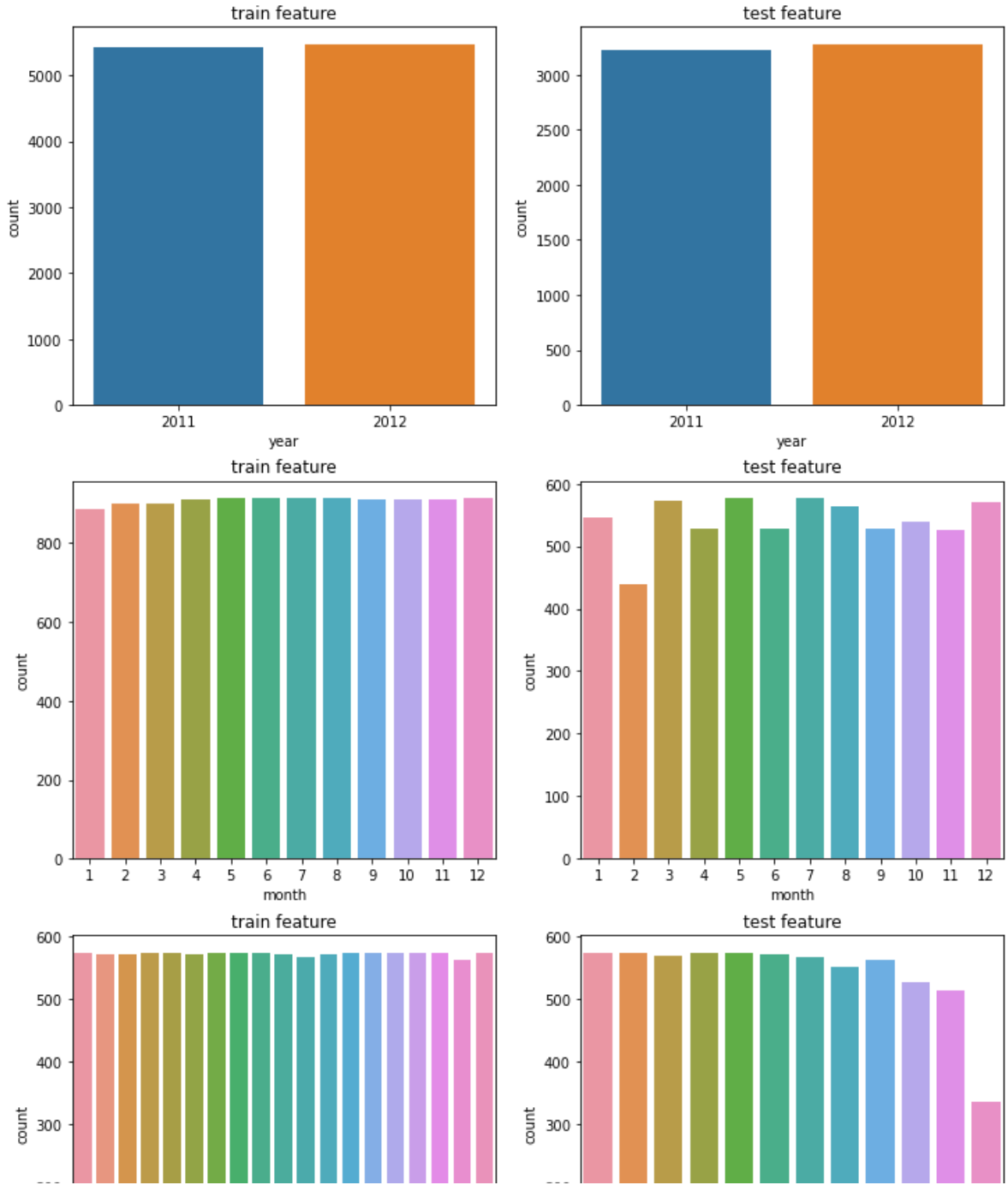
- 여름이 많다.
- day는 고른 분포를 보인다.
- hour는 8시, 17,18시대에 많다. (새벽 시간대도 있구나... 음.)
- minute, second는 0 데이터 의미가 없음.
- day 1~19 일... 20일이 없네요.(test)

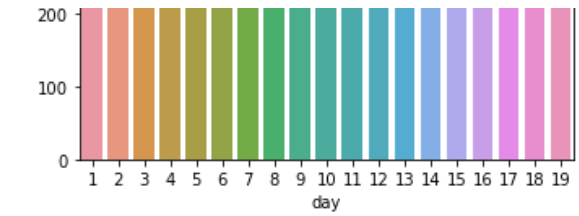
In [16]:

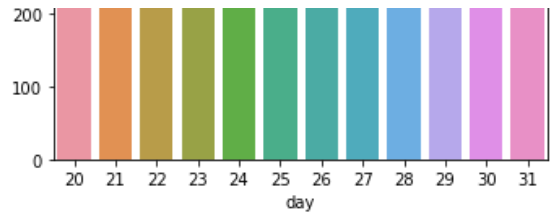
```
new_test['year'] = new_test['datetime'].dt.year
new_test['month'] = new_test['datetime'].dt.month
new_test['day'] = new_test['datetime'].dt.day
new_test['dayofweek'] = new_test['datetime'].dt.dayofweek
new_test['hour'] = new_test['datetime'].dt.hour
new_test['minute'] = new_test['datetime'].dt.minute
new_test['second'] = new_test['datetime'].dt.second
```

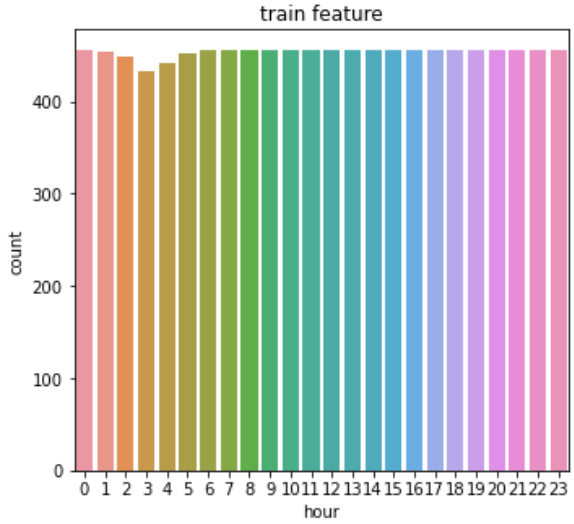
In [19]:

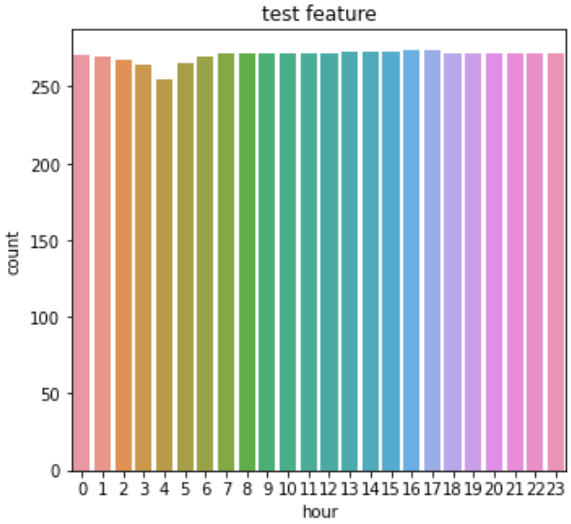
```
col_names = ['year','month','day','hour','dayofweek']
i = 0

plt.figure(figsize=(12,35))  ##전체 그래프 크기 지정

for name in col_names: ## 컬럼명으로 반복
  i = i+1
  plt.subplot(6,2,i)  ##2행2열, i = 1,2,3,4 (왼쪽 상단부터 시계방향으로 순번 지정)
  sns.countplot(x = name, data = new_tr)
  plt.title("train feature")

  i = i+1
  plt.subplot(6,2,i)  ##2행2열, i = 1,2,3,4 (왼쪽 상단부터 시계방향으로 순번 지정)
  sns.countplot(x = name, data = new_test)
  plt.title("test feature")

plt.show()
```

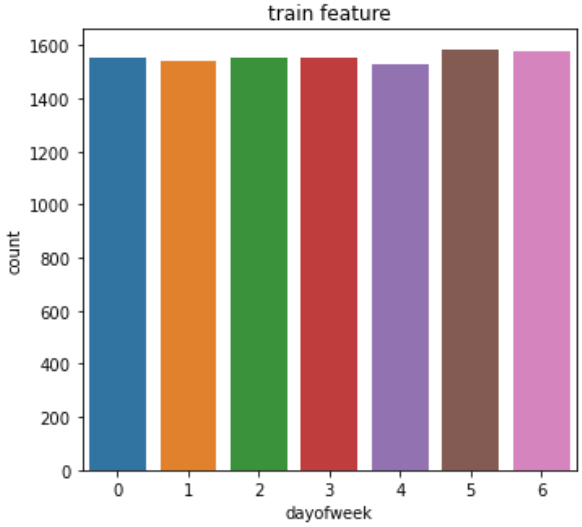


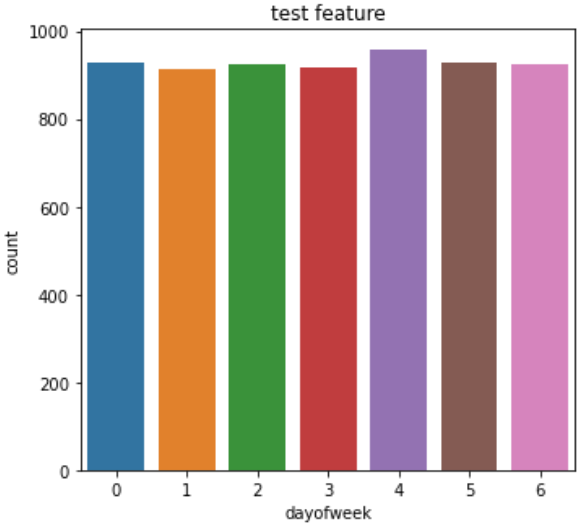












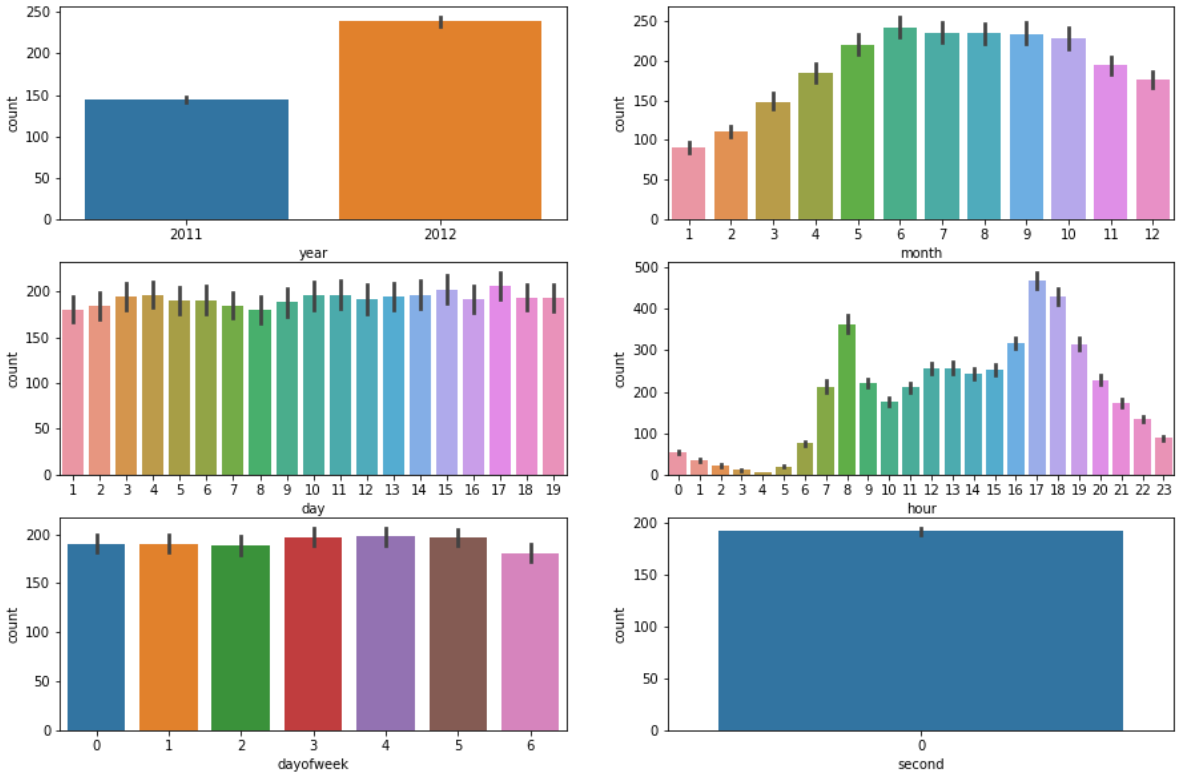
변수 생성

In [20]:

```
new_tr['dayofweek'] = new_tr['datetime'].dt.dayofweek  # Monday=0, Sunday=6
```

In [21]:

```
datetime_names = ['year', 'month', 'day', 'hour', 'dayofweek', 'second']

i=0
plt.figure(figsize=(15,10))
for name in datetime_names:
    i = i + 1
    plt.subplot(3,2,i)
    sns.barplot(x=name, y='count', data=new_tr)

plt.show()
```



In [22]:

```
print(new_test.shape)
new_test[["datetime", "year", "month", "day", "hour", "minute", "second", "dayofweek"]].head()
```

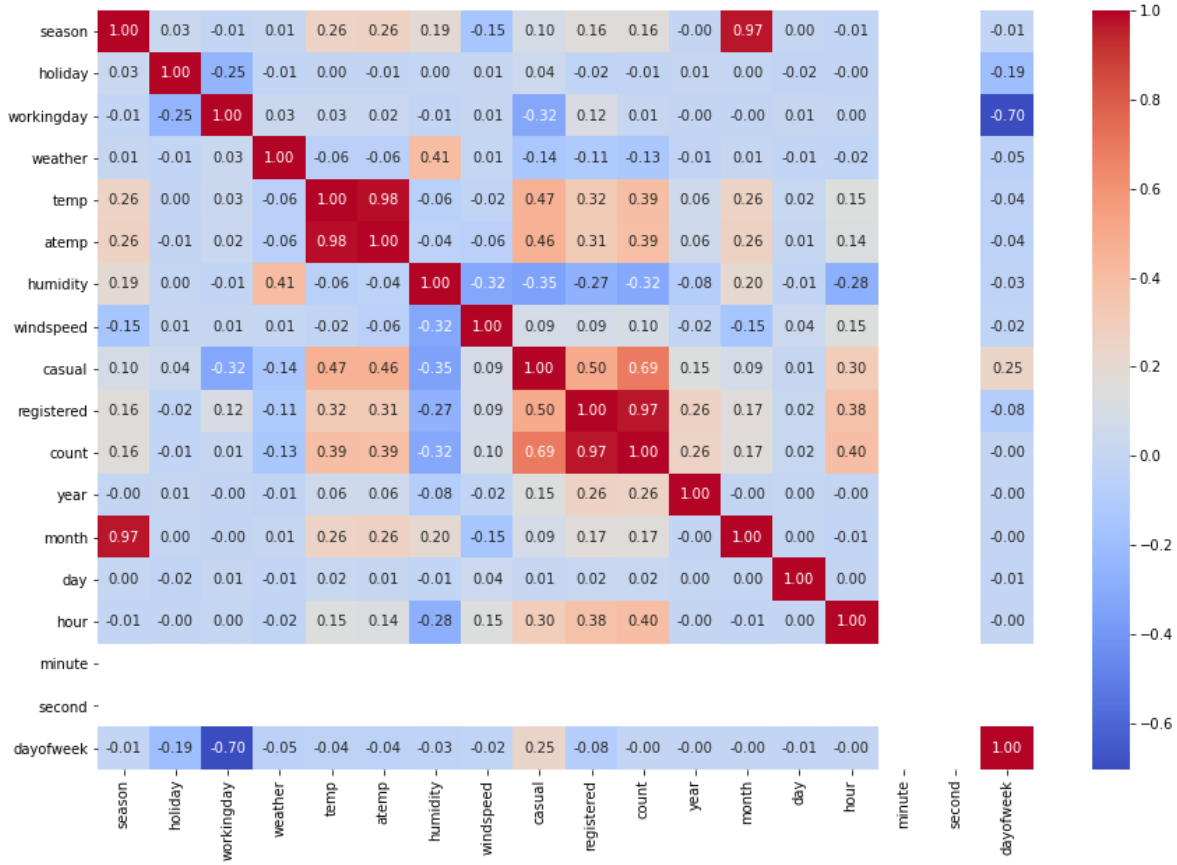
(6493, 16)

Out[22]:

	datetime	year	month	day	hour	minute	second	dayofweek
0	2011-01-20 00:00:00	2011	1	20	0	0	0	3
1	2011-01-20 01:00:00	2011	1	20	1	0	0	3
2	2011-01-20 02:00:00	2011	1	20	2	0	0	3
3	2011-01-20 03:00:00	2011	1	20	3	0	0	3
4	2011-01-20 04:00:00	2011	1	20	4	0	0	3

In [23]:

```
plt.figure(figsize=(15,10))
g = sns.heatmap(new_tr.corr(), annot=True, fmt=".2f", cmap="coolwarm")
```



In [24]:

```
print(new_tr.columns)
print(new_test.columns)
```

```
Index(['datetime', 'season', 'holiday', 'workingday', 'weather', 'temp',
       'atemp', 'humidity', 'windspeed', 'casual', 'registered', 'count',
       'year', 'month', 'day', 'hour', 'minute', 'second', 'dayofweek'],
      dtype='object')
Index(['datetime', 'season', 'holiday', 'workingday', 'weather', 'temp',
       'atemp', 'humidity', 'windspeed', 'year', 'month', 'day', 'dayofweek',
       'hour', 'minute', 'second'],
      dtype='object')
```

In [25]:

```
feature_names = [ 'season', 'holiday', 'workingday', 'weather',
                  'temp', 'atemp', 'humidity', 'windspeed',
                  "year", "hour", "dayofweek"]  # 공통 변수

X_train = new_tr[feature_names]  # 학습용 데이터 변수 선택
X_test = new_test[feature_names]    # 테스트 데이터의 변수 선택
print(X_train.head())
```

```
   season  holiday  workingday  weather  temp   atemp  humidity  windspeed  ₩
0       1        0           0        1  9.84  14.395        81        0.0
1       1        0           0        1  9.02  13.635        80        0.0
2       1        0           0        1  9.02  13.635        80        0.0
3       1        0           0        1  9.84  14.395        75        0.0
4       1        0           0        1  9.84  14.395        75        0.0

   year  hour  dayofweek
0  2011     0          5
1  2011     1          5
2  2011     2          5
3  2011     3          5
4  2011     4          5
```

In [26]:

```
label_name = 'count'                # 렌탈 대수 (종속변수)
y_train = new_tr[label_name]        # 렌탈 대수 변수 값 선택
```

1-4 모델 만들기 및 제출

모델 만들기 및 예측 순서

- 모델을 생성한다. model = 모델명()
- 모델을 학습한다. model.fit(입력값, 출력값)
- 모델을 이용하여 예측 model.predict(입력값)

In [61]:

```
from sklearn.linear_model import LinearRegression   # 선형회귀
model = LinearRegression()
model.fit(X_train, y_train)
predictions = model.predict(X_test)   # 예측(새로운 데이터로)
predictions
```

Out[61]:

```
array([-23.27179232, -20.84936197, -13.04580719, ..., 209.84495832,
       227.95174821, 217.86201958])
```

In [62]:

```
sub = pd.read_csv("bike/sampleSubmission.csv")
sub['count'] = predictions
sub.head()
```

Out[62]:

	datetime	count
0	2011-01-20 00:00:00	-23.271792
1	2011-01-20 01:00:00	-20.849362
2	2011-01-20 02:00:00	-13.045807
3	2011-01-20 03:00:00	-1.986454
4	2011-01-20 04:00:00	5.817101

음수에 대한 값처리

- count가 0이하의 경우에 대해서 'count'를 0으로 한다.

In [63]:

```
sub.loc[ sub['count'] < 0, 'count' ] = 0
sub.loc[ sub['count'] < 0, : ]
```

Out[63]:

	datetime	count

In [64]:

```
# 처음 만는 제출용 csv 파일, 행번호를 없애기
sub.to_csv("firstsubmission.csv", index=False)
```

의사 결정 트리 모델 만들기

In [65]:

```
from sklearn.tree import DecisionTreeRegressor

model = DecisionTreeRegressor()  # 모델 객체 생성.
model.fit(X_train, y_train)
pred_2 = model.predict(X_test)   # 예측(새로운 데이터로)
pred_2
```

Out[65]:

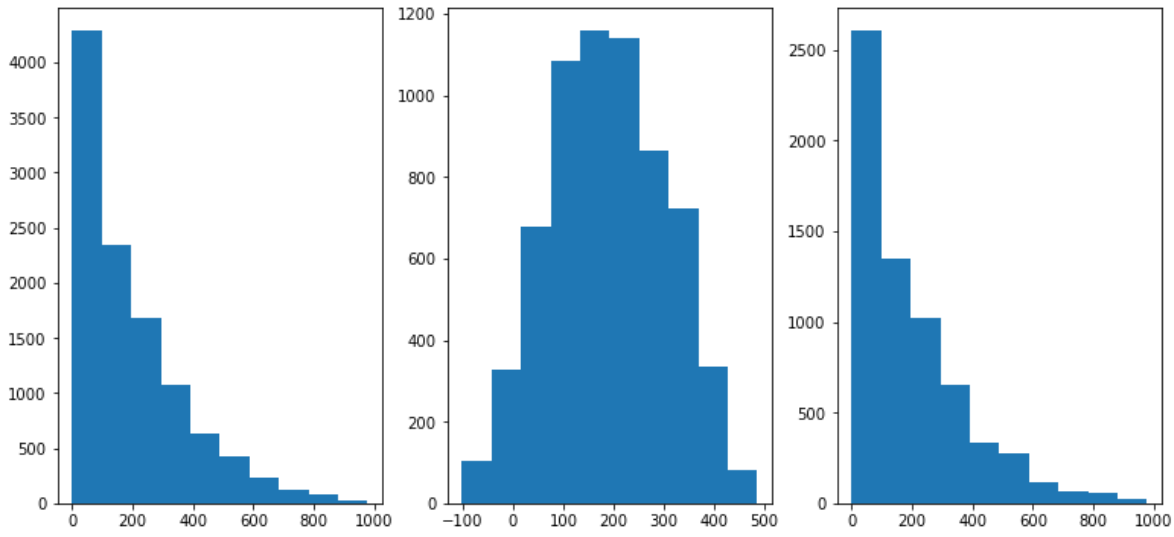
```
array([ 12.,   4.,   3., ...,  71., 106.,  46.])
```

In [66]:

```
plt.figure(figsize=(13,6))
plt.subplot(1,3,1)
plt.hist(new_tr['count'])      #  학습용 데이터 자전거 렌탈 대수
plt.subplot(1,3,2)
plt.hist(predictions) #  선형 회귀로 테스트 데이터 이용 예측한 대수
plt.subplot(1,3,3)
plt.hist(pred_2)     #  의사결정트리로 테스트 데이터 이용 예측한 대수
```

Out[66]:

```
(array([2605., 1351., 1022.,  649.,  336.,  277.,  113.,   64.,   56.,
          20.]),
 array([  1. ,  98.6, 196.2, 293.8, 391.4, 489. , 586.6, 684.2, 781.8,
        879.4, 977. ]),
 <BarContainer object of 10 artists>)
```



In [67]:

```
from sklearn.ensemble import RandomForestRegressor   # 앙상블(의사결정트리 확장판)
```

In [68]:

```
seed = 37
model = RandomForestRegressor(n_jobs=-1, random_state=seed)  # 모델 객체 생성.
model.fit(X_train, y_train)          # 모델 학습(공부가 되었다.)
predictions = model.predict(X_test)   # 예측(새로운 데이터로)
predictions
```

Out[68]:

```
array([ 11.52      ,   4.58      ,   3.76      , ..., 102.1       ,
        99.91333333,  46.9       ])
```

In [69]:

```
sub = pd.read_csv("bike/sampleSubmission.csv")
sub['count'] = predictions
```

In [70]:

```
sub.head()
```

Out[70]:

	datetime	count
0	2011-01-20 00:00:00	11.52
1	2011-01-20 01:00:00	4.58
2	2011-01-20 02:00:00	3.76
3	2011-01-20 03:00:00	3.61
4	2011-01-20 04:00:00	2.97

In [71]:

```
# 처음 만는 제출용 csv 파일, 행번호를 없애기
sub.to_csv("rf_submission.csv", index=False)
```

그렇다면 어떤 모델이 나은지 어떻게 판단할 수 있는가?

1-5 모델 평가 및 제출

- 데이터 나누는 방법으로 기본으로 train_test_split 함수가 있음.
- 교차검증 반복 함수 cross_val_score
  - cross-validation에 의해 점수를 평가한다.
- cross_val_score(model, X, y, scoring=None, cv=None)

```
model : 회귀 분석 모형
X : 독립 변수 데이터
y : 종속 변수 데이터
scoring : 성능 검증에 사용할 함수 이름
cv : 교차검증 생성기 객체 또는 숫자.
    None이면 KFold(3), 숫자 k이면 KFold(k)
```

In [72]:

```
from sklearn.model_selection import cross_val_score
```

In [102]:

```
from sklearn.linear_model import LinearRegression
from sklearn.tree import DecisionTreeRegressor
from sklearn.neighbors import KNeighborsRegressor
from sklearn.ensemble import RandomForestRegressor
from sklearn.ensemble import AdaBoostRegressor
import xgboost as xgb
```

In [74]:

```
import numpy as np
```

In [103]:

```
model_list = ["LinearRegression",  "DecisionTreeRegressor", "KNeighborsRegressor",
              "RandomForestRegressor",  "AdaBoostRegressor", 'XGBoost']
model_score = []
```

선형회귀 01

In [104]:

```
model = LinearRegression()
model.fit(X_train, y_train)
score = cross_val_score(model, X_train, y_train,
                        cv=5, scoring="neg_mean_squared_error")
print(score)
print("MSE 평균 :", score.mean())
m_score = np.abs(score.mean())  # 절대값
model_score.append(m_score)
```

```
[-10001.73269892 -14719.1205855  -13684.42876335 -33057.3894553
 -33971.64722717]
MSE 평균 : -21086.86374604611
```

의사결정트리 decision tree, knn

In [105]:

```
model = DecisionTreeRegressor()
model.fit(X_train, y_train)
score = cross_val_score(model, X_train, y_train,
                        cv=5, scoring="neg_mean_squared_error")
print(score)
print("MSE 평균 :", score.mean())
m_score = np.abs(score.mean())  # 절대값
print(m_score)
model_score.append(m_score)
```

```
[-7782.01388889 -5197.78180983 -8741.2596463  -8810.50941663
 -8719.94487827]
MSE 평균 : -7850.301927984484
7850.301927984484
```

In [106]:

```
model = KNeighborsRegressor()
model.fit(X_train, y_train)
score = cross_val_score(model, X_train, y_train,
                        cv=5, scoring="neg_mean_squared_error")
print(score)
print("MSE 평균 :", score.mean())
m_score = np.abs(score.mean())  # 절대값
model_score.append(m_score)
```

```
[-15489.78091827 -19509.55790537 -12562.31961415 -24299.72957281
 -28798.93245751]
MSE 평균 : -20132.064093622575
```

앙상블 RandomForest, Ada

In [107]:

```
model = RandomForestRegressor()
model.fit(X_train, y_train)
score = cross_val_score(model, X_train, y_train,
                        cv=5, scoring="neg_mean_squared_error")
print(score)
print("MSE 평균 :", score.mean())
m_score = np.abs(score.mean())  # 절대값
model_score.append(m_score)
```

```
[-6935.45581557 -2912.27409891 -6272.28918354 -4639.16769773
 -5771.57903426]
MSE 평균 : -5306.153166002016
```

In [108]:

```
model = AdaBoostRegressor()
model.fit(X_train, y_train)
score = cross_val_score(model, X_train, y_train,
                        cv=5, scoring="neg_mean_squared_error")
print(score)
print("MSE 평균 :", score.mean())
m_score = np.abs(score.mean())  # 절대값
model_score.append(m_score)
```

```
[-19748.77369039  -9561.03124556 -15969.16105578 -12759.7077947
 -15936.48784288]
MSE 평균 : -14795.03232586231
```

In [109]:

```
# 기본 옵션 확인
xg_reg = xgb.XGBRegressor()
xg_reg
```

Out[109]:

```
XGBRegressor(base_score=None, booster=None, colsample_bylevel=None,
             colsample_bynode=None, colsample_bytree=None, gamma=None,
             gpu_id=None, importance_type='gain', interaction_constraints=None,
             learning_rate=None, max_delta_step=None, max_depth=None,
             min_child_weight=None, missing=nan, monotone_constraints=None,
             n_estimators=100, n_jobs=None, num_parallel_tree=None,
             random_state=None, reg_alpha=None, reg_lambda=None,
             scale_pos_weight=None, subsample=None, tree_method=None,
             validate_parameters=None, verbosity=None)
```

In [110]:

```
xg_reg = xgb.XGBRegressor(objective ='reg:linear',
            colsample_bytree = 0.3, # 각나무마다 사용하는 feature 비율
            learning_rate = 0.1,
            max_depth = 4,
            alpha = 0.1,
            n_estimators = 1000)  # n_estimators=100

xg_reg.fit(X_train,y_train)
```

```
[00:02:21] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.4.0/sr
c/objective/regression_obj.cu:171: reg:linear is now deprecated in favor of reg:squa
rederror.
```

Out[110]:

```
XGBRegressor(alpha=0.1, base_score=0.5, booster='gbtree', colsample_bylevel=1,
             colsample_bynode=1, colsample_bytree=0.3, gamma=0, gpu_id=-1,
             importance_type='gain', interaction_constraints='',
             learning_rate=0.1, max_delta_step=0, max_depth=4,
             min_child_weight=1, missing=nan, monotone_constraints='()',
             n_estimators=1000, n_jobs=8, num_parallel_tree=1,
             objective='reg:linear', random_state=0, reg_alpha=0.100000001,
             reg_lambda=1, scale_pos_weight=1, subsample=1, tree_method='exact',
             validate_parameters=1, verbosity=None)
```

In [111]:

```
score = cross_val_score(xg_reg, X_train, y_train,
                        cv=5, scoring="neg_mean_squared_error")

print(score)
print("MSE 평균 :", score.mean())
m_score = np.abs(score.mean())  # 절대값
model_score.append(m_score)
```

```
[00:02:44] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.4.0/sr
c/objective/regression_obj.cu:171: reg:linear is now deprecated in favor of reg:squa
rederror.
[00:02:46] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.4.0/sr
c/objective/regression_obj.cu:171: reg:linear is now deprecated in favor of reg:squa
rederror.
[00:02:48] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.4.0/sr
c/objective/regression_obj.cu:171: reg:linear is now deprecated in favor of reg:squa
rederror.
[00:02:50] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.4.0/sr
c/objective/regression_obj.cu:171: reg:linear is now deprecated in favor of reg:squa
rederror.
[00:02:52] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.4.0/sr
c/objective/regression_obj.cu:171: reg:linear is now deprecated in favor of reg:squa
rederror.
[-4380.28869005 -2324.6164414  -1840.46573254 -4999.57870057
 -5634.6040644 ]
MSE 평균 : -3835.9107257931914
```

In [112]:

```
import pandas as pd
dat = pd.DataFrame( {'model_name':model_list, 'score': model_score })
dat
```

Out[112]:

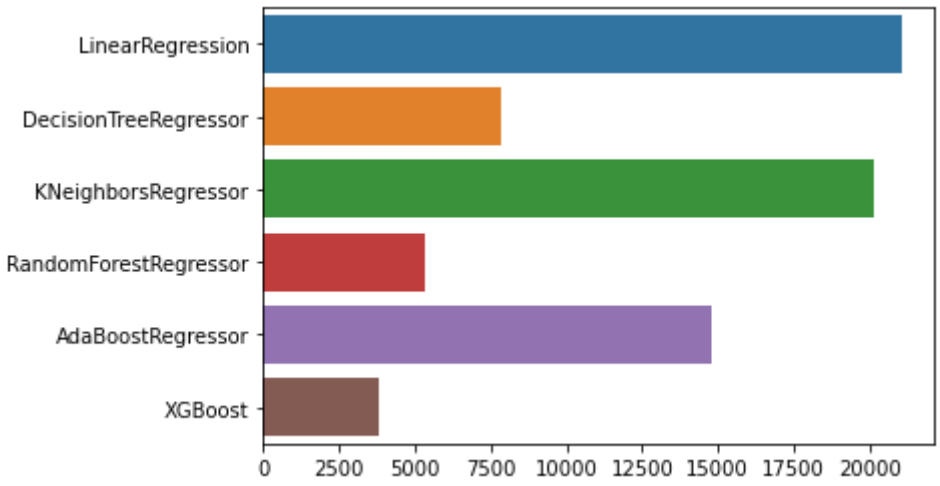
	model_name	score
0	LinearRegression	21086.863746
1	DecisionTreeRegressor	7850.301928
2	KNeighborsRegressor	20132.064094
3	RandomForestRegressor	5306.153166
4	AdaBoostRegressor	14795.032326
5	XGBoost	3835.910726

In [113]:

```
# 모델과 스코어 확인하기
sns.barplot(x=model_score , y=model_list, data=dat)
```

Out[113]:

<AxesSubplot:>



가장 오차가 적은 XGBoost 모델로 예측해 보기

In [114]:

```
xg_reg = xgb.XGBRegressor(objective ='reg:linear',
            colsample_bytree = 0.3, # 각나무마다 사용하는 feature 비율
            learning_rate = 0.1,
            max_depth = 4,
            alpha = 0.1,
            n_estimators = 1000)  # n_estimators=100

xg_reg.fit(X_train,y_train)
pred = xg_reg.predict(X_test)
pred[0:10]
```

```
[00:03:49] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.4.0/sr
c/objective/regression_obj.cu:171: reg:linear is now deprecated in favor of reg:squa
rederror.
```

Out[114]:

```
array([ 14.049359,  -8.794612, -13.757817,  -8.786678,  -8.786678,
        14.515716,  46.236958, 132.30856 , 290.85114 , 112.38747 ],
      dtype=float32)
```

In [115]:

```
pd.DataFrame( {"pred":pred})
```

Out[115]:

	pred
0	14.049359
1	-8.794612
2	-13.757817
3	-8.786678
4	-8.786678
...	...
6488	257.850494
6489	175.489990
6490	134.655014
6491	71.388786
6492	42.137260

6493 rows × 1 columns

In [116]:

```
sub = pd.read_csv("bike/sampleSubmission.csv")
sub['count'] = pred
sub.to_csv("sub_xgb_last.csv", index=False)
```

REF

- cross_val_score:
  - https://scikit-learn.org/stable/modules/generated/sklearn.model_selection.cross_val_score.html (https://scikit-learn.org/stable/modules/generated/sklearn.model_selection.cross_val_score.html)
- 모델 평가 scoring : https://scikit-learn.org/stable/modules/model_evaluation.html (https://scikit-learn.org/stable/modules/model_evaluation.html)
- XGBOOST Documentation : https://xgboost.readthedocs.io/en/latest/index.html (https://xgboost.readthedocs.io/en/latest/index.html)

History

- 2020-06 update
- 2020-09 update v12
- 2021-10 update v13 - mse 추가