라이브러리 불러오기

In [2]:

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import os
```

In [3]:

```
import pandas as pd
data_tr = pd.read_csv("california_housing_train.csv")
data_test = pd.read_csv("california_housing_test.csv")

print("캘리포니아 데이터 행열(train) :", data_tr.shape)
print("캘리포니아 데이터 행열(test) :", data_test.shape)
```

```
캘리포니아 데이터 행열(train) : (17000, 9)
캘리포니아 데이터 행열(test) : (3000, 9)
```

일부 행만 보기

In [4]:

```
print(data_tr.head())     # 5행만 보기
print(data_test.head(3)) # 3행만 보기
# tail를 이용하여 뒤에 5행을 볼 수 있음.
data_tr.tail()     # 뒤에서 5행만 보기
```

```
   longitude  latitude  housing_median_age  total_rooms  total_bedrooms  ₩
0    -114.31     34.19                15.0       5612.0          1283.0
1    -114.47     34.40                19.0       7650.0          1901.0
2    -114.56     33.69                17.0        720.0           174.0
3    -114.57     33.64                14.0       1501.0           337.0
4    -114.57     33.57                20.0       1454.0           326.0

   population  households  median_income  median_house_value
0      1015.0       472.0         1.4936             66900.0
1      1129.0       463.0         1.8200             80100.0
2       333.0       117.0         1.6509             85700.0
3       515.0       226.0         3.1917             73400.0
4       624.0       262.0         1.9250             65500.0
   longitude  latitude  housing_median_age  total_rooms  total_bedrooms  ₩
0    -122.05     37.37                27.0       3885.0          661.0
1    -118.30     34.26                43.0       1510.0          310.0
2    -117.81     33.78                27.0       3589.0          507.0

   population  households  median_income  median_house_value
0      1537.0       606.0         6.6085            344700.0
1       809.0       277.0         3.5990            176500.0
2      1484.0       495.0         5.7934            270500.0
```

Out[4]:

	longitude	latitude	housing_median_age	total_rooms	total_bedrooms	population	house
16995	-124.26	40.58	52.0	2217.0	394.0	907.0	
16996	-124.27	40.69	36.0	2349.0	528.0	1194.0	
16997	-124.30	41.84	17.0	2677.0	531.0	1244.0	
16998	-124.30	41.80	19.0	2672.0	552.0	1298.0	
16999	-124.35	40.54	52.0	1820.0	300.0	806.0	

파일 만들기(csv, excel)

In [5]:

```
### 구글 콜랩의 데이터 셋을 이용해서 csv, excel파일을 만들자.
data_tr.to_csv("data.csv", index=False)
data_tr.to_excel("data.xlsx", index=True)

### 파일을 불러와 보자.
excel_data = pd.read_excel("data.xlsx")
csv_data = pd.read_csv("data.csv")
```

In [6]:

```
### 파일 생성 확인(리눅스 명령 이용)
!ls
```

'ls'은(는) 내부 또는 외부 명령, 실행할 수 있는 프로그램, 또는
배치 파일이 아닙니다.

In [7]:

```
excel_data.head()
```

Out[7]:

	Unnamed: 0	longitude	latitude	housing_median_age	total_rooms	total_bedrooms	population
0	0	-114.31	34.19	15	5612	1283	1015
1	1	-114.47	34.40	19	7650	1901	1129
2	2	-114.56	33.69	17	720	174	333
3	3	-114.57	33.64	14	1501	337	515
4	4	-114.57	33.57	20	1454	326	624

In [8]:

```
csv_data.head()
```

Out[8]:

	longitude	latitude	housing_median_age	total_rooms	total_bedrooms	population	household
0	-114.31	34.19	15.0	5612.0	1283.0	1015.0	472
1	-114.47	34.40	19.0	7650.0	1901.0	1129.0	463
2	-114.56	33.69	17.0	720.0	174.0	333.0	117
3	-114.57	33.64	14.0	1501.0	337.0	515.0	226
4	-114.57	33.57	20.0	1454.0	326.0	624.0	262

In [9]:

```
1 data_tr = pd.read_csv("sample_data/california_housing_train.csv")
2 data_test = pd.read_csv("sample_data/california_housing_test.csv")
```

```
---------------------------------------------------------------------------
FileNotFoundError                         Traceback (most recent call last)
<ipython-input-9-b0b012c74a52> in <module>
----> 1 data_tr = pd.read_csv("sample_data/california_housing_train.csv")
      2 data_test = pd.read_csv("sample_data/california_housing_test.csv")

~₩Anaconda3₩lib₩site-packages₩pandas₩io₩parsers.py in parser_f(filepath_or_
buffer, sep, delimiter, header, names, index_col, usecols, squeeze, prefi
x, mangle_dupe_cols, dtype, engine, converters, true_values, false_values,
skipinitialspace, skiprows, skipfooter, nrows, na_values, keep_default_na,
na_filter, verbose, skip_blank_lines, parse_dates, infer_datetime_format,
 keep_date_col, date_parser, dayfirst, iterator, chunksize, compression, t
housands, decimal, lineterminator, quotechar, quoting, doublequote, escape
char, comment, encoding, dialect, tupleize_cols, error_bad_lines, warn_bad
_lines, delim_whitespace, low_memory, memory_map, float_precision)
    700                     skip_blank_lines=skip_blank_lines)
    701
--> 702         return _read(filepath_or_buffer, kwds)
    703
    704     parser_f.__name__ = name

~₩Anaconda3₩lib₩site-packages₩pandas₩io₩parsers.py in _read(filepath_or_buf
fer, kwds)
    427
    428     # Create the parser.
--> 429     parser = TextFileReader(filepath_or_buffer, **kwds)
    430
    431     if chunksize or iterator:

~₩Anaconda3₩lib₩site-packages₩pandas₩io₩parsers.py in __init__(self, f, eng
ine, **kwds)
    893             self.options['has_index_names'] = kwds['has_index_names']
    894
--> 895         self._make_engine(self.engine)
    896
    897     def close(self):

~₩Anaconda3₩lib₩site-packages₩pandas₩io₩parsers.py in _make_engine(self, eng
ine)
   1120     def _make_engine(self, engine='c'):
   1121         if engine == 'c':
-> 1122             self._engine = CParserWrapper(self.f, **self.options)
   1123         else:
   1124             if engine == 'python':

~₩Anaconda3₩lib₩site-packages₩pandas₩io₩parsers.py in __init__(self, src, *
*kwds)
   1851         kwds['usecols'] = self.usecols
   1852
-> 1853         self._reader = parsers.TextReader(src, **kwds)
   1854         self.unnamed_cols = self._reader.unnamed_cols
   1855

pandas/_libs/parsers.pyx in pandas._libs.parsers.TextReader.__cinit__()
```

```
pandas/_libs/parsers.pyx in pandas._libs.parsers.TextReader._setup_parser_source
()

FileNotFoundError: [Errno 2] File b'sample_data/california_housing_train.csv' does
not exist: b'sample_data/california_housing_train.csv'
```

데이터의 컬럼명 확인

In [10]:

```
1 print("데이터 열의 제목(train) : ", data_tr.columns)
2 print("데이터 열의 제목(test) : ", data_test.columns)
```

```
데이터 열의 제목(train) :  Index(['longitude', 'latitude', 'housing_median_age', 'to
tal_rooms',
       'total_bedrooms', 'population', 'households', 'median_income',
       'median_house_value'],
      dtype='object')
데이터 열의 제목(test) :  Index(['longitude', 'latitude', 'housing_median_age', 'tot
al_rooms',
       'total_bedrooms', 'population', 'households', 'median_income',
       'median_house_value'],
      dtype='object')
```

데이터의 정보 확인

- 컬럼의 자료형, 행열, 비어있는 값의 개수

In [11]:

```
1 print(data_tr.info() )
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 17000 entries, 0 to 16999
Data columns (total 9 columns):
longitude             17000 non-null float64
latitude              17000 non-null float64
housing_median_age    17000 non-null float64
total_rooms           17000 non-null float64
total_bedrooms        17000 non-null float64
population            17000 non-null float64
households            17000 non-null float64
median_income         17000 non-null float64
median_house_value    17000 non-null float64
dtypes: float64(9)
memory usage: 1.2 MB
None
```

In [12]:

```
print(data_test.info() )
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3000 entries, 0 to 2999
Data columns (total 9 columns):
longitude             3000 non-null float64
latitude              3000 non-null float64
housing_median_age    3000 non-null float64
total_rooms           3000 non-null float64
total_bedrooms        3000 non-null float64
population            3000 non-null float64
households            3000 non-null float64
median_income         3000 non-null float64
median_house_value    3000 non-null float64
dtypes: float64(9)
memory usage: 211.0 KB
None
```

데이터의 빈 값을 채우기

In [13]:

```
import numpy as np
data_tr.iloc[0,1] = np.nan
data_test.iloc[2,1:8] = np.nan

print(data_tr.head() )
print(data_test.head() )
```

```
   longitude  latitude  housing_median_age  total_rooms  total_bedrooms  ₩
0    -114.31       NaN                15.0       5612.0          1283.0
1    -114.47     34.40                19.0       7650.0          1901.0
2    -114.56     33.69                17.0        720.0           174.0
3    -114.57     33.64                14.0       1501.0           337.0
4    -114.57     33.57                20.0       1454.0           326.0

   population  households  median_income  median_house_value
0      1015.0       472.0         1.4936             66900.0
1      1129.0       463.0         1.8200             80100.0
2       333.0       117.0         1.6509             85700.0
3       515.0       226.0         3.1917             73400.0
4       624.0       262.0         1.9250             65500.0
   longitude  latitude  housing_median_age  total_rooms  total_bedrooms  ₩
0    -122.05     37.37                27.0       3885.0           661.0
1    -118.30     34.26                43.0       1510.0           310.0
2    -117.81       NaN                 NaN          NaN             NaN
3    -118.36     33.82                28.0         67.0            15.0
4    -119.67     36.33                19.0       1241.0           244.0

   population  households  median_income  median_house_value
0      1537.0       606.0         6.6085            344700.0
1       809.0       277.0         3.5990            176500.0
2         NaN         NaN            NaN            270500.0
3        49.0        11.0         6.1359            330000.0
4       850.0       237.0         2.9375             81700.0
```

In [14]:

```
print("train 데이터 셋 : ", data_tr.info() )
print()
print("test 데이터 셋 : ", data_test.info() )
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 17000 entries, 0 to 16999
Data columns (total 9 columns):
longitude             17000 non-null float64
latitude              16999 non-null float64
housing_median_age    17000 non-null float64
total_rooms           17000 non-null float64
total_bedrooms        17000 non-null float64
population            17000 non-null float64
households            17000 non-null float64
median_income         17000 non-null float64
median_house_value    17000 non-null float64
dtypes: float64(9)
memory usage: 1.2 MB
train 데이터 셋 :  None

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3000 entries, 0 to 2999
Data columns (total 9 columns):
longitude             3000 non-null float64
latitude              2999 non-null float64
housing_median_age    2999 non-null float64
total_rooms           2999 non-null float64
total_bedrooms        2999 non-null float64
population            2999 non-null float64
households            2999 non-null float64
median_income         2999 non-null float64
median_house_value    3000 non-null float64
dtypes: float64(9)
memory usage: 211.0 KB
test 데이터 셋 :  None
```

In [15]:

```
import pandas as pd
```

데이터 선택(iloc : 인덱스로 선택함)

In [19]:

```
base_dir = "./"
data_tr = pd.read_csv(base_dir + "california_housing_train.csv")
data_test = pd.read_csv(base_dir + "california_housing_test.csv")

# 두번째 행 선택
print(data_tr.iloc[1, :])
```

```
longitude             -114.47
latitude                34.40
housing_median_age      19.00
total_rooms           7650.00
total_bedrooms        1901.00
population            1129.00
households             463.00
median_income            1.82
median_house_value    80100.00
Name: 1, dtype: float64
```

In [20]:

```
data_tr.shape
```

Out[20]:

```
(17000, 9)
```

In [21]:

```
print(data_tr.iloc[2:4])    # (2+1)행부터 4행까지 선택
print(data_tr.iloc[:4])     # 처음부터 4행까지 선택
print(data_tr.iloc[16997:]) # 16998행부터 끝까지 선택
```

```
   longitude  latitude  housing_median_age  total_rooms  total_bedrooms  ₩
2    -114.56     33.69                17.0        720.0           174.0
3    -114.57     33.64                14.0       1501.0           337.0

   population  households  median_income  median_house_value
2       333.0       117.0         1.6509             85700.0
3       515.0       226.0         3.1917             73400.0
   longitude  latitude  housing_median_age  total_rooms  total_bedrooms  ₩
0    -114.31     34.19                15.0       5612.0          1283.0
1    -114.47     34.40                19.0       7650.0          1901.0
2    -114.56     33.69                17.0        720.0           174.0
3    -114.57     33.64                14.0       1501.0           337.0

   population  households  median_income  median_house_value
0      1015.0       472.0         1.4936             66900.0
1      1129.0       463.0         1.8200             80100.0
2       333.0       117.0         1.6509             85700.0
3       515.0       226.0         3.1917             73400.0
       longitude  latitude  housing_median_age  total_rooms  total_bedrooms  ₩
16997    -124.30     41.84                17.0       2677.0           531.0
16998    -124.30     41.80                19.0       2672.0           552.0
16999    -124.35     40.54                52.0       1820.0           300.0

       population  households  median_income  median_house_value
16997      1244.0       456.0         3.0313            103600.0
16998      1298.0       478.0         1.9797             85800.0
16999       806.0       270.0         3.0147             94600.0
```

In [22]:

```
data_tr.head(3)
```

Out[22]:

	longitude	latitude	housing_median_age	total_rooms	total_bedrooms	population	household
0	-114.31	34.19	15.0	5612.0	1283.0	1015.0	472
1	-114.47	34.40	19.0	7650.0	1901.0	1129.0	463
2	-114.56	33.69	17.0	720.0	174.0	333.0	117

데이터의 열선택

- 컬럼명으로 데이터를 선택하기

In [23]:

```
# 열 선택(열 컬럼명으로 선택)
print("latitude 컬럼명으로 선택")
col_sel = data_tr['latitude']
print(col_sel.head())
```

```
latitude 컬럼명으로 선택
0    34.19
1    34.40
2    33.69
3    33.64
4    33.57
Name: latitude, dtype: float64
```

데이터의 열선택(iloc 이용)

In [24]:

```
# 두번째 열 선택(열도 0부터 시작하므로 지정값의 +1열)
print("두번째 열 선택")
col_sel = data_tr.iloc[:,1]
print( col_sel.head() )
```

```
두번째 열 선택
0    34.19
1    34.40
2    33.69
3    33.64
4    33.57
Name: latitude, dtype: float64
```

In [25]:

```
# 복수열 선택 : 3개 열 선택(컬럼명으로)
print("컬럼명으로 선택_3개 컬럼")
column_name = ['latitude', 'total_rooms', 'population']
row_sel = data_tr[column_name]
print( row_sel.head() )
```

```
컬럼명으로 선택_3개 컬럼
   latitude  total_rooms  population
0     34.19       5612.0      1015.0
1     34.40       7650.0      1129.0
2     33.69        720.0       333.0
3     33.64       1501.0       515.0
4     33.57       1454.0       624.0
```

In [26]:

```
# 복수열 선택 : 3개 열 선택(숫자 이용)
print("컬럼명으로 선택_3개 컬럼")
row_sel = data_tr.iloc[:,[1,3,5]]
print( row_sel.head() )
```

```
컬럼명으로 선택_3개 컬럼
   latitude  total_rooms  population
0     34.19       5612.0      1015.0
1     34.40       7650.0      1129.0
2     33.69        720.0       333.0
3     33.64       1501.0       515.0
4     33.57       1454.0       624.0
```

In [27]:

```
# 일부 데이터 선택 (iloc 를 이용 행과 열에 접근)
# 1~10행, longitude, latitude, total_rooms, population에 접근
print("데이터의 일부 가져오기")
dat_part = data_tr.iloc[0:10,[0,1,3,5]]
print( dat_part.head() )
```

```
데이터의 일부 가져오기
   longitude  latitude  total_rooms  population
0    -114.31     34.19       5612.0      1015.0
1    -114.47     34.40       7650.0      1129.0
2    -114.56     33.69        720.0       333.0
3    -114.57     33.64       1501.0       515.0
4    -114.57     33.57       1454.0       624.0
```

지도 시각화

- folium 을 이용하기

In [28]:

```
import folium
```

데이터 셋의 경도, 위도 정보를 이용해서 이에 대한 위치를 지도위에 표시

In [29]:

```
lat_m = dat_part['latitude'].mean()  # 위도 위치의 평균
log_m = dat_part['longitude'].mean() # 경도 위치의 평균
rooms_m = dat_part['total_rooms'].mean() # 총 방수의 평균
pop_m = dat_part['population'].mean() # 인구의 평균

print("위도, 경도", lat_m , log_m )
print("방, 인구(평균", rooms_m , pop_m )

# 지도 중심위치 및 확대
map1 = folium.Map(location=[lat_m, log_m], zoom_start=7)
# Marker 설명(집, 인구)
des = "room : " + str(rooms_m) + "<br>" + "pop :" + str(pop_m)

folium.Marker([lat_m, log_m], popup=des).add_to(map1) # 마커 추가
map1
```

위도, 경도 34.0 -114.542
방, 인구(평균 2832.9 1042.4

Out[29]:

Make this Notebook Trusted to load map: File -> Trust Notebook

In [31]:

```
## 컬럼명 변경
dat_part.columns = ['long', 'lat', 'tot_rooms', 'pop']
dat_part.columns
```

Out[31]:

```
Index(['long', 'lat', 'tot_rooms', 'pop'], dtype='object')
```

In [32]:

```
df = dat_part.copy()
df.describe()
```

Out[32]:

	long	lat	tot_rooms	pop
count	10.000000	10.000000	10.000000	10.000000
mean	-114.542000	34.000000	2832.900000	1042.400000
std	0.089294	0.519145	2377.174534	858.024242
min	-114.600000	33.570000	720.000000	333.000000
25%	-114.587500	33.615000	1403.750000	542.250000
50%	-114.575000	33.665000	1499.000000	729.000000
75%	-114.562500	34.347500	4318.500000	1100.500000
max	-114.310000	34.830000	7650.000000	3134.000000

In [33]:

```
# 여러개의 데이터 표시
# 데이터 셋 복사 및 컬럼명 변경
df = dat_part.copy()
df.columns = ['long', 'lat', 'tot_rooms', 'pop']
map2 = folium.Map(location=[lat_m, log_m], zoom_start=9)

# 추후 색 지정을 위한 함수
def color(pop_num):
    if pop_num in range(0,1000):
        col = 'green'
    elif pop_num in range(1001,1999):
        col = 'blue'
    elif pop_num in range(2000,2999):
        col = 'orange'
    else:
        col='red'
    return col
```

In [34]:

```
for lat,lan,room,pop in zip(df['lat'],df['long'],df['tot_rooms'],df['pop']):
    # as a list as an argument
    folium.Marker(location=[lat,lan],popup = "room:" + str(room),
                  icon= folium.Icon(color=color(pop),
                  icon_color='yellow',icon = 'cloud')).add_to(map2)


# Save the file created above
map2.save('test7.html')
map2
```

Out[34]:

Make this Notebook Trusted to load map: File -> Trust Notebook

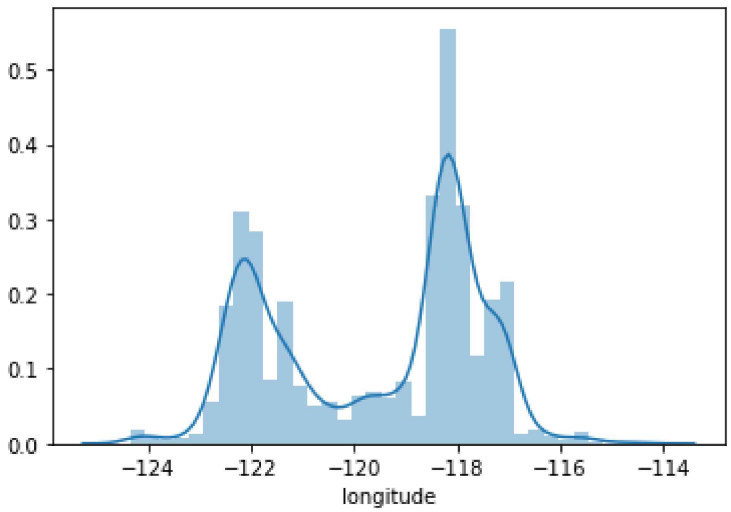
7.5 조건을 이용한 데이터 선택

In [35]:

```
import seaborn as sns
sns.distplot(data_tr['longitude'])
```

Out[35]:

<matplotlib.axes._subplots.AxesSubplot at 0x2f981bdeb38>

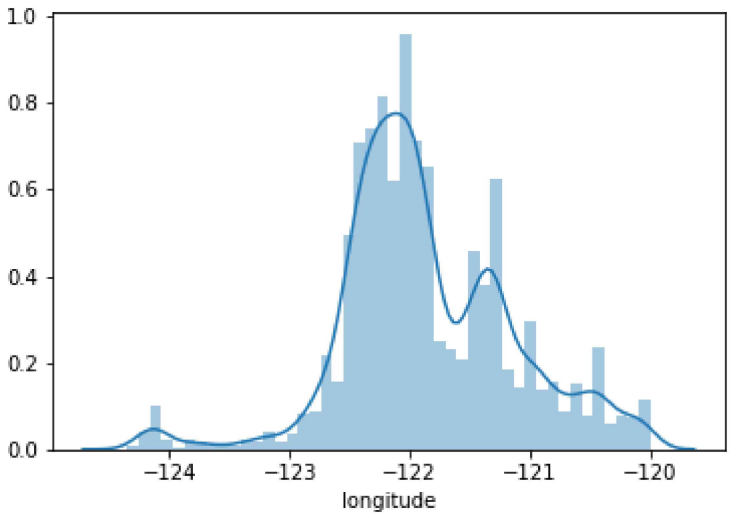


In [36]:

```
data_tr_long = data_tr[data_tr.longitude <= -120]
sns.distplot(data_tr_long['longitude'])
```

Out[36]:

<matplotlib.axes._subplots.AxesSubplot at 0x2f981fb23c8>

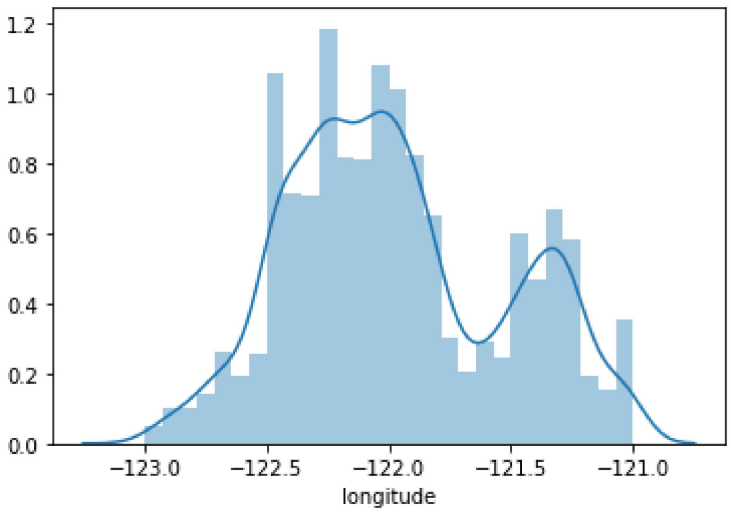


In [37]:

```
data_tr_long = data_tr[ (data_tr.longitude >= -123) & (data_tr.longitude <= -121) ]
sns.distplot(data_tr_long['longitude'])
```

Out[37]:

<matplotlib.axes._subplots.AxesSubplot at 0x2f98136b550>

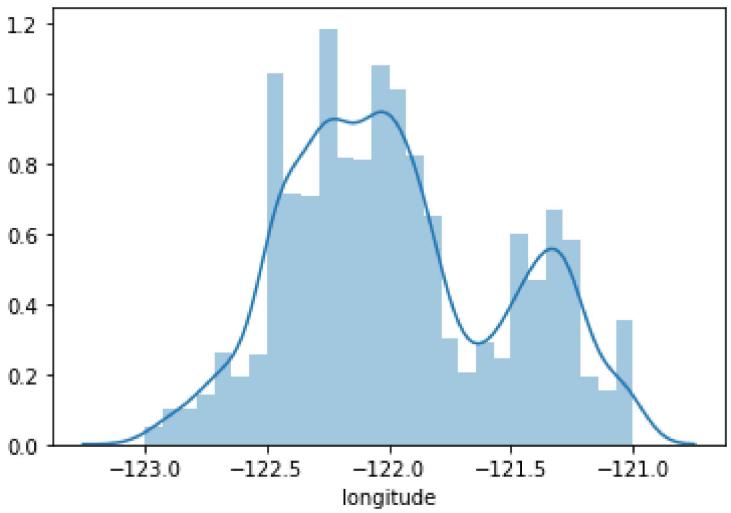


In [38]:

```
data_tr_long = data_tr.loc[ (data_tr.longitude >= -123) & (data_tr.longitude <= -121) ]
sns.distplot(data_tr_long['longitude'])
```

Out[38]:

<matplotlib.axes._subplots.AxesSubplot at 0x2f9808e97f0>

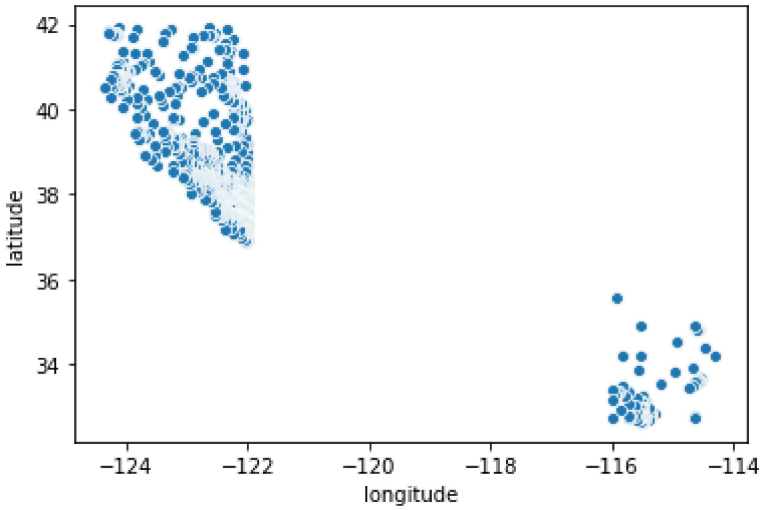


In [39]:

```
data_tr_long = data_tr[ (data_tr.longitude <= -122) | (data_tr.longitude >= -116) ]
sns.scatterplot(x="longitude", y="latitude", data=data_tr_long)
```

Out[39]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x2f980877f60>
```



두개의 데이터 셋을 하나로 만들기

- append 함수를 이용

In [41]:

```
base_dir = "./"

data_tr = pd.read_csv(base_dir + "california_housing_train.csv")
data_test = pd.read_csv(base_dir + "california_housing_test.csv")

data_all = data_tr.append(data_test)
print(data_all.shape)
print(data_all.iloc[16995:17005])
```

```
(20000, 9)
       longitude  latitude  housing_median_age  total_rooms  total_bedrooms  W
16995    -124.26     40.58                52.0       2217.0           394.0
16996    -124.27     40.69                36.0       2349.0           528.0
16997    -124.30     41.84                17.0       2677.0           531.0
16998    -124.30     41.80                19.0       2672.0           552.0
16999    -124.35     40.54                52.0       1820.0           300.0
0        -122.05     37.37                27.0       3885.0           661.0
1        -118.30     34.26                43.0       1510.0           310.0
2        -117.81     33.78                27.0       3589.0           507.0
3        -118.36     33.82                28.0         67.0            15.0
4        -119.67     36.33                19.0       1241.0           244.0

       population  households  median_income  median_house_value
16995       907.0       369.0         2.3571            111400.0
16996      1194.0       465.0         2.5179             79000.0
16997      1244.0       456.0         3.0313            103600.0
16998      1298.0       478.0         1.9797             85800.0
16999       806.0       270.0         3.0147             94600.0
0          1537.0       606.0         6.6085            344700.0
1           809.0       277.0         3.5990            176500.0
2          1484.0       495.0         5.7934            270500.0
3            49.0        11.0         6.1359            330000.0
4           850.0       237.0         2.9375             81700.0
```

데이터의 인덱스 번호를 초기화

- [].reset_index() 함수를 사용

In [42]:

```
data_all = data_all.reset_index(drop=True)
print(data_all.iloc[16995:17005])
```

```
       longitude  latitude  housing_median_age  total_rooms  total_bedrooms  W
16995    -124.26     40.58                52.0       2217.0           394.0
16996    -124.27     40.69                36.0       2349.0           528.0
16997    -124.30     41.84                17.0       2677.0           531.0
16998    -124.30     41.80                19.0       2672.0           552.0
16999    -124.35     40.54                52.0       1820.0           300.0
17000    -122.05     37.37                27.0       3885.0           661.0
17001    -118.30     34.26                43.0       1510.0           310.0
17002    -117.81     33.78                27.0       3589.0           507.0
17003    -118.36     33.82                28.0         67.0            15.0
17004    -119.67     36.33                19.0       1241.0           244.0

       population  households  median_income  median_house_value
16995       907.0       369.0         2.3571            111400.0
16996      1194.0       465.0         2.5179             79000.0
16997      1244.0       456.0         3.0313            103600.0
16998      1298.0       478.0         1.9797             85800.0
16999       806.0       270.0         3.0147             94600.0
17000      1537.0       606.0         6.6085            344700.0
17001       809.0       277.0         3.5990            176500.0
17002      1484.0       495.0         5.7934            270500.0
17003        49.0        11.0         6.1359            330000.0
17004       850.0       237.0         2.9375             81700.0
```

In [43]:

```
data_all.describe()
```

Out[43]:

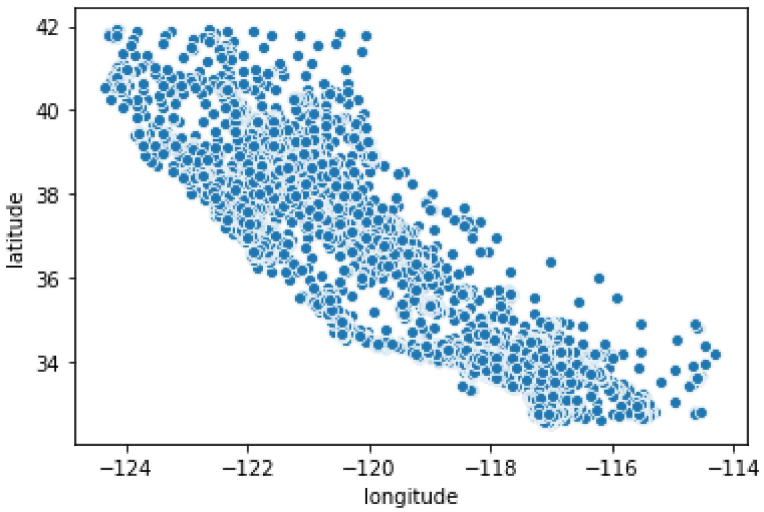
	longitude	latitude	housing_median_age	total_rooms	total_bedrooms	popu
count	20000.000000	20000.000000	20000.000000	20000.000000	20000.000000	20000.0
mean	-119.566172	35.626750	28.627750	2637.051550	537.991800	1425.5
std	2.003609	2.136141	12.582229	2176.314757	420.631119	1131.0
min	-124.350000	32.540000	1.000000	2.000000	1.000000	3.0
25%	-121.790000	33.930000	18.000000	1451.000000	296.000000	788.0
50%	-118.490000	34.250000	29.000000	2126.000000	434.000000	1166.0
75%	-118.000000	37.710000	37.000000	3149.000000	647.000000	1724.0
max	-114.310000	41.950000	52.000000	37937.000000	6445.000000	35682.0

In [44]:

```
1 sns.scatterplot(x="longitude", y="latitude", data=data_all)
```

Out[44]:

<matplotlib.axes._subplots.AxesSubplot at 0x2f980c1d5f8>



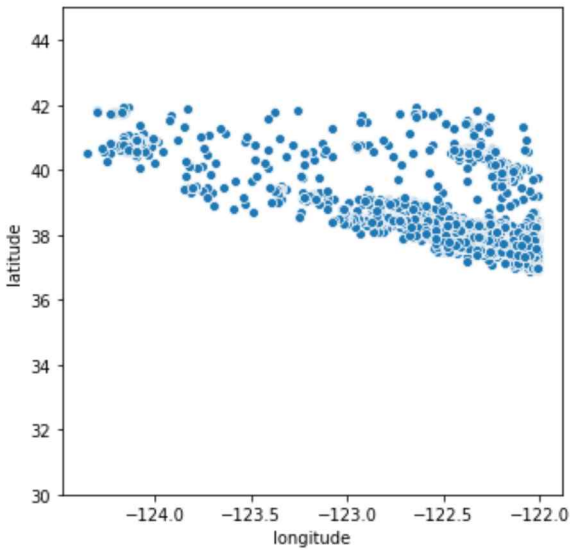
In [45]:

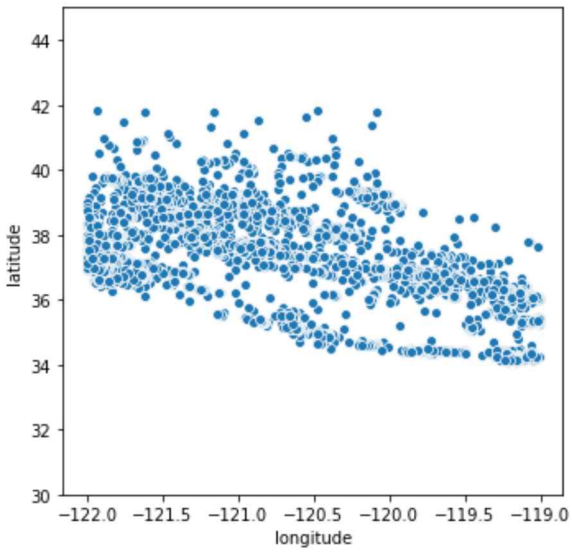
```
print(data_all.describe())
### -122이만, -122이상~-119이만, -119이상~-118이만, -118이상
data01 = data_all[data_all['longitude'] < -122]
data02 = data_all[ (data_all['longitude'] >= -122) &
                   (data_all['longitude'] < -119) ]
data03 = data_all[ (data_all['longitude'] >= -119) &
                   (data_all['longitude'] < -118) ]
data04 = data_all[data_all['longitude'] >= -118]

f, axes = plt.subplots(2, 2, figsize=(12, 12))
axes[0,0].set_ylim([30, 45])
axes[0,1].set_ylim([30, 45])
axes[1,0].set_ylim([30, 45])
axes[1,1].set_ylim([30, 45])

sns.scatterplot(x="longitude", y="latitude", data=data01, ax=axes[0, 0])
sns.scatterplot(x="longitude", y="latitude", data=data02, ax=axes[0, 1])
sns.scatterplot(x="longitude", y="latitude", data=data03, ax=axes[1, 0])
sns.scatterplot(x="longitude", y="latitude", data=data04, ax=axes[1, 1])
```

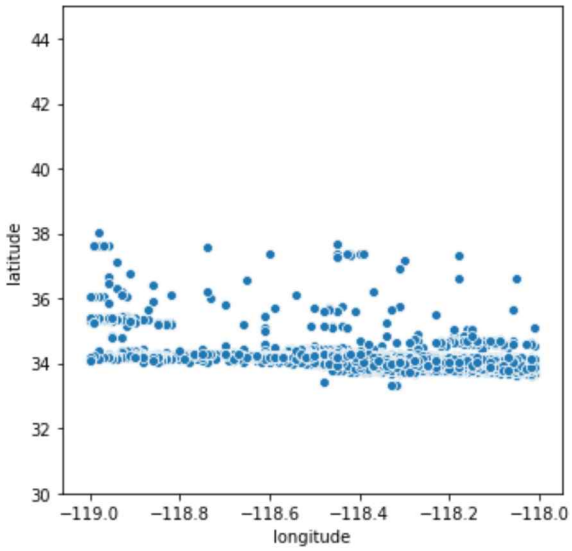
```
          longitude      latitude  housing_median_age   total_rooms  ₩
count  20000.000000  20000.000000        20000.000000  20000.000000
mean    -119.566172     35.626750           28.627750   2637.051550
std        2.003609      2.136141           12.582229   2176.314757
min     -124.350000     32.540000            1.000000      2.000000
25%     -121.790000     33.930000           18.000000   1451.000000
50%     -118.490000     34.250000           29.000000   2126.000000
75%     -118.000000     37.710000           37.000000   3149.000000
max     -114.310000     41.950000           52.000000  37937.000000

       total_bedrooms    population    households  median_income  ₩
count    20000.000000  20000.000000  20000.000000   20000.000000
mean       537.991800   1425.557650    499.525450       3.872132
std        420.631119   1131.048487    381.729517       1.900356
min          1.000000      3.000000      1.000000       0.499900
25%        296.000000    788.000000    280.000000       2.562500
50%        434.000000   1166.000000    409.000000       3.536000
75%        647.000000   1724.000000    604.000000       4.745325
max       6445.000000  35682.000000   6082.000000      15.000100

       median_house_value
count        20000.000000
mean        207082.716750
std         115557.055856
min          14999.000000
25%         119800.000000
50%         179800.000000
75%         265000.000000
max         500001.000000
```

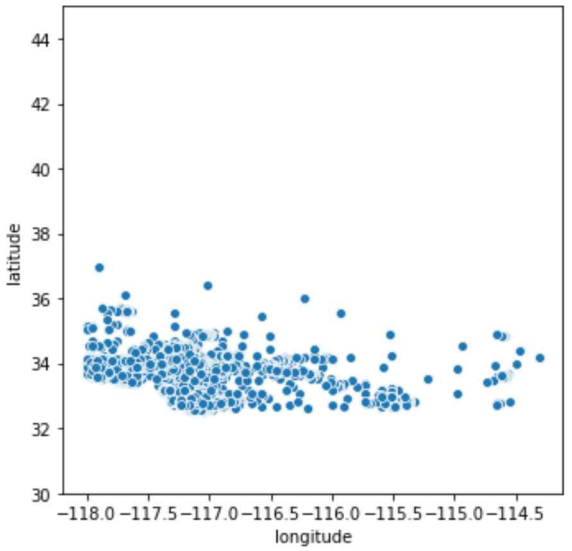
Out[45]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x2f9808867b8>
```


latitude
longitude
44
42
40
38
36
34
32
30
−124.0
−123.5
−123.0
−122.5
−122.0


latitude
longitude
44
42
40
38
36
34
32
30
−122.0
−121.5
−121.0
−120.5
−120.0
−119.5
−119.0


latitude
longitude
44
42
40
38
36
34
32
30
−119.0
−118.8
−118.6
−118.4
−118.2
−118.0


latitude
longitude
44
42
40
38
36
34
32
30
−118.0
−117.5
−117.0
−116.5
−116.0
−115.5
−115.0
−114.5

In [46]:

```
data01.to_csv('data_01.csv', index=False)
data02.to_csv('data_02.csv', index=False)
data03.to_csv('data_03.csv', index=False)
data04.to_csv('data_04.csv', index=False)

print(os.listdir())
```

```
['.git', '.gitattributes', '.gitignore', '.ipynb_checkpoints', '1_1_PythonBasic.ipyn
b', '1_2_Basic_Pandas.ipynb', '1_2_Pandas_Practice.ipynb', '1_2_Pandas_practice01.ip
ynb', '1_2_Pandas_practice02.ipynb', '1_2_PythonBasic_fnc_module.ipynb', '1_2_Python
Basic_for_fnc.ipynb', '1_2_Seaborn_Practice.ipynb', '1_3_folium_poltly기본.ipynb',
'1_3_plotly.ipynb', '1_3_Seaborn_Basic.ipynb', '2_2_BS4_Naver_all_add_v10-Copy1.ipyn
b', '2_2_BS4_Naver_all_add_v10.ipynb', '3_2_all_Konlpy_Basic_v10.ipynb', '3_2_env_co
lab_nanum_install_v10.ipynb', '4_2_bs4_v11_Problem.ipynb', '4_2_bs4_v11_Problem_sol.
ipynb', 'california_housing_test.csv', 'california_housing_train.csv', 'ch07_pandas.
py', 'data.csv', 'data.xlsx', 'data_01.csv', 'data_02.csv', 'data_03.csv', 'data_04.
csv', 'README.md', 'team_12.csv', 'team_12.xlsx', 'test7.html']
```

데이터를 그룹화하여 요약 값 확인

- 네 개의 데이터를 읽어온다.
- 각각의 데이터 셋에 새로운 변수(컬럼)을 생성.

In [47]:

```
data01 = pd.read_csv("data_01.csv")
data02 = pd.read_csv("data_02.csv")
data03 = pd.read_csv("data_03.csv")
data04 = pd.read_csv("data_04.csv")

print("각 데이터 행열 : {}".format(data01.shape) )
print("각 데이터 행열 : {}".format(data02.shape) )
print("각 데이터 행열 : {}".format(data03.shape) )
print("각 데이터 행열 : {}".format(data04.shape) )
```

```
각 데이터 행열 : (3831, 9)
각 데이터 행열 : (5486, 9)
각 데이터 행열 : (5681, 9)
각 데이터 행열 : (5002, 9)
```

In [48]:

```
# 새로운 컬럼 생성
data01['group_lat'] = 1
data02['group_lat'] = 2
data03['group_lat'] = 3
data04['group_lat'] = 4
```

한번에 여러개 파일 합치기

In [49]:

```
data_all = data01.append([data02, data03, data04], ignore_index = True)
data_all.group_lat.unique()  # 새 컬럼의 유일한 값 확인
```

Out[49]:

```
array([1, 2, 3, 4], dtype=int64)
```

새로운 컬럼을 활용하여 집 값의 중위값을 표시

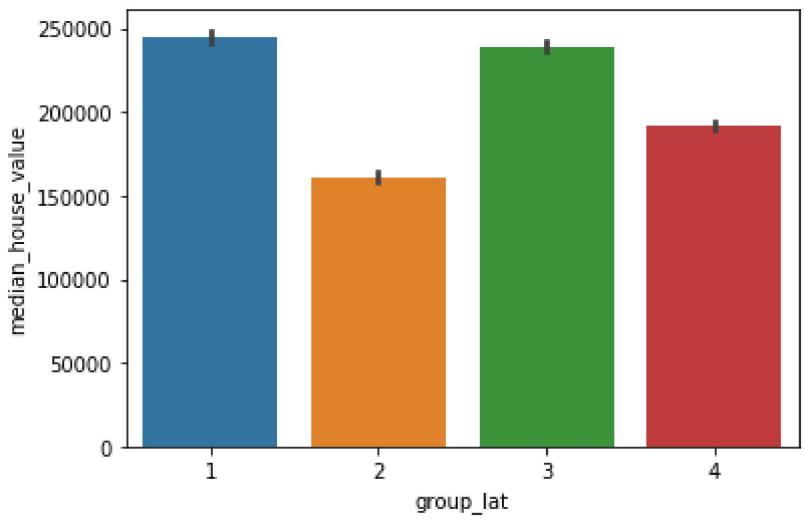
In [50]:

```
print("전체 데이터 행열 :{}".format(data_all.shape))
print("전체 데이터 컬럼명 :{}".format(data_all.columns))
print("group_lat 컬럼의 값 : {}".format(data_all.group_lat.unique()) )
sns.barplot(x="group_lat", y="median_house_value", data=data_all)
```

```
전체 데이터 행열 :(20000, 10)
전체 데이터 컬럼명 :Index(['longitude', 'latitude', 'housing_median_age', 'total_roo
ms',
       'total_bedrooms', 'population', 'households', 'median_income',
       'median_house_value', 'group_lat'],
      dtype='object')
group_lat 컬럼의 값 : [1 2 3 4]
```

Out[50]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x2f9802c29b0>
```



값들의 데이터 개수 알아보기

In [51]:

```
print(data_all['group_lat'].value_counts() )
```

```
3    5681
2    5486
4    5002
1    3831
Name: group_lat, dtype: int64
```

In [52]:

```
print(pd.value_counts(data_all['group_lat']) )
```

```
3    5681
2    5486
4    5002
1    3831
Name: group_lat, dtype: int64
```

데이터를 그룹화하여 이에 대한 요약값을 확인하기

In [53]:

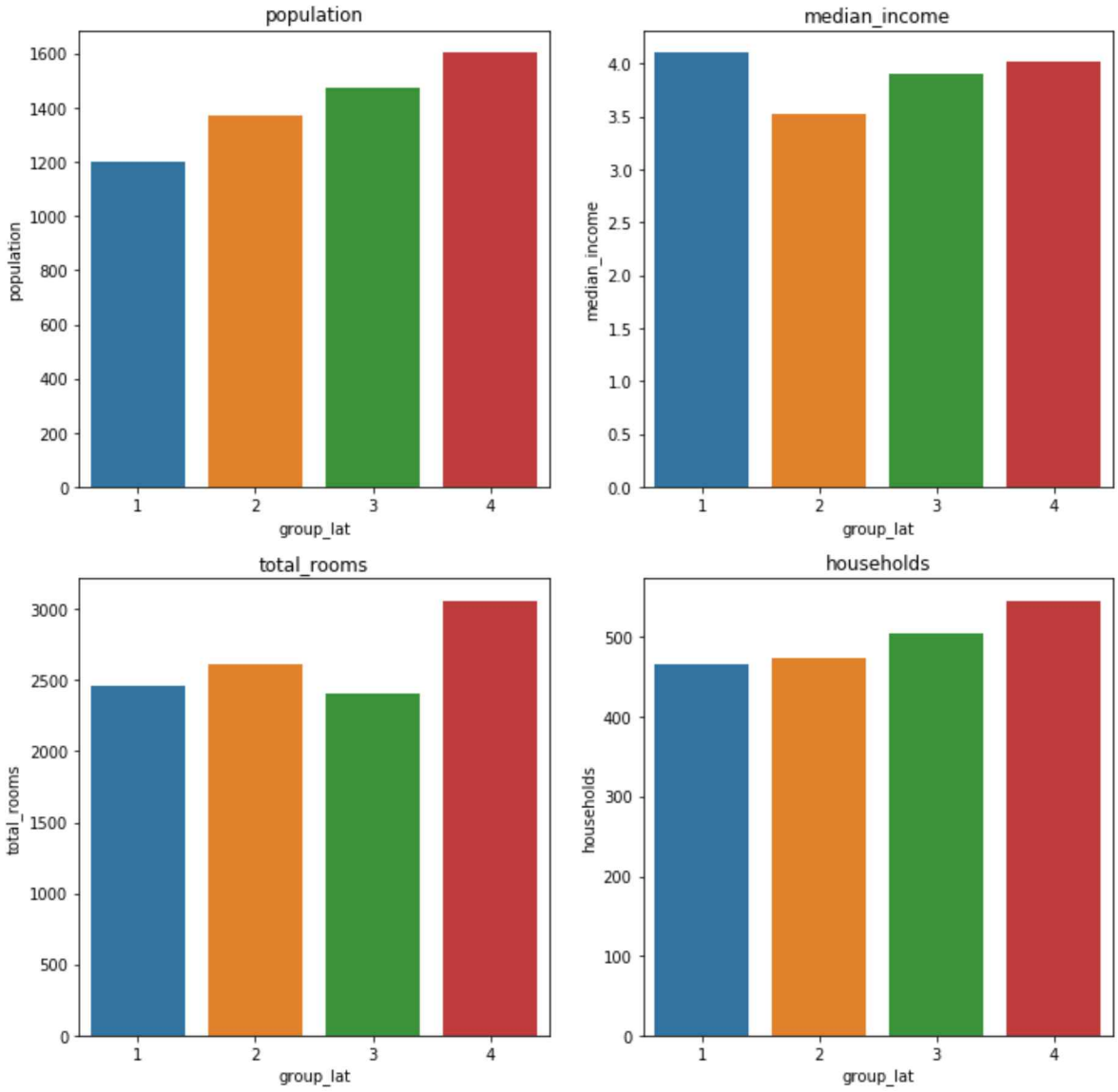
```
### 지역별 집 값 알아보기
grouped = data_all.groupby('group_lat')  # 그룹화
print( "행정구역 인구 평균 :₩n ", grouped.mean()['population'] )    # 행정 구역 인구 데이터의 
print( "소득 평균 :₩n ",grouped.mean()['median_income'] ) # 소득 데이터의 평균
print( "방 개수 평균 :₩n ",grouped.mean()['total_rooms'] )   # 방 개수 데이터의 평균
print( "세대 수 평균 :₩n ",grouped.mean()['households'] )    # 세대 수 데이터의 평균
```

```
행정구역 인구 평균 :
  group_lat
1    1199.107022
2    1371.886438
3    1471.122162
4    1606.109556
Name: population, dtype: float64
소득 평균 :
  group_lat
1    4.112725
2    3.529840
3    3.904002
4    4.027080
Name: median_income, dtype: float64
방 개수 평균 :
  group_lat
1    2457.613678
2    2609.436930
3    2410.067594
4    3062.564574
Name: total_rooms, dtype: float64
세대 수 평균 :
  group_lat
1    466.478204
2    474.076376
3    505.227953
4    546.271092
Name: households, dtype: float64
```

그룹화한 결과를 시각화하여 확인하기

In [54]:

```
# 2행 2열의 그래프 만들고 전체 크기 지정
fig ,axes = plt.subplots(nrows=2, ncols=2)  # 2행 2열의 구조
fig.set_size_inches(12,12)  # 전체 크기

# 그룹화하기
grouped = data_all.groupby('group_lat').mean()

# 막대 그래프로 확인해 보기
sns.barplot(x=grouped.index, y="population", data=grouped, ax= axes[0][0])
sns.barplot(x=grouped.index, y="median_income", data=grouped, ax= axes[0][1])
sns.barplot(x=grouped.index, y="total_rooms", data=grouped, ax= axes[1][0])
sns.barplot(x=grouped.index, y="households", data=grouped, ax= axes[1][1])

# 각각의 그래프에 제목을 넣기
axes[0][0].title.set_text('population')
axes[0][1].title.set_text('median_income')
axes[1][0].title.set_text('total_rooms')
axes[1][1].title.set_text('households')

```



In [55]:

```
### 지역별 집 값 알아보기
grouped = data_all.groupby('group_lat')  # 그룹화
print( grouped.mean()['median_house_value'] )  # 지역별 집 값 평균
print( grouped.sum()['median_house_value'] )  # 지역별 집값의 전체 합
print( grouped.std()['median_house_value'] )  # 지역별 집값의 표준편차

grouped = grouped.mean()
sns.barplot(x=grouped.index, y="median_house_value", data=grouped)
```

```
group_lat
1    244581.258418
2    161318.769595
3    239442.813237
4    191802.107557
Name: median_house_value, dtype: float64
group_lat
1    9.369908e+08
2    8.849948e+08
3    1.360275e+09
4    9.593941e+08
Name: median_house_value, dtype: float64
group_lat
1    128465.584053
2     96476.318617
3    117564.610356
4    100284.984009
Name: median_house_value, dtype: float64
```

Out[55]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x2f980790b38>
```