Ag23

January 22, 2024

[1]:
```
import pandas as pd
import numpy as np
import matplotlib
import matplotlib.pyplot as plt
import seaborn as sns
df = pd.read_csv('/Users/thutranghoa/Code/Data_analysis/Data/Du lieu thue xe.
 ↪csv')
df
```

[1]:
```
      fuelType  rating  renterTripsTaken  reviewCount location.city  \
0     ELECTRIC    5.00              13.0         12.0       Seattle
1     ELECTRIC    5.00               2.0          1.0       Tijeras
2       HYBRID    4.92              28.0         24.0   Albuquerque
3     GASOLINE    5.00              21.0         20.0   Albuquerque
4     GASOLINE    5.00               3.0          1.0   Albuquerque
…          …     …                 …            …            …
5846  GASOLINE    5.00              32.0         27.0      Honolulu
5847    HYBRID    5.00              17.0         16.0          Aiea
5848  GASOLINE    4.94              18.0         17.0        Kailua
5849  GASOLINE     NaN               1.0          0.0       Waipahu
5850  GASOLINE    5.00              16.0         14.0        Kailua

     location.country  location.latitude  location.longitude location.state  \
0                  US          47.449107         -122.308841             WA
1                  US          35.111060         -106.276551             NM
2                  US          35.127163         -106.566681             NM
3                  US          35.149726         -106.711425             NM
4                  US          35.208659         -106.601008             NM
…                 …                   …                   …            …
5846               US          21.292950         -157.836856             HI
5847               US          21.375507         -157.914919             HI
5848               US          21.378719         -157.727816             HI
5849               US          21.376105         -158.020237             HI
5850               US          21.378040         -157.730000             HI

        owner.id  rate.daily vehicle.make vehicle.model vehicle.type  \
0     12847615.0       135.0        Tesla       Model X          suv
```

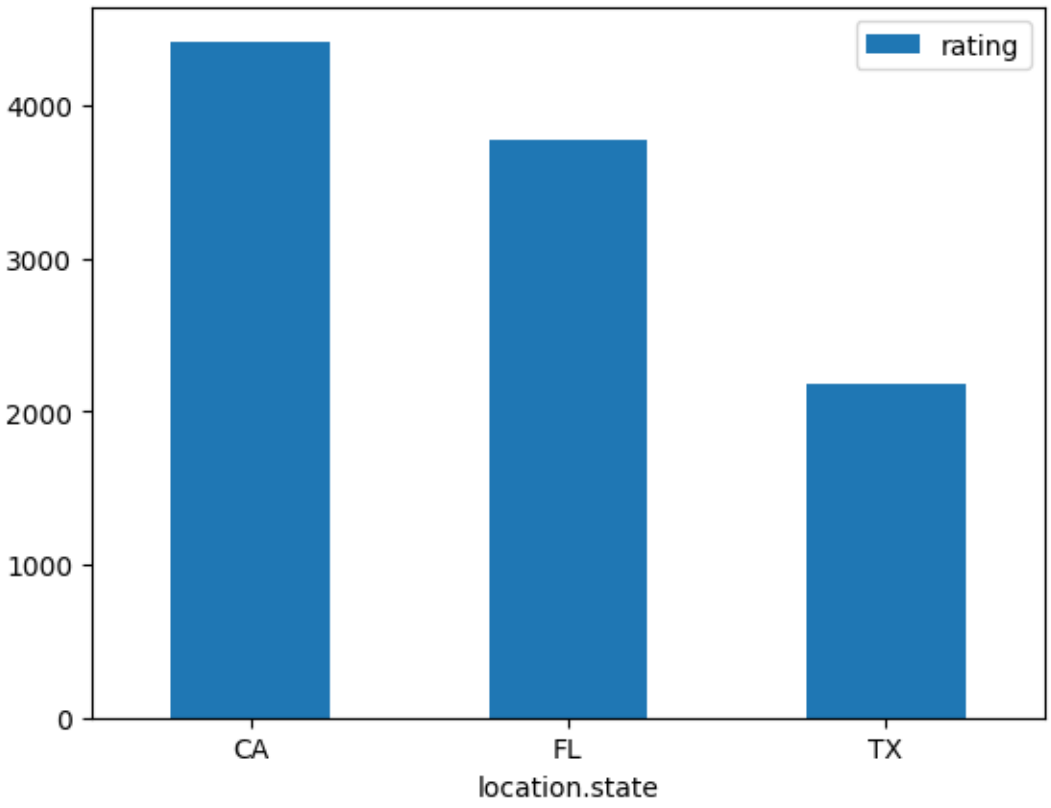
```
1     15621242.0       190.0        Tesla       Model X          suv
2     10199256.0        35.0       Toyota         Prius          car
3      9365496.0        75.0         Ford       Mustang          car
4      3553565.0        47.0     Chrysler       Sebring          car
…            …           …            …            …            …
5846   9794111.0        33.0    Chevrolet         Cruze          car
5847   2754690.0        49.0        Lexus       HS 250h          car
5848  11313508.0        35.0        smart        fortwo          car
5849   4209883.0        77.0          GMC        Savana          van
5850  11313508.0        35.0        smart        fortwo          car

      vehicle.year  airportcity
0           2019.0  Albuquerque
1           2018.0  Albuquerque
2           2012.0  Albuquerque
3           2018.0  Albuquerque
4           2010.0  Albuquerque
…              …            …
5846        2017.0     Honolulu
5847        2010.0     Honolulu
5848        2013.0     Honolulu
5849        2015.0     Honolulu
5850        2013.0     Honolulu

[5851 rows x 16 columns]
```

[2]:
```
print(df.isnull().sum())
```

```
fuelType               75
rating                501
renterTripsTaken        0
reviewCount             0
location.city           0
location.country        0
location.latitude       0
location.longitude      0
location.state          0
owner.id                0
rate.daily              0
vehicle.make            0
vehicle.model           0
vehicle.type            0
vehicle.year            0
airportcity             0
dtype: int64
```

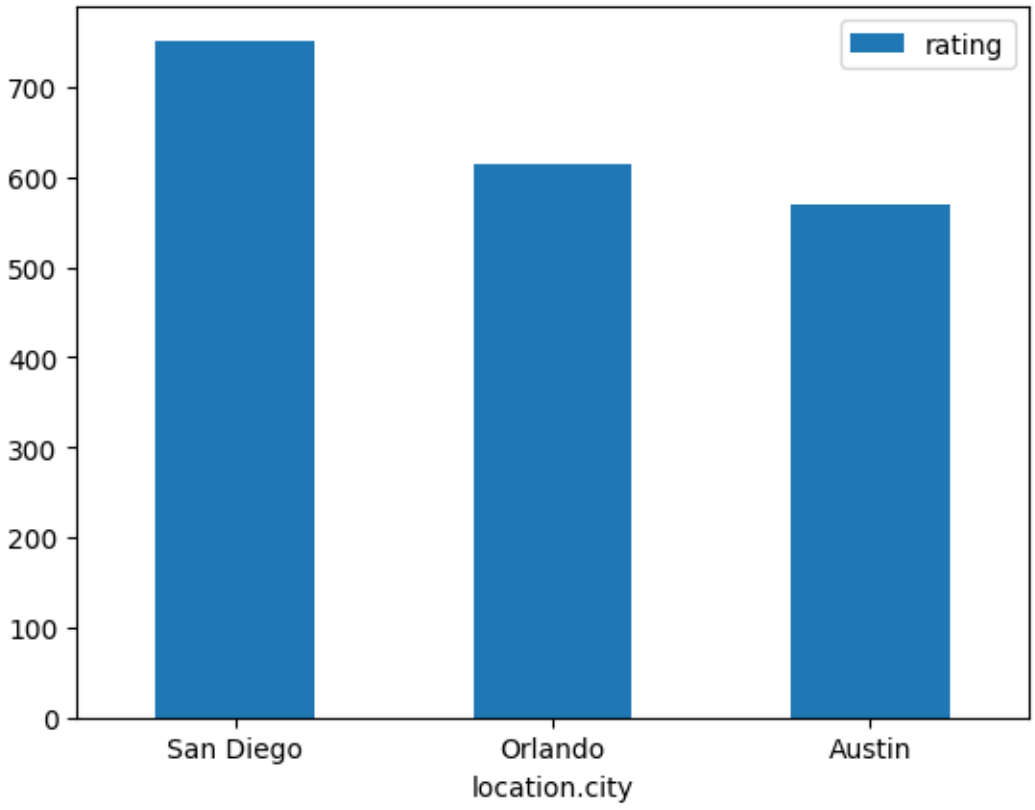
[13]:
```
'1) Visualize top 3 state that uses the most cars.'
state = df[['rating','location.state']]
state = state.groupby('location.state', as_index=False).sum()
state = state.sort_values(by= ['rating'], ascending=False)
top3 = state.iloc[:3]
top3.plot.bar(x = 'location.state', y = 'rating', rot = 0)
```

[13]: <Axes: xlabel='location.state'>



[18]:
```
'2) Visualize top 3 cities that uses the most cars under those top 3 states.'
top_state = ['CA', 'FL', 'TX']
mask = df['location.state'].isin(top_state)
city = df[mask]
city = city.groupby('location.city', as_index=False).sum()
city = city.sort_values(by= ['rating'], ascending=False)
top3_city = city.iloc[:3]
top3_city.plot.bar(x = 'location.city', y = 'rating', rot = 0)
```

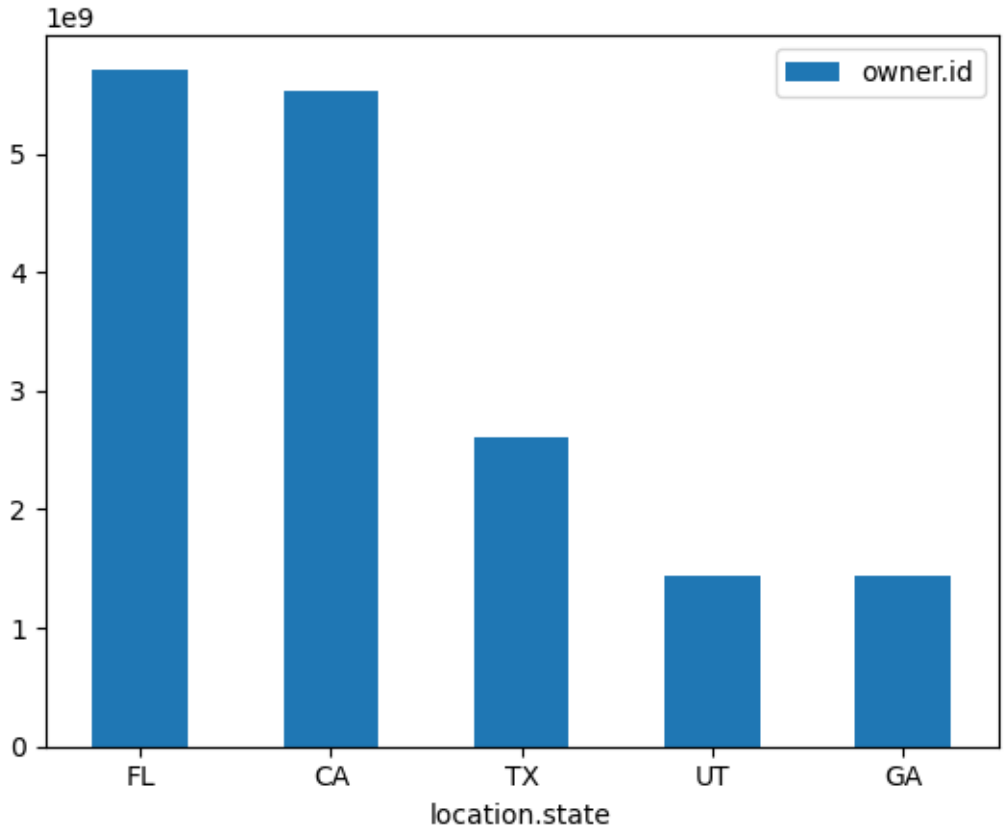
[18]: <Axes: xlabel='location.city'>



3) Visualize top 5 states with max owners.

[28]:
```
state_o = df[['owner.id','location.state']]
state_o = state_o.groupby('location.state', as_index=False).sum()
state_o = state_o.sort_values(by= ['owner.id'], ascending=False)
top5_o = state_o.iloc[:5]
top5_o.plot.bar(x = 'location.state', y = 'owner.id', rot = 0)
```

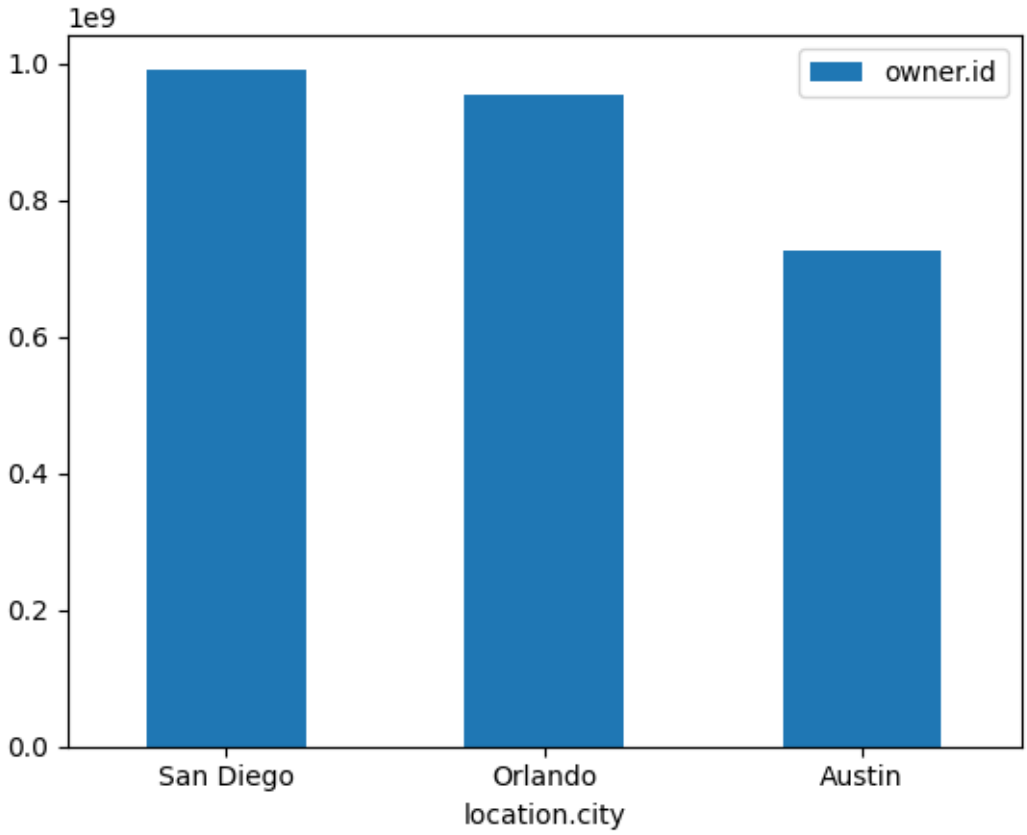
[28]:
```
<Axes: xlabel='location.state'>
```



4) Visualize top 3 cities under Top 3 states with max owners

[30]:
```
top_state = list(top5_o['location.state'])
mask = df['location.state'].isin(top_state)
city_o = df[mask]
city_o = city_o.groupby('location.city', as_index=False).sum()
city_o = city_o.sort_values(by= ['owner.id'], ascending=False)
top3_cityo = city_o.iloc[:3]
top3_cityo.plot.bar(x = 'location.city', y = 'owner.id', rot = 0)
```

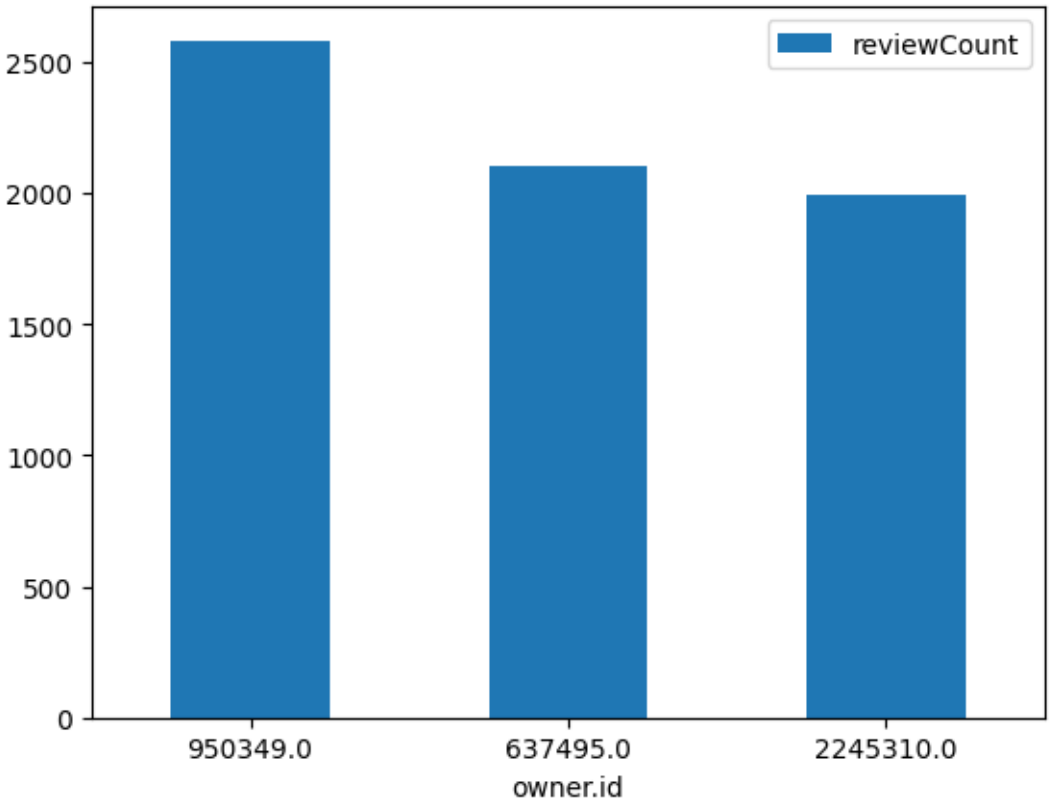
[30]:
```
<Axes: xlabel='location.city'>
```



5) Visualize top owners who own max cars

[34]:
```
owner = df[['owner.id','reviewCount']]
owner = owner.groupby('owner.id', as_index=False).sum()
owner = owner.sort_values(by= ['reviewCount'], ascending=False)
owner = owner.iloc[:3]
owner.plot.bar(x = 'owner.id', y = 'reviewCount', rot = 0)
```

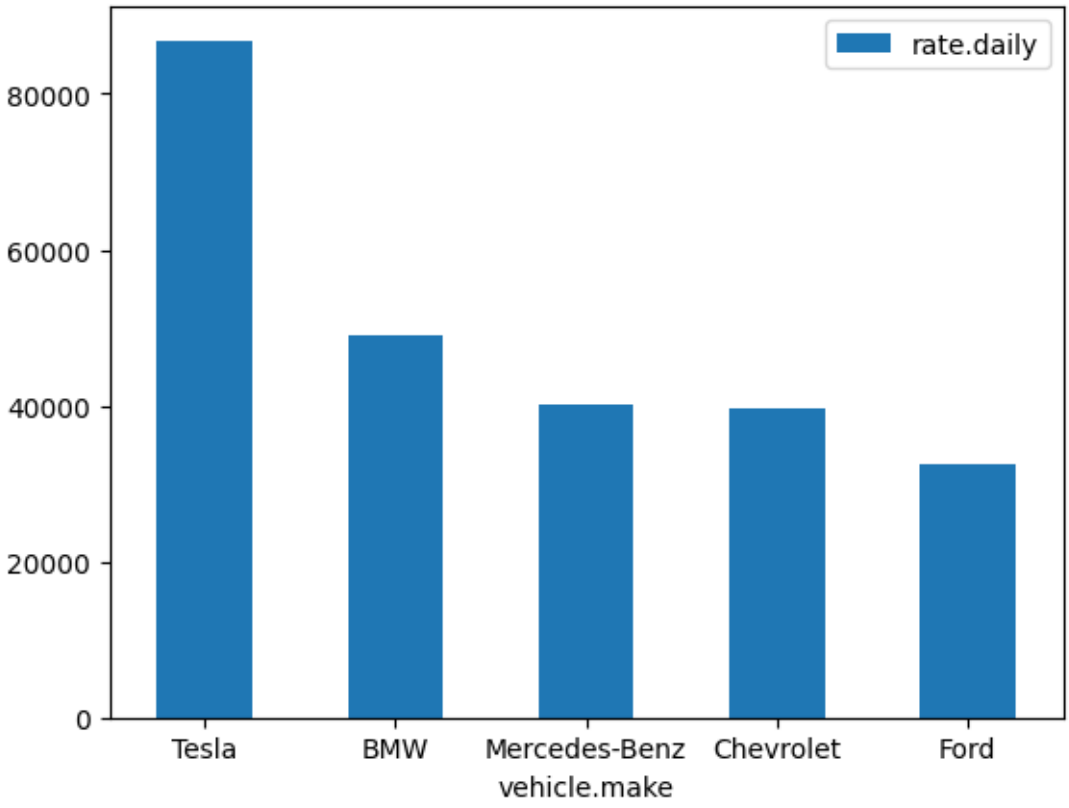
[34]:
```
<Axes: xlabel='owner.id'>
```



7) Visualize top 5 vehicle makers who helped making most avg. daily rate

[44]:
```
daily = df[['vehicle.make','rate.daily']]
daily = daily.groupby('vehicle.make', as_index=False).sum()
daily = daily.sort_values(by= ['rate.daily'], ascending=False)
daily = daily.iloc[:5]
daily.plot.bar(x = 'vehicle.make', y = 'rate.daily', rot = 0)
```

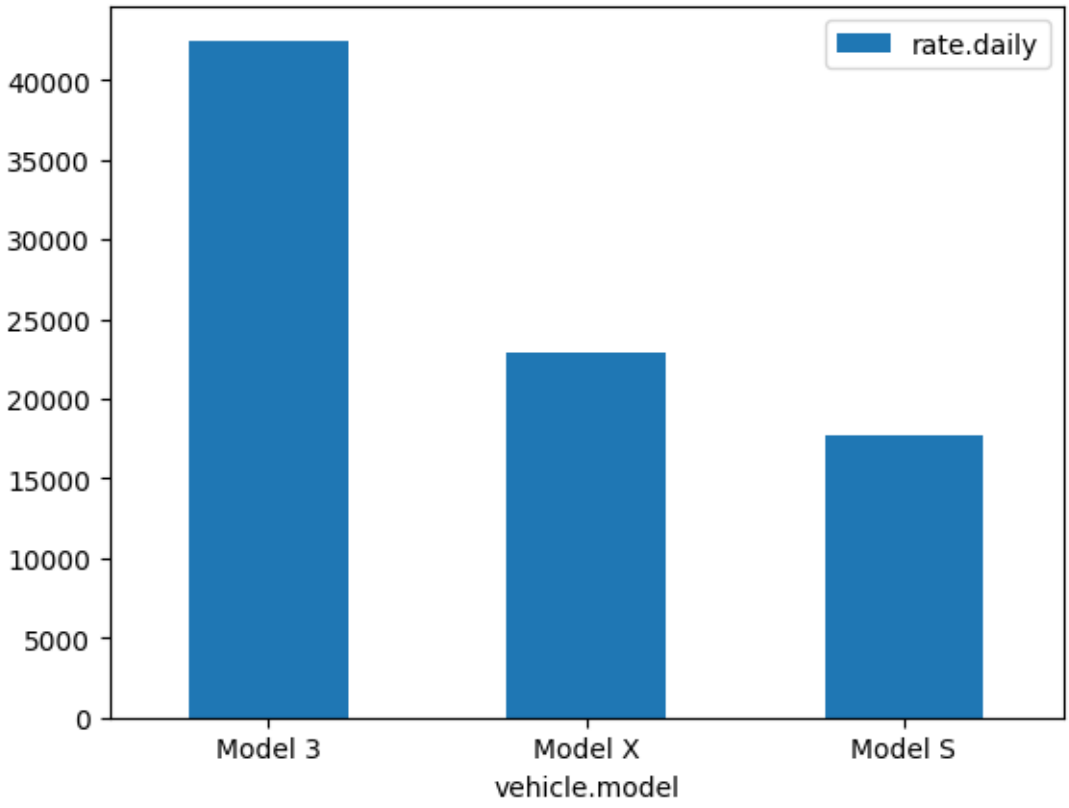
[44]: <Axes: xlabel='vehicle.make'>



8) Visualize top 3 models under each car maker helping to make those avg daily rate

[47]:
```
top_maker = list(daily['vehicle.make'])
mask = df['vehicle.make'].isin(top_maker)
city_o = df[mask]
city_o = city_o.groupby('vehicle.model', as_index=False).sum()
city_o = city_o.sort_values(by= ['rate.daily'], ascending=False)
top3_cityo = city_o.iloc[:3]
top3_cityo.plot.bar(x = 'vehicle.model', y = 'rate.daily', rot = 0)
```

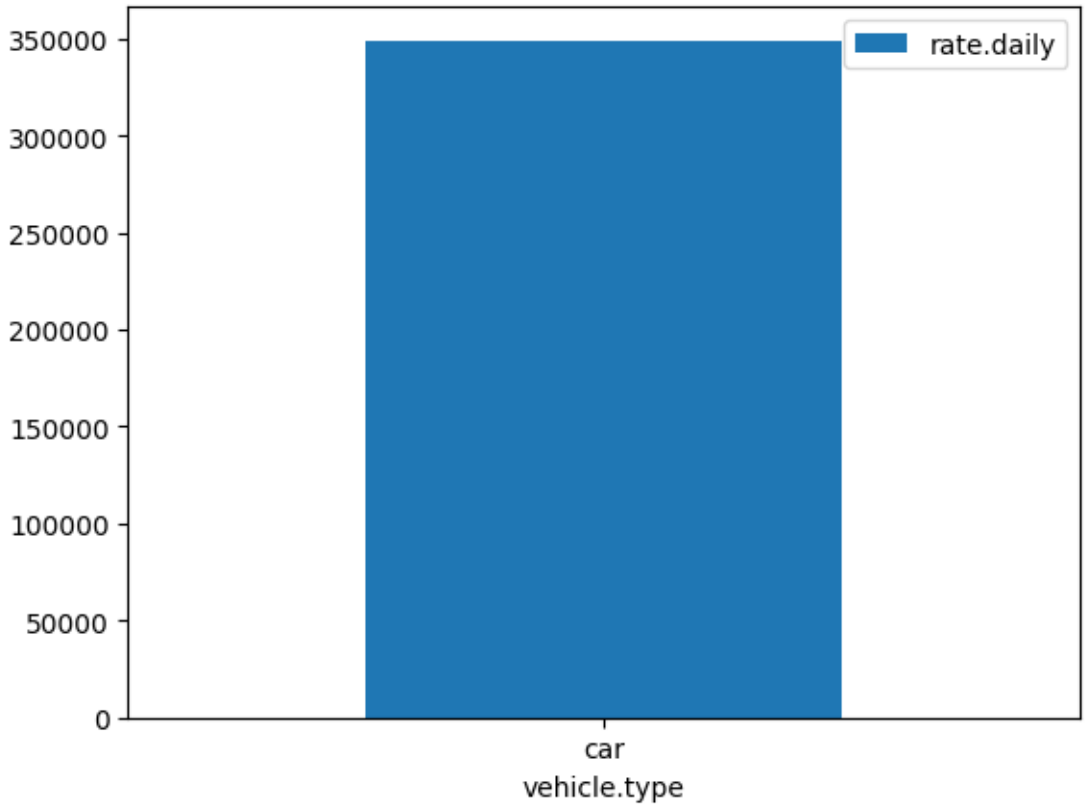
[47]:
```
<Axes: xlabel='vehicle.model'>
```



9) Visualize vehicle type that makes most avg daily rates

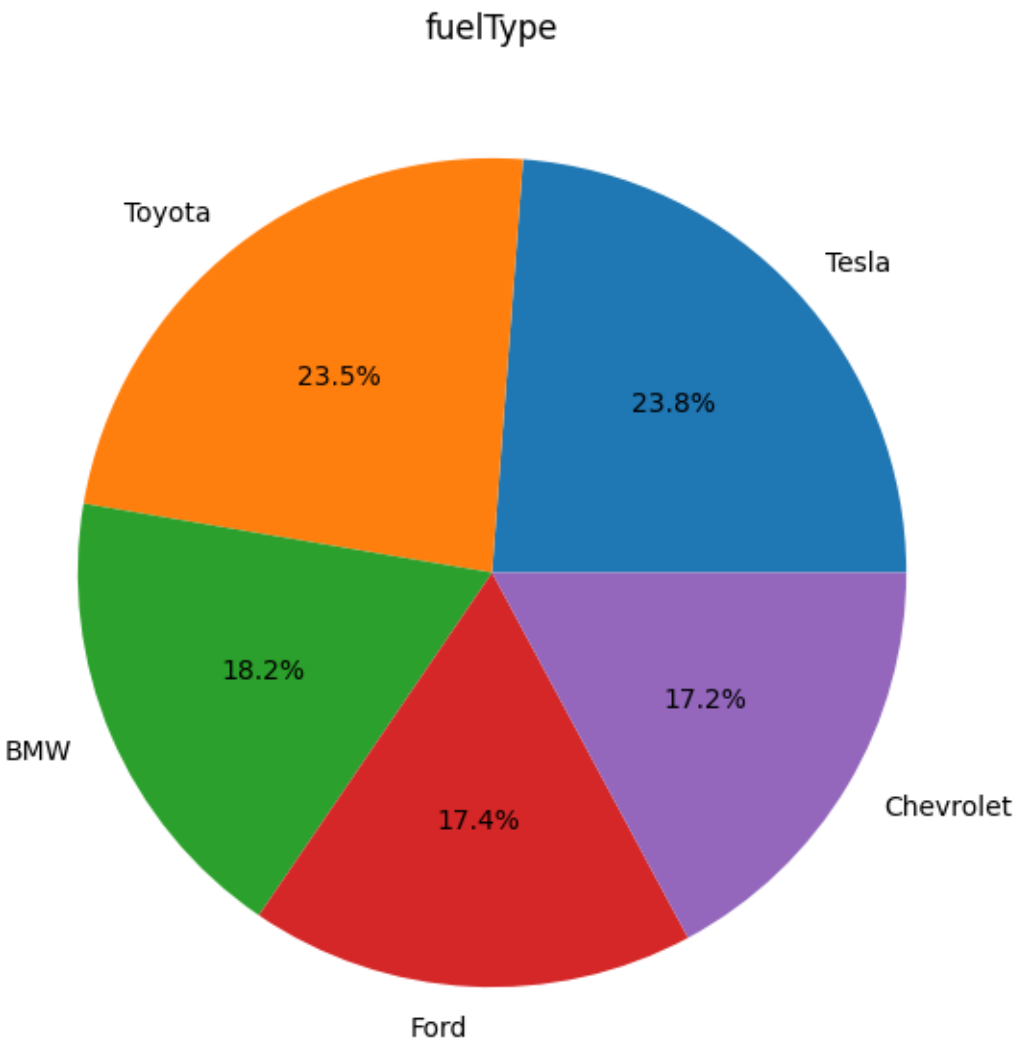
[48]:
```
daily = df[['vehicle.type','rate.daily']]
daily = daily.groupby('vehicle.type', as_index=False).sum()
daily = daily.sort_values(by= ['rate.daily'], ascending=False)
daily = daily.iloc[:1]
daily.plot.bar(x = 'vehicle.type', y = 'rate.daily', rot = 0)
```

[48]:
```
<Axes: xlabel='vehicle.type'>
```



10) Visualize distribution of cars based on fuel type

[38]:
```
labels=df['vehicle.make'].value_counts()[:5].index
values=df['vehicle.make'].value_counts()[:5].values

#visualization
plt.figure(figsize=(7,7))
plt.pie(values ,labels = labels ,autopct='%1.1f%%')
plt.title('fuelType')
plt.show()
plt.savefig('Fuel Type.png', format='png')
```

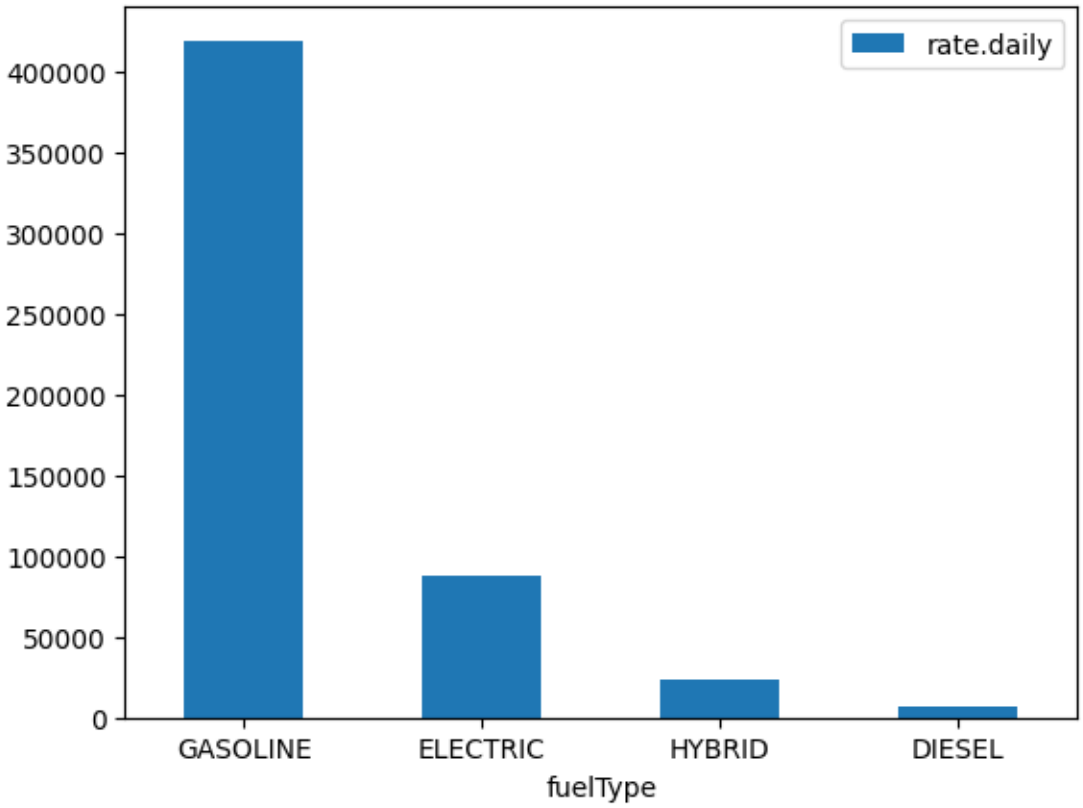



```
<Figure size 640x480 with 0 Axes>
```

11) Avg daily rate based on fuel type

[49]:
```
daily = df[['fuelType','rate.daily']]
daily = daily.groupby('fuelType', as_index=False).sum()
daily = daily.sort_values(by= ['rate.daily'], ascending=False)
# daily = daily.iloc[:1]
daily.plot.bar(x = 'fuelType', y = 'rate.daily', rot = 0)
```

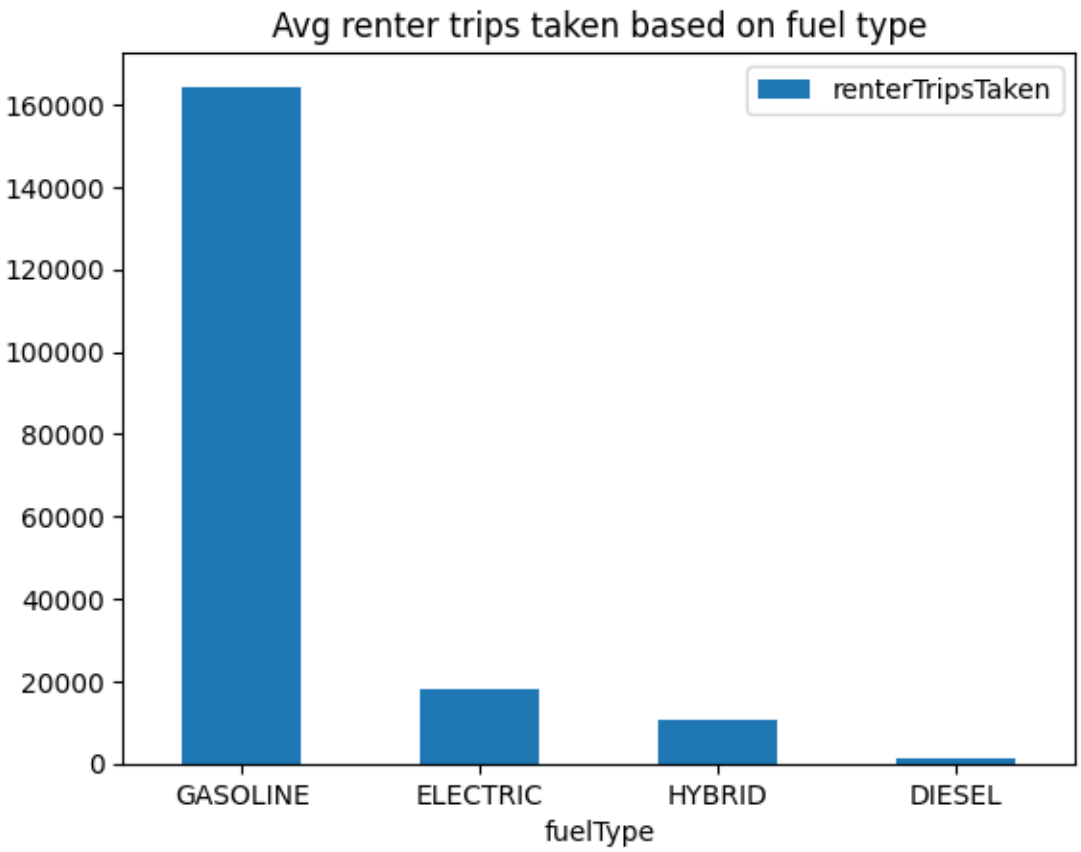
[49]:
```
<Axes: xlabel='fuelType'>
```



12) Avg renter trips taken based on fuel type

[50]:
```
daily = df[['fuelType','renterTripsTaken']]
daily = daily.groupby('fuelType', as_index=False).sum()
daily = daily.sort_values(by= ['renterTripsTaken'], ascending=False)
# daily = daily.iloc[:1]
daily.plot.bar(x = 'fuelType', y = 'renterTripsTaken', rot = 0)
plt.title('Avg renter trips taken based on fuel type')
```

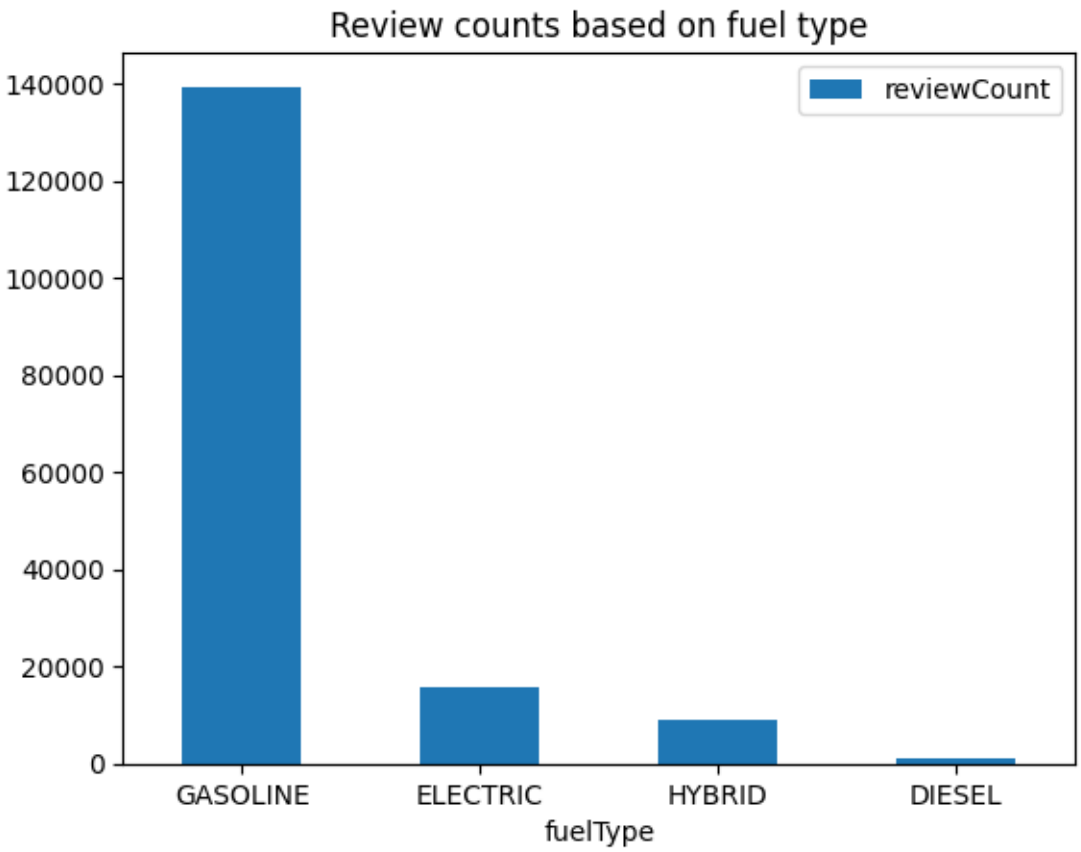
[50]:
```
Text(0.5, 1.0, 'Avg renter trips taken based on fuel type')
```



[ ]:
```
13) Review counts based on fuel type
```

[51]:
```
daily = df[['fuelType','reviewCount']]
daily = daily.groupby('fuelType', as_index=False).sum()
daily = daily.sort_values(by= ['reviewCount'], ascending=False)
# daily = daily.iloc[:1]
daily.plot.bar(x = 'fuelType', y = 'reviewCount', rot = 0)
plt.title('Review counts based on fuel type')
```

[51]:
```
Text(0.5, 1.0, 'Review counts based on fuel type')
```



14) Does vehicles with most trips taken have a better review count?

[53]:
```
daily = df[['vehicle.type','renterTripsTaken', 'reviewCount']]
daily = daily.groupby('vehicle.type', as_index=False).sum()
daily = daily.sort_values(by= ['renterTripsTaken'], ascending=False)
print (daily)
print ('It has the best review count')
```

```
  vehicle.type  renterTripsTaken  reviewCount
0          car          133901.0     114528.0
2          suv           50170.0      42263.0
1      minivan            7134.0       5806.0
3        truck            4282.0       3609.0
4          van             389.0        283.0
It has the best review count
```

15) Which vehicle type makes most rental trips

[60]:
```
print ('{} make most rental trips '.format(daily.iloc[0][0]))
```

```
car make most rental trips
```

```
/var/folders/cs/8r3m5sjs0rd7ts526sxtp81c0000gn/T/ipykernel_30820/326969067.py:1:
FutureWarning: Series.__getitem__ treating keys as positions is deprecated. In a
future version, integer keys will always be treated as labels (consistent with
DataFrame behavior). To access a value by position, use `ser.iloc[pos]`
  print ('{} make most rental trips '.format(daily.iloc[0][0]))
```