```
#Assignment 11
import pandas as pd
import numpy as np
df=pd.read csv('Vehicles.csv')
df.head()
           id
                                                                url \
   7222695916
               https://prescott.craigslist.org/cto/d/prescott...
  7218891961
               https://fayar.craigslist.org/ctd/d/bentonville...
1
2
  7221797935
               https://keys.craigslist.org/cto/d/summerland-k...
  7222270760
               https://worcester.craigslist.org/cto/d/west-br...
  7210384030
               https://greensboro.craigslist.org/cto/d/trinit...
                    region
                                                     region url price
year
0
                              https://prescott.craigslist.org
                                                                  6000
                  prescott
NaN
1
             fayetteville
                                  https://fayar.craigslist.org
                                                                 11900
NaN
                                  https://keys.craigslist.org
2
             florida keys
                                                                 21000
NaN
                             https://worcester.craigslist.org
  worcester / central MA
                                                                  1500
NaN
                            https://greensboro.craigslist.org
                                                                  4900
4
               greensboro
NaN
  manufacturer model condition cylinders ... size type
paint_color
           NaN
                  NaN
                                                                    NaN
                            NaN
                                       NaN
                                                 NaN
                                                        NaN
                            NaN
                                                        NaN
                                                                     NaN
1
           NaN
                  NaN
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2
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3
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           NaN
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                                                                    NaN
  image url description county state lat long posting date
0
        NaN
                     NaN
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                                    az NaN
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                                                          NaN
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        NaN
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3
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                            NaN
                                    ma NaN
4
        NaN
                     NaN
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                                    nc NaN
                                            NaN
                                                          NaN
[5 rows x 26 columns]
```

```
df.tail()
              id
                                                                  url
region
1996 7308972392
                  https://dothan.craigslist.org/ctd/d/alachua-20...
dothan
1997
                  https://dothan.craigslist.org/ctd/d/alachua-20...
     7308971633
dothan
                  https://dothan.craigslist.org/ctd/d/dothan-201...
1998
      7308831024
dothan
1999
                  https://dothan.craigslist.org/ctd/d/alachua-20...
     7308801755
dothan
2000
     7308801682
                  https://dothan.craigslist.org/ctd/d/alachua-20...
dothan
                                               year manufacturer \
                          region url
                                      price
1996
      https://dothan.craigslist.org
                                      17860
                                             2014.0
                                                             ieep
1997
      https://dothan.craigslist.org
                                             2020.0
                                                             ford
                                      54488
      https://dothan.craigslist.org
                                             2017.0
1998
                                      33990
                                                              ram
1999
      https://dothan.craigslist.org
                                             2020.0
                                                             ford
                                          3
      https://dothan.craigslist.org 18681 2019.0
2000
                                                          nissan
                        model condition
                                            cylinders
                                                        ... size
                                                                    type
1996
       grand cherokee limited
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                                     NaN
                                                  NaN
                                                        . . .
                                                             NaN
1997
             f-150 lariat 4wd
                                     NaN
                                                                     NaN
                                                  NaN
                                                             NaN
1998 1500 crew cab tradesman
                                          8 cylinders
                                                                  pickup
                                    good
                                                             NaN
1999
              fusion se sedan
                                     NaN
                                                  NaN
                                                             NaN
                                                                     NaN
2000
          altima 2.5 sr sedan
                                     NaN
                                                  NaN
                                                             NaN
                                                                     NaN
     paint color
                                                            image url \
1996
             NaN
                  https://images.craigslist.org/00000 ijP20x9vMi...
                  https://images.craigslist.org/00U0U_dT0exE0B2l...
1997
             NaN
1998
            blue
                  https://images.craigslist.org/00Y0Y jRbwm0dSjS...
                  https://images.craigslist.org/00E0E b3RHuW4jYv...
1999
             NaN
                  https://images.craigslist.org/00101 lBMiBbuKBr...
2000
             NaN
                                             description county
state \
      2014 JEEP GRAND CHEROKEE LIMITED ~ Hundreds of...
                                                             NaN
                                                                    al
1997
      2020 FORD F-150 LARIAT 4WD / F150 4X4 TRUCK ~ ...
                                                             NaN
                                                                    al
1998
      Carvana is the safer way to buy a car During t...
                                                             NaN
                                                                    al
      2020 FORD FUSION SE SEDAN ~ Hundreds of NEW & ...
1999
                                                             NaN
                                                                    al
```

```
2019 NISSAN ALTIMA 2.5 SR SEDAN ~ Hundreds of ...
2000
                                                             NaN
                                                                     al
            lat
                       long
                                         posting_date
      29.801374 -82.531052
                             2021-04-18T17:15:59-0500
1996
      29.802119 -82.529850
                             2021-04-18T17:14:22-0500
1997
1998
      31.230000 -85.400000
                             2021-04-18T12:50:51-0500
                             2021-04-18T11:59:35-0500
      29.803337 -82.528074
1999
2000
      29.802566 -82.529678
                             2021-04-18T11:59:27-0500
[5 rows x 26 columns]
df.info
<bound method DataFrame.info of</pre>
                                                id
url
0
      7222695916
                  https://prescott.craigslist.org/cto/d/prescott...
                  https://fayar.craigslist.org/ctd/d/bentonville...
1
      7218891961
2
      7221797935
                  https://keys.craigslist.org/cto/d/summerland-k...
3
      7222270760
                  https://worcester.craigslist.org/cto/d/west-br...
4
      7210384030
                  https://greensboro.craigslist.org/cto/d/trinit...
1996
      7308972392
                  https://dothan.craigslist.org/ctd/d/alachua-20...
                  https://dothan.craigslist.org/ctd/d/alachua-20...
1997
      7308971633
1998
      7308831024
                  https://dothan.craigslist.org/ctd/d/dothan-201...
1999
      7308801755
                  https://dothan.craigslist.org/ctd/d/alachua-20...
                  https://dothan.craigslist.org/ctd/d/alachua-20...
2000
      7308801682
                       region
                                                       region url
                                                                   price
\
0
                     prescott
                                 https://prescott.craigslist.org
                                                                     6000
                fayetteville
1
                                    https://fayar.craigslist.org
                                                                    11900
                florida keys
                                     https://keys.craigslist.org
                                                                    21000
      worcester / central MA
3
                                https://worcester.craigslist.org
                                                                     1500
                               https://greensboro.craigslist.org
                                                                     4900
                  greensboro
1996
                       dothan
                                   https://dothan.craigslist.org
                                                                    17860
1997
                       dothan
                                   https://dothan.craigslist.org
                                                                    54488
1998
                       dothan
                                   https://dothan.craigslist.org
                                                                    33990
1999
                       dothan
                                   https://dothan.craigslist.org
```

2000		dothan	https://dothan.craigslist.org	18681
		nufacturer	model condition	
cylin 0 NaN	ders \ NaN	NaN	NaN NaN	
1 NaN	NaN	NaN	NaN NaN	
2 NaN	NaN	NaN	NaN NaN	
3 NaN	NaN	NaN	NaN NaN	
4 NaN	NaN	NaN	NaN NaN	
			•••	
1996 NaN	2014.0	jeep g	grand cherokee limited NaN	
1997 NaN	2020.0	ford	f-150 lariat 4wd NaN	
1998 cylin	2017.0 ders	ram 15	500 crew cab tradesman good 8	
1999 NaN	2020.0	ford	fusion se sedan NaN	
2000 NaN	2019.0	nissan	altima 2.5 sr sedan NaN	
0 1 2 3 4	size NaN NaN NaN NaN NaN	type paint_ NaN NaN NaN NaN NaN	NaN NaN NaN NaN NaN	
1996 1997 1998 1999 2000	NaN NaN NaN NaN NaN	NaN NaN pickup NaN NaN	NaN NaN blue NaN NaN	
0 1 2 3 4			image_url \ NaN NaN NaN NaN	
1996 1997			ist.org/00000_ijP2Qx9vMi ist.org/00U0U_dT0exE0B2l	

```
1998
      https://images.craigslist.org/00Y0Y jRbwm0dSjS...
1999
      https://images.craigslist.org/00E0E b3RHuW4jYv...
2000
      https://images.craigslist.org/00101 lBMiBbuKBr...
                                              description county
state \
                                                       NaN
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      2014 JEEP GRAND CHEROKEE LIMITED ~ Hundreds of...
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1997
      2020 FORD F-150 LARIAT 4WD / F150 4X4 TRUCK ~ ...
                                                              NaN
                                                                     al
1998
      Carvana is the safer way to buy a car During t...
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                                                                     al
1999
      2020 FORD FUSION SE SEDAN ~ Hundreds of NEW & ...
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2000
      2019 NISSAN ALTIMA 2.5 SR SEDAN ~ Hundreds of ...
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1996
      29.801374 -82.531052
                             2021-04-18T17:15:59-0500
      29.802119 -82.529850
                             2021-04-18T17:14:22-0500
1997
1998
      31.230000 -85.400000
                             2021-04-18T12:50:51-0500
      29.803337 -82.528074
1999
                             2021-04-18T11:59:35-0500
      29.802566 -82.529678
                             2021-04-18T11:59:27-0500
2000
[2001 rows x 26 columns]>
df.describe
<bound method NDFrame.describe of</pre>
                                                  id
url
0
      7222695916
                   https://prescott.craigslist.org/cto/d/prescott...
1
                   https://fayar.craigslist.org/ctd/d/bentonville...
      7218891961
2
      7221797935
                   https://keys.craigslist.org/cto/d/summerland-k...
```

```
3
      7222270760
                   https://worcester.craigslist.org/cto/d/west-br...
4
      7210384030
                   https://greensboro.craigslist.org/cto/d/trinit...
                   https://dothan.craigslist.org/ctd/d/alachua-20...
1996
      7308972392
1997
      7308971633
                   https://dothan.craigslist.org/ctd/d/alachua-20...
1998
      7308831024
                   https://dothan.craigslist.org/ctd/d/dothan-201...
1999
                   https://dothan.craigslist.org/ctd/d/alachua-20...
      7308801755
2000
      7308801682
                   https://dothan.craigslist.org/ctd/d/alachua-20...
                       region
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1
                 fayetteville
                                     https://fayar.craigslist.org
                                                                     11900
2
                 florida keys
                                      https://keys.craigslist.org
                                                                    21000
3
      worcester / central MA
                                 https://worcester.craigslist.org
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4
                               https://greensboro.craigslist.org
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                   greensboro
1996
                       dothan
                                    https://dothan.craigslist.org
                                                                    17860
1997
                       dothan
                                    https://dothan.craigslist.org
                                                                    54488
1998
                       dothan
                                    https://dothan.craigslist.org
                                                                    33990
                                    https://dothan.craigslist.org
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2000
                       dothan
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                                                                    18681
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cylinders
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      2014.0
                             grand cherokee limited
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                      jeep
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1997
      2020.0
                      ford
                                    f-150 lariat 4wd
                                                             NaN
NaN
1998
      2017.0
                        ram
                             1500 crew cab tradesman
                                                            good
cylinders
1999 2020.0
                      ford
                                      fusion se sedan
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                                 altima 2.5 sr sedan
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                    nissan
NaN
                   type paint_color \
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      https://images.craigslist.org/00000 ijP2Qx9vMi...
1997
      https://images.craigslist.org/00U0U dT0exE0B2l...
1998
      https://images.craigslist.org/00Y0Y_jRbwm0dSjS...
      https://images.craigslist.org/00E0E_b3RHuW4jYv...
1999
      https://images.craigslist.org/00101 lBMiBbuKBr...
2000
                                               description county
state \
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      2014 JEEP GRAND CHEROKEE LIMITED ~ Hundreds of...
1996
                                                                NaN
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```

```
2020 FORD F-150 LARIAT 4WD / F150 4X4 TRUCK ~ ...
1997
                                                              NaN
                                                                      al
1998
      Carvana is the safer way to buy a car During t...
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1999
      2020 FORD FUSION SE SEDAN ~ Hundreds of NEW & ...
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2000
      2019 NISSAN ALTIMA 2.5 SR SEDAN ~ Hundreds of ...
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0
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      29.801374 -82.531052
                             2021-04-18T17:15:59-0500
1996
1997
      29.802119 -82.529850
                             2021-04-18T17:14:22-0500
1998
      31.230000 -85.400000
                             2021-04-18T12:50:51-0500
                             2021-04-18T11:59:35-0500
      29.803337 -82.528074
1999
2000
      29.802566 -82.529678
                             2021-04-18T11:59:27-0500
[2001 \text{ rows } \times 26 \text{ columns}] >
df.isnull
<bound method DataFrame.isnull of</pre>
                                                   id
url
                   https://prescott.craigslist.org/cto/d/prescott...
      7222695916
                   https://fayar.craigslist.org/ctd/d/bentonville...
1
      7218891961
2
      7221797935
                   https://keys.craigslist.org/cto/d/summerland-k...
3
      7222270760
                   https://worcester.craigslist.org/cto/d/west-br...
4
      7210384030
                   https://greensboro.craigslist.org/cto/d/trinit...
      7308972392
1996
                   https://dothan.craigslist.org/ctd/d/alachua-20...
1997
      7308971633
                   https://dothan.craigslist.org/ctd/d/alachua-20...
1998
      7308831024
                   https://dothan.craigslist.org/ctd/d/dothan-201...
                   https://dothan.craigslist.org/ctd/d/alachua-20...
1999
      7308801755
2000
      7308801682
                   https://dothan.craigslist.org/ctd/d/alachua-20...
                       region
                                                        region url
                                                                     price
\
0
                                  https://prescott.craigslist.org
                     prescott
                                                                      6000
1
                 fayetteville
                                     https://fayar.craigslist.org
                                                                     11900
2
                 florida keys
                                      https://keys.craigslist.org
                                                                     21000
3
      worcester / central MA
                                 https://worcester.craigslist.org
                                                                      1500
```

4		greensboro	https://greensboro.crai	lgslist.org	4900
1996		dothan	https://dothan.crai	lgslist.org	17860
1997		dothan	https://dothan.crai	lgslist.org	54488
1998		dothan	https://dothan.crai	lgslist.org	33990
1999		dothan	https://dothan.crai	igslist.org	3
2000		dothan	https://dothan.crai		18681
			·		
cylin		nufacturer	model co	ondition	
0	NaN	NaN	NaN	NaN	
NaN 1	NaN	NaN	NaN	NaN	
NaN 2	NaN	NaN	NaN	NaN	
NaN 3	NaN	NaN	NaN	NaN	
NaN 4	NaN	NaN	NaN	NaN	
NaN	Nan	Nan	Naiv	IVAIV	
1996 NaN	2014.0	jeep g	rand cherokee limited	NaN	
1997 NaN	2020.0	ford	f-150 lariat 4wd	NaN	
1998 cylin	2017.0	ram 15	00 crew cab tradesman	good 8	
1999	2020.0	ford	fusion se sedan	NaN	
NaN 2000 NaN	2019.0	nissan	altima 2.5 sr sedan	NaN	
0 1 2 3 4	size NaN NaN NaN NaN	type paint_ NaN NaN NaN NaN NaN	color \ NaN NaN NaN NaN NaN NaN		
1996 1997 1998	NaN NaN NaN	NaN NaN pickup	NaN NaN blue		

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1999
           NaN
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2000
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1996
      https://images.craigslist.org/00000 ijP20x9vMi...
1997
      https://images.craigslist.org/00U0U dT0exE0B2l...
1998
      https://images.craigslist.org/00Y0Y jRbwm0dSjS...
      https://images.craigslist.org/00E0E_b3RHuW4jYv...
1999
2000
      https://images.craigslist.org/00101 lBMiBbuKBr...
                                              description county
state \
0
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1996
      2014 JEEP GRAND CHEROKEE LIMITED ~ Hundreds of...
                                                              NaN
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1997
      2020 FORD F-150 LARIAT 4WD / F150 4X4 TRUCK ~ ...
                                                              NaN
                                                                      al
1998
      Carvana is the safer way to buy a car During t...
                                                                      al
                                                              NaN
      2020 FORD FUSION SE SEDAN ~ Hundreds of NEW & ...
1999
                                                              NaN
                                                                      al
2000
      2019 NISSAN ALTIMA 2.5 SR SEDAN ~ Hundreds of ...
                                                              NaN
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0
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      29.801374 -82.531052
                             2021-04-18T17:15:59-0500
1996
                             2021-04-18T17:14:22-0500
1997
      29.802119 -82.529850
      31.230000 -85.400000
                             2021-04-18T12:50:51-0500
1998
```

```
1999
      29.803337 -82.528074 2021-04-18T11:59:35-0500
2000
     29.802566 -82.529678 2021-04-18T11:59:27-0500
[2001 rows x 26 columns]>
df.info()
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2001 entries, 0 to 2000
Data columns (total 26 columns):
                   Non-Null Count
#
     Column
                                   Dtype
- - -
     -----
                                   ----
0
     id
                   2001 non-null
                                   int64
 1
     url
                   2001 non-null
                                   object
 2
                   2001 non-null
     region
                                   object
 3
     region_url
                   2001 non-null
                                   object
 4
                   2001 non-null
                                   int64
     price
 5
                   1952 non-null
                                   float64
     vear
 6
     manufacturer
                   1831 non-null
                                   object
 7
     model
                   1961 non-null
                                   object
 8
     condition
                   1122 non-null
                                   object
 9
     cylinders
                   1258 non-null
                                   object
 10
    fuel
                   1940 non-null
                                   object
 11
    odometer
                   1962 non-null
                                   float64
    title status
                   1871 non-null
 12
                                   object
 13
                   1973 non-null
    transmission
                                   object
 14 VIN
                   1268 non-null
                                   object
 15
    drive
                   1363 non-null
                                   object
 16
    size
                   493 non-null
                                   object
                   1380 non-null
 17
    type
                                   object
 18
    paint color
                   1534 non-null
                                   object
 19 image url
                   1974 non-null
                                   object
 20 description
                   1974 non-null
                                   object
 21 county
                   0 non-null
                                   float64
                   2001 non-null
 22
    state
                                   object
 23
    lat
                   1962 non-null
                                   float64
                   1962 non-null
 24
                                   float64
    lona
 25
     posting date 1974 non-null
                                   object
dtypes: float64(5), int64(2), object(19)
memory usage: 406.6+ KB
df.describe()
                 id
                                                    odometer
                            price
                                          year
county
count 2.001000e+03
                     2.001000e+03 1952.000000
                                                1.962000e+03
                                                                 0.0
      7.308532e+09
                     5.625151e+05 2011.201332
                                                2.038947e+05
                                                                 NaN
mean
       1.150144e+07 2.219042e+07
                                      9.704075
                                                9.915782e+05
                                                                 NaN
std
```

```
min
       7.208550e+09
                      0.000000e+00
                                     1903.000000
                                                  0.000000e+00
                                                                    NaN
25%
       7.305754e+09
                      5.500000e+03
                                     2008,000000
                                                  2.967350e+04
                                                                    NaN
50%
       7.310397e+09
                      1.720000e+04
                                     2013.000000
                                                  8.799700e+04
                                                                    NaN
                                     2017.000000
       7.313504e+09
                      2.998000e+04
                                                  1.572288e+05
75%
                                                                    NaN
       7.316878e+09
                      9.876543e+08
                                     2021,000000
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max
               lat
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       1962.000000
                     1962.000000
count
                      -85.549365
         33.735365
mean
          2.167945
                        3.375666
std
         26.021800
min
                     -122.693000
25%
         32.922900
                      -86.817617
                      -86.737847
50%
         33.455361
75%
         33.736288
                      -85.480000
         44.120200
                      -73.572300
max
df.isnull
<bound method DataFrame.isnull of</pre>
                                                  id
url
                   https://prescott.craigslist.org/cto/d/prescott...
0
      7222695916
                   https://fayar.craigslist.org/ctd/d/bentonville...
1
      7218891961
2
      7221797935
                   https://keys.craigslist.org/cto/d/summerland-k...
3
                   https://worcester.craigslist.org/cto/d/west-br...
      7222270760
                   https://greensboro.craigslist.org/cto/d/trinit...
4
      7210384030
                   https://dothan.craigslist.org/ctd/d/alachua-20...
1996
      7308972392
      7308971633
                   https://dothan.craigslist.org/ctd/d/alachua-20...
1997
                   https://dothan.craigslist.org/ctd/d/dothan-201...
1998
      7308831024
                   https://dothan.craigslist.org/ctd/d/alachua-20...
1999
      7308801755
2000
      7308801682
                   https://dothan.craigslist.org/ctd/d/alachua-20...
                       region
                                                        region url
                                                                    price
/
0
                     prescott
                                  https://prescott.craigslist.org
                                                                     6000
1
                 fayetteville
                                     https://fayar.craigslist.org
                                                                    11900
2
                 florida keys
                                      https://keys.craigslist.org
                                                                    21000
3
      worcester / central MA
                                https://worcester.craigslist.org
                                                                     1500
4
                               https://greensboro.craigslist.org
                                                                     4900
                   greensboro
```

1996		dotha	n	https://do	than.cra	igslist.org	17860
1997		dotha	n	https://do	than.cra	igslist.org	54488
1998		dotha	n	https://do	than.cra	igslist.org	33990
1999		dotha	n	https://do	than.cra	igslist.org	3
2000		dotha	n	https://doi	than.cra	igslist.org	18681
		anufacturer			model co	ondition	
cylin							
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2000	2019.0	niccan	-1+	ima 2.5 sr	codon	NaN	
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1998	NaN	pickup	blue	2			
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1997
      https://images.craigslist.org/00U0U dT0exE0B2l...
      https://images.craigslist.org/00Y0Y jRbwm0dSjS...
1998
1999
      https://images.craigslist.org/00E0E b3RHuW4jYv...
      https://images.craigslist.org/00101 lBMiBbuKBr...
2000
                                              description county
state \
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      2014 JEEP GRAND CHEROKEE LIMITED ~ Hundreds of...
1996
                                                              NaN
                                                                     al
1997
      2020 FORD F-150 LARIAT 4WD / F150 4X4 TRUCK ~ ...
                                                                     al
                                                              NaN
1998
      Carvana is the safer way to buy a car During t...
                                                              NaN
                                                                     al
1999
      2020 FORD FUSION SE SEDAN ~ Hundreds of NEW & ...
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2000
      2019 NISSAN ALTIMA 2.5 SR SEDAN ~ Hundreds of ...
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            lat
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1996
      29.801374 -82.531052
                             2021-04-18T17:15:59-0500
      29.802119 -82.529850
                             2021-04-18T17:14:22-0500
1997
1998
      31.230000 -85.400000
                             2021-04-18T12:50:51-0500
      29.803337 -82.528074
1999
                             2021-04-18T11:59:35-0500
2000
      29.802566 -82.529678
                             2021-04-18T11:59:27-0500
[2001 rows x 26 columns]>
```

```
df.columns
Index(['id', 'url', 'region', 'region url', 'price', 'year',
'transmission', 'VIN', 'drive', 'size', 'type', 'paint_color',
      'image_url', 'description', 'county', 'state', 'lat', 'long',
       'posting date'],
     dtype='object')
data=['id','region']
data
['id', 'region']
df[data]
                                region
             id
0
     7222695916
                              prescott
1
                          fayetteville
     7218891961
2
     7221797935
                          florida keys
3
     7222270760 worcester / central MA
4
     7210384030
                            greensboro
1996 7308972392
                                dothan
     7308971633
1997
                                dothan
1998
    7308831024
                                dothan
1999
     7308801755
                                dothan
2000 7308801682
                                dothan
[2001 rows x 2 columns]
df.size
52026
df[data].head()
                             region
          id
  7222695916
                           prescott
0
1
  7218891961
                       fayetteville
2
  7221797935
                       florida keys
3
  7222270760 worcester / central MA
4 7210384030
                         greensboro
df[data].tail()
                region
             id
                 dothan
1996
     7308972392
1997
     7308971633
                dothan
```

1998	7308831024	dothan
1999	7308801755	dothan
2000	7308801682	dothan