eksik-gozlem-analizi-1

March 11, 2024

1 Eksik Veri Analizi

1.1 Eksik Değerlerin Saptanması

```
[34]: import pandas as pd
      df = pd.read_csv("/content/Meteorite_Landings.csv")
[35]:
     df.head()
                    id nametype
[35]:
                                                mass (g)
             name
                                     recclass
                                                          fall
                                                                   year
                                                                           reclat \
      0
           Aachen
                      1
                           Valid
                                            L5
                                                    21.0 Fell
                                                                1880.0
                                                                         50.77500
      1
           Aarhus
                      2
                           Valid
                                            Н6
                                                   720.0 Fell
                                                                 1951.0
                                                                         56.18333
      2
             Abee
                      6
                           Valid
                                           EH4
                                                107000.0 Fell
                                                                 1952.0
                                                                         54.21667
      3
         Acapulco
                     10
                           Valid
                                  Acapulcoite
                                                  1914.0
                                                          Fell
                                                                 1976.0
                                                                         16.88333
          Achiras
                   370
                           Valid
                                                   780.0 Fell
                                                                 1902.0 -33.16667
           reclong
                              GeoLocation
      0
           6.08333
                        (50.775, 6.08333)
      1
          10.23333
                     (56.18333, 10.23333)
      2 -113.00000
                       (54.21667, -113.0)
      3 -99.90000
                        (16.88333, -99.9)
                      (-33.16667, -64.95)
      4 -64.95000
[36]:
     df.isnull().sum()
[36]: name
                         0
      id
                         0
      nametype
                         0
      recclass
                         0
      mass (g)
                       131
      fall
                         0
      year
                       291
      reclat
                      7315
      reclong
                      7315
      GeoLocation
                      7315
      dtype: int64
[45]: df.isnull().sum().sum()
```

[45]: 22367

df[df.isnull().any(axis = 1)] [39]: recclass name id nametype 12 Aire-sur-la-Lys 425 Valid Unknown 37 Northwest Africa 5815 50693 Valid L5 38 2301 Valid L6 Angers 76 Barcelona (stone) 4944 Valid OC 93 Belville 5009 Valid OC 45589 Yamato 984028 40648 Valid Martian (shergottite) Yambo no. 2 30346 Valid 45660 Zacatecas (1969) Valid 45692 30382 Iron, IIIAB 45698 Zapata County 30393 Valid Iron Zaragoza 45700 48916 Valid Iron, IVA-an mass (g) fall year reclat reclong GeoLocation 12 NaN Fell 1769.0 50.66667 2.33333 (50.66667, 2.33333) 37 256.800 (0.0, 0.0)Found NaN 0.00000 0.00000 Fell 1822.0 (47.46667, -0.55)38 NaN 47.46667 -0.55000 (41.36667, 2.16667) 76 NaN Fell 1704.0 41.36667 2.16667 93 Fell 1937.0 -32.33333 -64.86667 (-32.33333, -64.86667)NaN 45589 12.342 Found 1998.0 NaN NaN NaN 45660 3.200 Found 1975.0 NaN NaN NaN 45692 6660.000 Found 1969.0 NaN NaN NaN 45698 NaNFound 1930.0 27.00000 -99.00000 (27.0, -99.0)45700 162000.000 Found 41.65000 -0.86667 (41.65, -0.86667) ${\tt NaN}$ [7601 rows x 10 columns] [46]: df[df.notnull().all(axis = 1)] [46]: name id nametype recclass mass (g) fall \ 0 Aachen 1 Valid L5 21.0 Fell 1 Aarhus 2 Valid Н6 720.0 Fell 2 6 EH4 Abee Valid 107000.0 Fell 3 Acapulco Valid Acapulcoite Fell 10 1914.0 4 Achiras 370 Valid L6 780.0 Fell Zillah 002 31356 Valid Found 45711 Eucrite 172.0 Valid Pallasite, ungrouped 45712 Zinder 30409 46.0 Found

3.3

200.0 Found

2167.0

H4

L6

L3.7

Found

Found

30410

31357

30414

Valid

Valid

Valid

Zlin

Zubkovsky

Zulu Queen

45713

45714

45715

```
(50.775, 6.08333)
      0
              1880.0
                      50.77500
                                   6.08333
      1
              1951.0
                      56.18333
                                  10.23333
                                               (56.18333, 10.23333)
                                                 (54.21667, -113.0)
      2
              1952.0
                      54.21667 -113.00000
      3
             1976.0
                                 -99.90000
                                                  (16.88333, -99.9)
                      16.88333
              1902.0 -33.16667
                                 -64.95000
                                                (-33.16667, -64.95)
      45711
             1990.0
                      29.03700
                                  17.01850
                                                  (29.037, 17.0185)
                                                (13.78333, 8.96667)
      45712
             1999.0
                      13.78333
                                   8.96667
                                                  (49.25, 17.66667)
      45713
             1939.0
                      49.25000
                                  17.66667
                                                (49.78917, 41.5046)
      45714
             2003.0
                      49.78917
                                  41.50460
      45715 1976.0
                      33.98333 -115.68333
                                             (33.98333, -115.68333)
      [38115 rows x 10 columns]
[41]: df["year"].isnull().sum()
[41]: 291
      df[df["year"].isnull()]
[44]:
                                         id nametype
                                                           recclass
                                                                      mass (g)
                                                                                  fall
                                name
             Northwest Africa 5815
                                      50693
                                                                  L5
                                                                                Found
      37
                                               Valid
                                                                         256.8
      1937
                         Cacilandia
                                       5191
                                                Valid
                                                                  Н6
                                                                                 Found
                                                                            NaN
                                                        Iron, IIIAB
      3431
                    Apache Junction
                                      54566
                                               Valid
                                                                       25000.0
                                                                                 Found
                    Asarco Mexicana
                                                        Iron, IIIAB
      3462
                                       2344
                                                Valid
                                                                            NaN
                                                                                 Found
      5008
                                       4902
                                                Valid
                                                                           30.2
                                                                                 Found
                                 Aus
                                                                   L
      38207
                           Valencia 24147
                                                Valid
                                                                  Н5
                                                                       33500.0
                                                                                 Found
      38231
                       Villa Regina 53827
                                               Valid
                                                        Iron, IIIAB
                                                                        5030.0 Found
                    Wietrzno-Bobrka
                                      24259
                                               Valid
                                                                                 Found
      38308
                                                                Tron
                                                                         376.0
                                                                       92750.0
      38335
                          Wiltshire
                                      56143
                                                Valid
                                                                  Н5
                                                                                 Found
      45700
                           Zaragoza
                                      48916
                                                       Iron, IVA-an
                                                                      162000.0
                                                Valid
                                                                                 Found
             year
                                                   GeoLocation
                      reclat
                                 reclong
      37
              NaN
                     0.00000
                                 0.00000
                                                    (0.0, 0.0)
      1937
              NaN
                         NaN
                                     NaN
                                                           NaN
      3431
              NaN
                    33.45000 -111.51667
                                           (33.45, -111.51667)
      3462
              NaN
                         NaN
                                     NaN
                                                           NaN
      5008
              NaN -26.66667
                                16.25000
                                            (-26.66667, 16.25)
                    39.00000
                               -0.03333
                                              (39.0, -0.03333)
      38207
              NaN
                                            (-39.1, -67.06667)
      38231
              NaN -39.10000
                               -67.06667
      38308
              NaN
                    49.41667
                                21.70000
                                              (49.41667, 21.7)
                                             (51.14967, -1.81)
      38335
                    51.14967
                                -1.81000
              NaN
      45700
              {\tt NaN}
                   41.65000
                               -0.86667
                                             (41.65, -0.86667)
```

reclong

year

reclat

GeoLocation

[291 rows x 10 columns]

```
[43]: df[df["year"].isnull()]["year"]
[43]: 37
                NaN
       1937
                NaN
       3431
                NaN
       3462
                {\tt NaN}
       5008
                {\tt NaN}
       38207
                NaN
       38231
                NaN
       38308
                {\tt NaN}
       38335
                NaN
       45700
                NaN
      Name: year, Length: 291, dtype: float64
```

1.2 Eksik Veri Yapısının Görselleştirilmesi

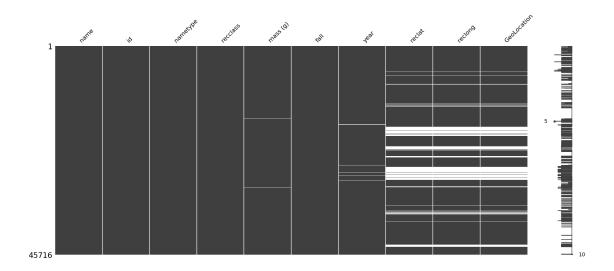
```
[47]: import missingno as msno

[49]: msno.bar(df)

[49]: <a href="https://www.april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.gov/april.g
```

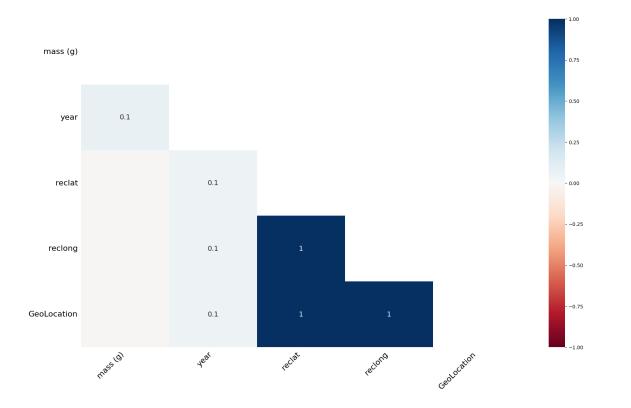
```
[48]: msno.matrix(df)
```

[48]: <Axes: >



[50]: msno.heatmap(df)

[50]: <Axes: >



1.3 Silme Yöntemleri

```
[58]: df.dropna(inplace = True)
                                                                 inplace: değişiklikleri
                                     # eksik verileri sil
        →kalıcı hale getirir.
[59]: df.isnull().sum()
[59]: name
                      0
                      0
      id
                      0
      nametype
      recclass
                      0
      mass (g)
                      0
      fall
                      0
                      0
      year
      reclat
                      0
                      0
      reclong
      GeoLocation
                      0
      dtype: int64
[60]: df = pd.read_csv("/content/Meteorite_Landings.csv")
[70]: df.dropna(how = "all")
                                 # tamamında eksiklik olan verileri sil
[70]:
                             id nametype
                                                       recclass
                                                                  mass (g)
                                                                             fall
                                                                                    \
                   name
      0
                              1
                                   Valid
                                                              L5
                                                                      21.0
                                                                             Fell
                 Aachen
                 Aarhus
                              2
                                   Valid
                                                                             Fell
      1
                                                              Н6
                                                                     720.0
      2
                    Abee
                              6
                                   Valid
                                                             EH4
                                                                  107000.0
                                                                             Fell
      3
               Acapulco
                             10
                                   Valid
                                                    Acapulcoite
                                                                    1914.0
                                                                             Fell
      4
                Achiras
                            370
                                   Valid
                                                                     780.0
                                                                             Fell
                                                              L6
                                                                     172.0 Found
      45711
             Zillah 002 31356
                                   Valid
                                                        Eucrite
                 Zinder
      45712
                         30409
                                   Valid Pallasite, ungrouped
                                                                      46.0 Found
      45713
                    Zlin 30410
                                   Valid
                                                                       3.3 Found
                                                              H4
                                   Valid
      45714
              Zubkovsky
                          31357
                                                              L6
                                                                    2167.0
                                                                            Found
      45715
             Zulu Queen 30414
                                   Valid
                                                            L3.7
                                                                     200.0 Found
                                                       GeoLocation
               year
                        reclat
                                  reclong
      0
                                                 (50.775, 6.08333)
             1880.0
                     50.77500
                                  6.08333
      1
             1951.0
                      56.18333
                                 10.23333
                                              (56.18333, 10.23333)
                                                (54.21667, -113.0)
      2
             1952.0
                      54.21667 -113.00000
      3
             1976.0
                      16.88333
                                -99.90000
                                                 (16.88333, -99.9)
      4
             1902.0 -33.16667
                                -64.95000
                                               (-33.16667, -64.95)
      45711
            1990.0
                     29.03700
                                 17.01850
                                                 (29.037, 17.0185)
                                               (13.78333, 8.96667)
      45712 1999.0
                      13.78333
                                  8.96667
                                                 (49.25, 17.66667)
      45713 1939.0
                      49.25000
                                 17.66667
                                               (49.78917, 41.5046)
      45714 2003.0 49.78917
                                 41.50460
```

[45716 rows x 10 columns]

```
[71]: df.dropna(axis = 1) # sütunda eksik veri varsa sütunu sil
[71]:
                            id nametype
                                                                 fall
                   name
                                                      recclass
                             1
                                  Valid
                                                            L5
                                                                 Fell
      0
                 Aachen
                             2
                                  Valid
      1
                 Aarhus
                                                            Н6
                                                                 Fell
      2
                   Abee
                             6
                                  Valid
                                                           EH4
                                                                 Fell
      3
               Acapulco
                                  Valid
                                                   Acapulcoite
                            10
                                                                 Fell
      4
                Achiras
                           370
                                  Valid
                                                            L6
                                                                 Fell
             Zillah 002 31356
                                  Valid
                                                       Eucrite
                                                                Found
      45711
      45712
                 Zinder 30409
                                  Valid Pallasite, ungrouped
                                                                Found
                   Zlin 30410
                                  Valid
      45713
                                                                Found
      45714
              Zubkovsky
                         31357
                                  Valid
                                                            L6 Found
      45715 Zulu Queen 30414
                                  Valid
                                                          L3.7 Found
      [45716 rows x 5 columns]
[72]: df.dropna(axis = 1, how = "all")
                                            #tamamında eksik veri varsa sütunu sil
[72]:
                            id nametype
                                                                mass (g)
                                                                           fall \
                   name
                                                      recclass
                                  Valid
                                                                           Fell
      0
                 Aachen
                             1
                                                            L5
                                                                    21.0
      1
                 Aarhus
                             2
                                  Valid
                                                            Н6
                                                                   720.0
                                                                           Fell
      2
                   Abee
                             6
                                  Valid
                                                           EH4
                                                                107000.0
                                                                           Fell
      3
               Acapulco
                            10
                                  Valid
                                                   Acapulcoite
                                                                  1914.0
                                                                           Fell
                                  Valid
                                                                           Fell
                Achiras
                           370
                                                            L6
                                                                   780.0
      45711 Zillah 002 31356
                                  Valid
                                                       Eucrite
                                                                   172.0 Found
      45712
                 Zinder 30409
                                  Valid Pallasite, ungrouped
                                                                    46.0 Found
      45713
                   Zlin 30410
                                  Valid
                                                                     3.3 Found
                                  Valid
      45714
              Zubkovsky
                         31357
                                                            L6
                                                                  2167.0 Found
      45715
             Zulu Queen
                        30414
                                  Valid
                                                          L3.7
                                                                   200.0 Found
                       reclat
                                 reclong
                                                      GeoLocation
               year
      0
             1880.0 50.77500
                                 6.08333
                                                (50.775, 6.08333)
                                             (56.18333, 10.23333)
      1
             1951.0 56.18333
                                10.23333
      2
                                               (54.21667, -113.0)
             1952.0 54.21667 -113.00000
      3
             1976.0 16.88333
                               -99.90000
                                                (16.88333, -99.9)
             1902.0 -33.16667
                               -64.95000
                                              (-33.16667, -64.95)
      45711 1990.0 29.03700
                                17.01850
                                                (29.037, 17.0185)
      45712 1999.0 13.78333
                                 8.96667
                                              (13.78333, 8.96667)
      45713 1939.0
                     49.25000
                                17.66667
                                                (49.25, 17.66667)
      45714 2003.0
                     49.78917
                                41.50460
                                              (49.78917, 41.5046)
```

```
45715 1976.0 33.98333 -115.68333 (33.98333, -115.68333)
```

[45716 rows x 10 columns]

1.4 Değer Atama Yöntemleri

```
[77]: df[df["year"].isnull()]
[77]:
                                         id nametype
                                                                     mass (g)
                                                                                fall \
                               name
                                                          recclass
                                     50693
                                               Valid
                                                                        256.8 Found
      37
             Northwest Africa 5815
                                                                 L5
                         Cacilandia
                                               Valid
                                                                              Found
      1937
                                      5191
                                                                 Н6
                                                                          NaN
                   Apache Junction 54566
                                                                               Found
      3431
                                               Valid
                                                       Iron, IIIAB
                                                                      25000.0
      3462
                   Asarco Mexicana
                                               Valid
                                                       Iron, IIIAB
                                      2344
                                                                          NaN
                                                                               Found
      5008
                                Aus
                                      4902
                                               Valid
                                                                  L
                                                                         30.2 Found
      38207
                           Valencia 24147
                                               Valid
                                                                 Н5
                                                                      33500.0
                                                                               Found
                       Villa Regina
      38231
                                     53827
                                               Valid
                                                       Iron, IIIAB
                                                                       5030.0
                                                                               Found
      38308
                   Wietrzno-Bobrka
                                     24259
                                               Valid
                                                               Iron
                                                                        376.0
                                                                               Found
      38335
                          Wiltshire
                                     56143
                                               Valid
                                                                 Н5
                                                                      92750.0
                                                                               Found
      45700
                                     48916
                                               Valid
                                                      Iron, IVA-an
                                                                     162000.0
                           Zaragoza
                                                                               Found
                                                  GeoLocation
                     reclat
                                reclong
             year
      37
              {\tt NaN}
                     0.00000
                                0.00000
                                                   (0.0, 0.0)
      1937
              NaN
                         NaN
                                    NaN
      3431
              NaN
                   33.45000 -111.51667
                                          (33.45, -111.51667)
      3462
              NaN
                                    NaN
                                                          NaN
      5008
              NaN -26.66667
                               16.25000
                                           (-26.66667, 16.25)
      38207
              {\tt NaN}
                   39.00000
                               -0.03333
                                             (39.0, -0.03333)
      38231
              NaN -39.10000
                              -67.06667
                                           (-39.1, -67.06667)
                                             (49.41667, 21.7)
      38308
              NaN
                   49.41667
                               21.70000
                                            (51.14967, -1.81)
      38335
                   51.14967
                               -1.81000
              NaN
      45700
                   41.65000
                                            (41.65, -0.86667)
              NaN
                               -0.86667
      [291 rows x 10 columns]
[82]: new_year = df["year"].fillna(0)
                                          # sayısal değişken atama
                           # kontrol için örnek olarak index 37'ye bakalım.
[84]:
     new_year[37]
[84]: 0.0
[90]: df["year"].mean()
[90]: 1991.8288167308751
[87]: new_year1 = df["year"].fillna(df["year"].mean())
                                                               # ortalama ile doldurma
```

```
[89]: new_year1[37]
                                      # kontrol için örnek olarak index 37'ye bakalım.
[89]: 1991.8288167308751
[95]: new_df = df.apply(lambda x : x.fillna(0), axis = 0)
                                                                    # tüm değişkenlerde
        ⊶değiştirme
[96]: new_df.isnull().sum()
[96]: name
                      0
                      0
       id
                      0
       nametype
       recclass
                      0
       mass (g)
                      0
       fall
                      0
                      0
       year
       reclat
                      0
                      0
       reclong
       GeoLocation
                      0
       dtype: int64
           Kategorik Değişken Kırılımında Değer Atama
[157]: df = pd.read_csv("/content/Meteorite_Landings.csv")
[158]: df.head(13)
[158]:
                                                                                year \
                          name
                                  id nametype
                                                   recclass
                                                             mass (g)
                                                                        fall
       0
                        Aachen
                                        Valid
                                                         L5
                                                                  21.0
                                                                        Fell
                                                                              1880.0
                                   1
                                   2
                                        Valid
                                                                 720.0 Fell
       1
                        Aarhus
                                                         Н6
                                                                              1951.0
       2
                          Abee
                                   6
                                        Valid
                                                        EH4
                                                              107000.0 Fell
                                                                              1952.0
       3
                                        Valid
                                                                1914.0 Fell
                      Acapulco
                                  10
                                                Acapulcoite
                                                                              1976.0
       4
                       Achiras
                                 370
                                        Valid
                                                                 780.0 Fell
                                                                              1902.0
                                                         L6
       5
                      Adhi Kot
                                 379
                                        Valid
                                                         EH4
                                                                4239.0 Fell
                                                                              1919.0
       6
           Adzhi-Bogdo (stone)
                                 390
                                        Valid
                                                                 910.0 Fell
                                                                              1949.0
                                                      LL3-6
       7
                          Agen
                                 392
                                        Valid
                                                         Н5
                                                               30000.0 Fell
                                                                              1814.0
       8
                        Aguada
                                 398
                                        Valid
                                                         L6
                                                                1620.0 Fell
                                                                              1930.0
                                        Valid
                                                                1440.0 Fell
       9
                 Aguila Blanca
                                 417
                                                          L
                                                                              1920.0
       10
              Aioun el Atrouss
                                 423
                                        Valid Diogenite-pm
                                                                1000.0 Fell 1974.0
                                 424
                                        Valid
                                                               24000.0 Fell
       11
                           Aïr
                                                         L6
                                                                              1925.0
               Aire-sur-la-Lys
       12
                                 425
                                        Valid
                                                                   NaN Fell 1769.0
                                                    Unknown
             reclat
                       reclong
                                          GeoLocation
       0
           50.77500
                       6.08333
                                    (50.775, 6.08333)
                                 (56.18333, 10.23333)
       1
           56.18333
                      10.23333
       2
           54.21667 -113.00000
                                   (54.21667, -113.0)
       3
           16.88333
                    -99.90000
                                    (16.88333, -99.9)
```

```
4 -33.16667
                     -64.95000
                                  (-33.16667, -64.95)
                                         (32.1, 71.8)
       5
           32.10000
                      71.80000
                                 (44.83333, 95.16667)
       6
           44.83333
                      95.16667
                                  (44.21667, 0.61667)
           44.21667
       7
                       0.61667
       8 -31.60000
                     -65.23333
                                   (-31.6, -65.23333)
                                  (-30.86667, -64.55)
       9 -30.86667
                     -64.55000
                                 (16.39806, -9.57028)
       10 16.39806
                      -9.57028
                                  (19.08333, 8.38333)
       11
           19.08333
                       8.38333
                                  (50.66667, 2.33333)
       12 50.66667
                       2.33333
[172]: df[df["mass (g)"].isnull()]["mass (g)"]
[172]: 12
               NaN
       38
               NaN
       76
               NaN
       93
               NaN
       172
               NaN
       38282
               NaN
       38283
               NaN
       38285
               NaN
       41472
               NaN
       45698
               NaN
       Name: mass (g), Length: 131, dtype: float64
[173]: df.groupby("year")["mass (g)"].mean()
[173]: year
       860.0
                    472.000000
       920.0
                            NaN
       1399.0
                 107000.000000
       1490.0
                    103.300000
       1491.0
                 127000.000000
       2010.0
                    633.563940
       2011.0
                   1070.849593
       2012.0
                    992.383248
       2013.0
                   9471.636364
       2101.0
                     55.000000
       Name: mass (g), Length: 265, dtype: float64
[174]: new_maas = df["mass (g)"].fillna(df.groupby('year')['mass (g)'].
        ⇔transform("mean"))
      new_maas[93]
[175]:
[175]: 53533.74423076923
```

1.6 Kategorik Değişkenler için Eksik Değer Atama

```
[176]: df = pd.read_csv("/content/Meteorite_Landings.csv")
[177]: df
[177]:
                     name
                              id nametype
                                                         recclass
                                                                   mass (g)
                                                                               fall
                                                                                     \
                                     Valid
                                                               L5
                                                                        21.0
                                                                               Fell
       0
                   Aachen
                               1
                   Aarhus
                               2
                                     Valid
       1
                                                               Н6
                                                                       720.0
                                                                               Fell
       2
                     Abee
                               6
                                     Valid
                                                              EH4
                                                                    107000.0
                                                                               Fell
                Acapulco
                                                      Acapulcoite
       3
                              10
                                     Valid
                                                                      1914.0
                                                                               Fell
       4
                  Achiras
                             370
                                     Valid
                                                               L6
                                                                       780.0
                                                                               Fell
              Zillah 002
                          31356
                                     Valid
                                                                              Found
       45711
                                                          Eucrite
                                                                       172.0
       45712
                   Zinder
                           30409
                                     Valid
                                            Pallasite, ungrouped
                                                                        46.0
                                                                              Found
                                     Valid
                                                                              Found
       45713
                     Zlin
                           30410
                                                                         3.3
       45714
               Zubkovsky
                           31357
                                     Valid
                                                                      2167.0
                                                                              Found
                                                               L6
       45715
              Zulu Queen
                                     Valid
                                                                       200.0
                                                                             Found
                           30414
                                                             L3.7
                year
                         reclat
                                    reclong
                                                         GeoLocation
       0
               1880.0
                       50.77500
                                    6.08333
                                                   (50.775, 6.08333)
       1
               1951.0
                       56.18333
                                   10.23333
                                                (56.18333, 10.23333)
       2
                                                  (54.21667, -113.0)
               1952.0
                       54.21667 -113.00000
       3
               1976.0
                                  -99.90000
                                                   (16.88333, -99.9)
                       16.88333
                                                 (-33.16667, -64.95)
       4
               1902.0 -33.16667
                                 -64.95000
       45711
              1990.0
                       29.03700
                                   17.01850
                                                   (29.037, 17.0185)
       45712
              1999.0
                       13.78333
                                    8.96667
                                                 (13.78333, 8.96667)
                                                   (49.25, 17.66667)
       45713
              1939.0
                       49.25000
                                   17.66667
                                                 (49.78917, 41.5046)
       45714
              2003.0
                       49.78917
                                   41.50460
                                              (33.98333, -115.68333)
       45715 1976.0
                      33.98333 -115.68333
       [45716 rows x 10 columns]
[179]: df["mass (g)"].mode()[0]
[179]: 1.3
      new_mass1 = df["mass (g)"].fillna(df["mass (g)"].mode()[0])
[181]:
[182]:
      new mass1
[182]: 0
                     21.0
                    720.0
       1
       2
                107000.0
       3
                   1914.0
       4
                    780.0
```

```
45711
                   172.0
       45712
                    46.0
                     3.3
       45713
       45714
                  2167.0
       45715
                   200.0
       Name: mass (g), Length: 45716, dtype: float64
[183]: new_mass1.isnull().sum()
[183]: 0
[185]: df["mass (g)"].fillna(method = "bfill")
                                                            # boş olan değeri bir⊔
        ⇔sonraki değerler değiştir.
[185]: 0
                    21.0
       1
                   720.0
                107000.0
       2
       3
                  1914.0
       4
                   780.0
       45711
                   172.0
       45712
                    46.0
       45713
                     3.3
       45714
                  2167.0
       45715
                    200.0
       Name: mass (g), Length: 45716, dtype: float64
[186]: df["mass (g)"].fillna(method = "ffill")
                                                             # boş olan değeri bir önceki⊔
        ⊶değerler değiştir.
[186]: 0
                    21.0
                   720.0
       1
                107000.0
       2
       3
                  1914.0
       4
                    780.0
       45711
                   172.0
       45712
                    46.0
       45713
                     3.3
                  2167.0
       45714
       45715
                   200.0
       Name: mass (g), Length: 45716, dtype: float64
  []:
```