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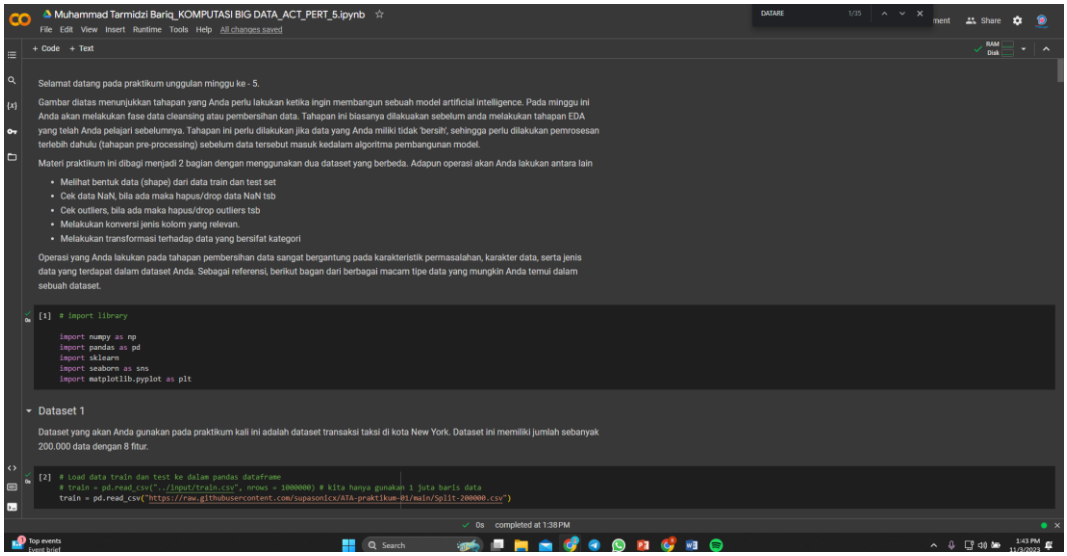
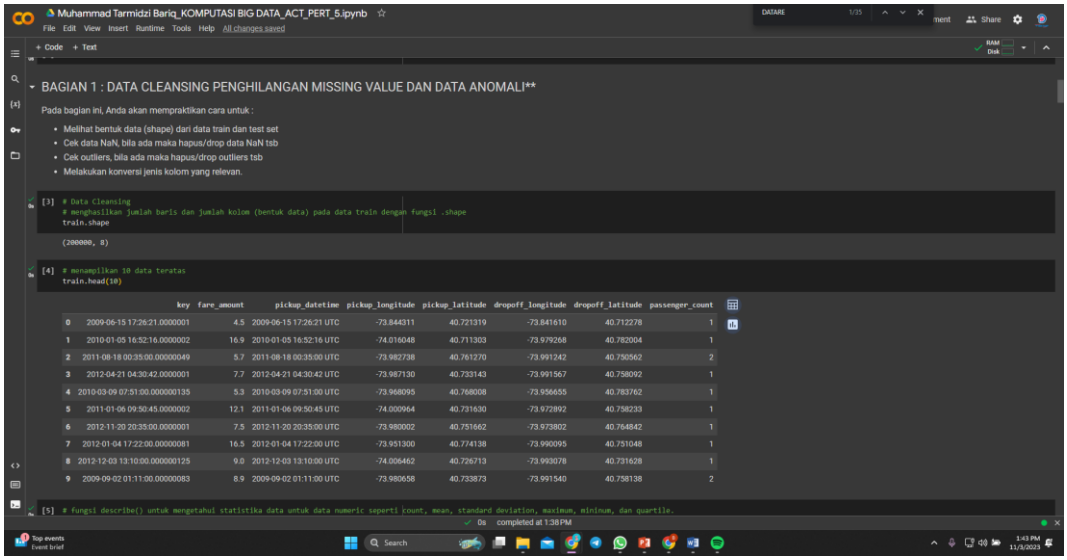
Kelas : 2IA11

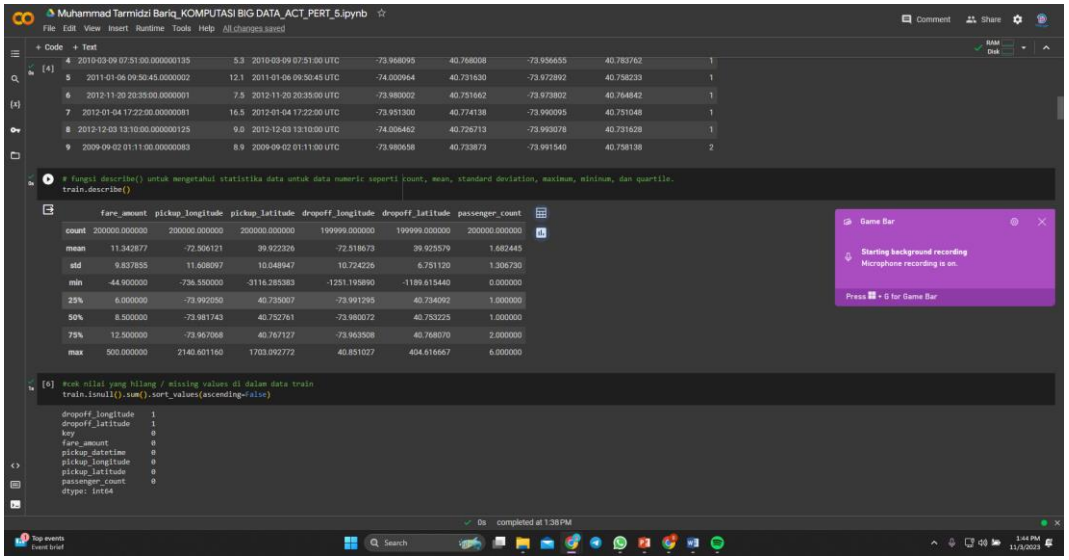
NPM : 51422161

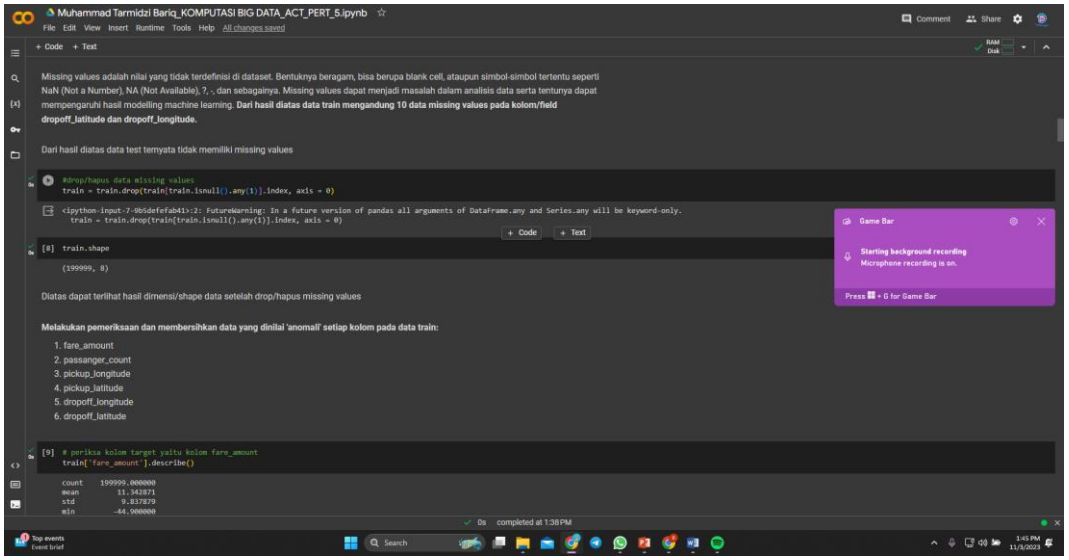
PRAKTIKUM KOMPUTASI BIG DATA

PERT 5






Muhammad Tarmidzi Bariq_KOMPUTASI BIG DATA_ACT_PERT_5.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment Share
+ Code + Text
4 2010-03-09 07:51:00.000000135 5.3 2010-03-09 07:51:00 UTC -73.968095 40.768008 -73.956655 40.783762 1
5 2011-01-06 09:50:45.0000002 12.1 2011-01-06 09:50:45 UTC -74.000964 40.731630 -73.972892 40.758233 1
6 2012-11-20 20:35:00.0000001 7.5 2012-11-20 20:35:00 UTC -73.980002 40.751662 -73.973802 40.764842 1
7 2012-01-04 17:22:00.00000081 16.5 2012-01-04 17:22:00 UTC -73.951300 40.774138 -73.990095 40.751048 1
8 2012-12-03 13:10:00.000000125 9.0 2012-12-03 13:10:00 UTC -74.006462 40.726713 -73.993078 40.731628 1
9 2009-09-02 01:11:00.00000083 8.9 2009-09-02 01:11:00 UTC -73.980658 40.733873 -73.991540 40.758138 2
[4] # fungsi describe() untuk mengetahui statistika data untuk data numeric seperti count, mean, standard deviation, maximum, minimum, dan quartile.
train.describe()
fare_amount pickup_longitude pickup_latitude dropoff_longitude dropoff_latitude passenger_count
count 200000.000000 200000.000000 200000.000000 199999.000000 199999.000000 200000.000000
mean 11.342877 -72.506121 39.922326 -72.518673 39.925579 1.682445
std 9.837855 11.608097 10.048947 10.724226 6.751120 1.306730
min -44.900000 -736.550000 -3116.285383 -1251.195890 -1189.615440 0.000000
25% 6.000000 -73.992050 40.735007 -73.991295 40.734092 1.000000
50% 8.500000 -73.981743 40.752761 -73.980072 40.753225 1.000000
75% 12.500000 -73.967068 40.767127 -73.963508 40.768070 2.000000
max 500.000000 2140.601160 1703.092772 40.851027 404.616667 6.000000
Game Bar
Starting background recording
Microphone recording is on.
Press + G for Game Bar
[6] #cek nilai yang hilang / missing values di dalam data train
train.isnull().sum().sort_values(ascending=False)
dropoff_longitude 1
dropoff_latitude 1
key 0
fare_amount 0
pickup_datetime 0
pickup_longitude 0
pickup_latitude 0
passenger_count 0
dtype: int64
0s completed at 1:38 PM
Search
1:44 PM
11/3/2023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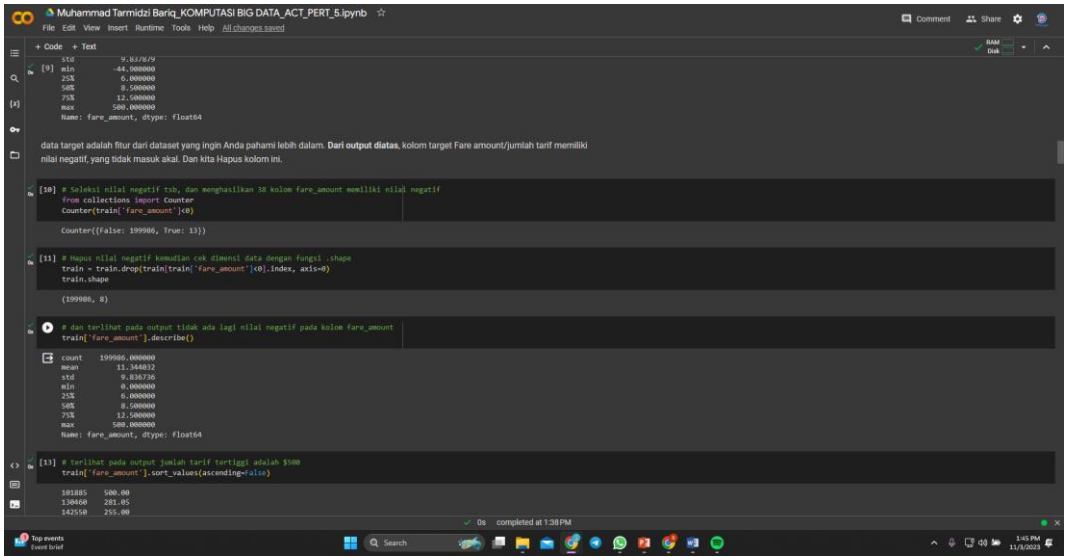
+ Code + Text
Missing values adalah nilai yang tidak terdefinisi di dataset. Bentuknya beragam, bisa berupa blank cell, ataupun simbol-simbol tertentu seperti NaN (Not a Number), NA (Not Available), ?, -, dan sebagainya. Missing values dapat menjadi masalah dalam analisis data serta tentunya dapat mempengaruhi hasil modelling machine learning. Dari hasil diatas data train mengandung 10 data missing values pada kolom/field dropoff_latitude dan dropoff_longitude.
Dari hasil diatas data test ternyata tidak memiliki missing values
#drop/hapus data missing values
train = train.drop(train[train.isnull().any(1)].index, axis = 0)
<ipython-input-7-0b5defefab41>:2: FutureWarning: In a future version of pandas all arguments of DataFrame.any and Series.any will be keyword-only.
train = train.drop(train[train.isnull().any(1)].index, axis = 0)
+ Code + Text
[8] train.shape
(199999, 8)
Diatas dapat terlihat hasil dimensi/shape data setelah drop/hapus missing values
Melakukan pemeriksaan dan membersihkan data yang dinilai 'anomali' setiap kolom pada data train:
1. fare_amount
2. passanger_count
3. pickup_longitude
4. pickup_latitude
5. dropoff_longitude
6. dropoff_latitude
Game Bar
Starting background recording
Microphone recording is on.
Press + G for Game Bar
[9] # periksa kolom target yaitu kolom fare_amount
train['fare_amount'].describe()
count 199999.000000
mean 11.342871
std 9.837829
min -44.900000
0s completed at 1:38 PM
Search
1:45 PM
11/3/2023


Muhammad Tarmidzi Bariq_KOMPUTASI BIG DATA_ACT_PERT_5.ipynb
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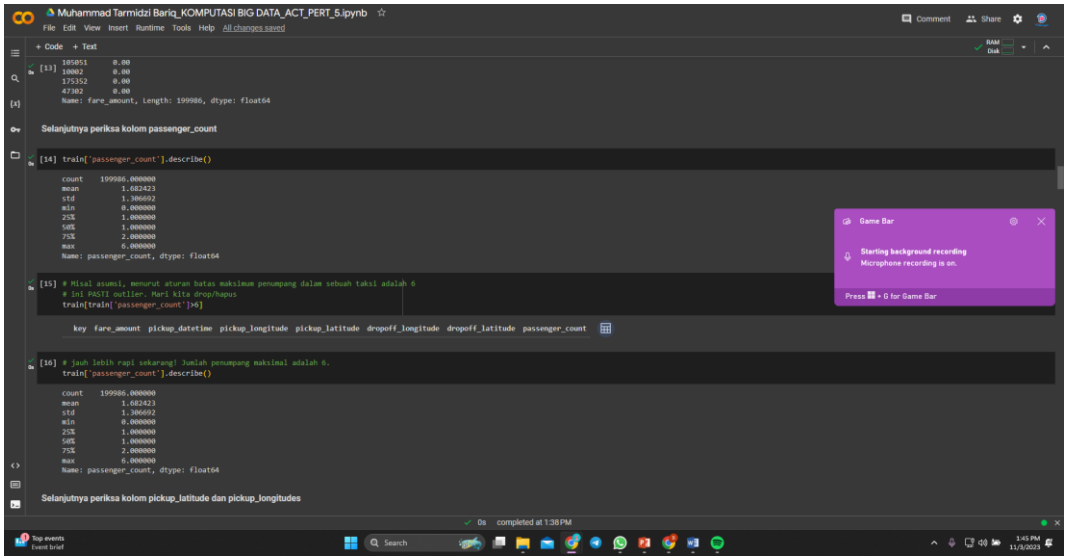
Comment Share
+ Code + Text
std 9.837829
[9] min -44.900000
25% 6.000000
50% 8.500000
75% 12.500000
max 500.000000
Name: fare_amount, dtype: float64
data target adalah fitur dari dataset yang ingin Anda pahami lebih dalam. Dari output diatas, kolom target Fare amount/jumlah tarif memiliki nilai negatif, yang tidak masuk akal. Dan kita Hapus kolom ini.
[10] # Seleksi nilai negatif tsb, dan menghasilkan 38 kolom fare_amount memiliki nilai negatif
from collections import Counter
Counter(train['fare_amount']<0)
Counter({False: 199986, True: 13})
[11] # Hapus nilai negatif kemudian cek dimensi data dengan fungsi .shape
train = train.drop(train[train['fare_amount']<0].index, axis=0)
train.shape
(199986, 8)
dan terlihat pada output tidak ada lagi nilai negatif pada kolom fare_amount
train['fare_amount'].describe()
count 199986.000000
mean 11.344032
std 9.836726
min 0.000000
25% 6.000000
50% 8.500000
75% 12.500000
max 500.000000
Name: fare_amount, dtype: float64
[13] # terlihat pada output jumlah tarif tertinggi adalah $500
train['fare_amount'].sort_values(ascending=False)
181885 500.00
130460 281.85
142550 255.00
0s completed at 1:38 PM
Search
1:45 PM
11/3/2023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Comment Share
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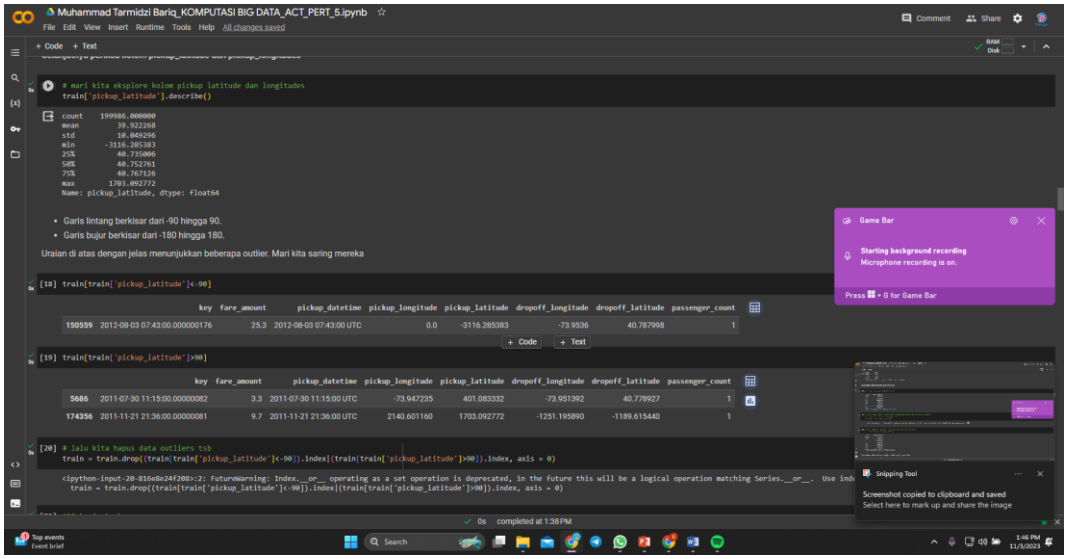
105051 0.00
10002 0.00
175352 0.00
47102 0.00
Name: fare_amount, Length: 199986, dtype: float64
Selanjutnya periksa kolom passenger_count
[14] train['passenger_count'].describe()
count 199986.000000
mean 1.682423
std 1.306692
min 0.000000
25% 1.000000
50% 1.000000
75% 2.000000
max 6.000000
Name: passenger_count, dtype: float64
[15] # Misal asumsi, menurut aturan batas maksimum penumpang dalam sebuah taksi adalah 6
ini PASTI outlier. Mari kita drop/hapus
train[train['passenger_count']>6]
key fare_amount pickup_datetime pickup_longitude pickup_latitude dropoff_longitude dropoff_latitude passenger_count
[16] # jauh lebih rapi sekarang! Jumlah penumpang maksimal adalah 6.
train['passenger_count'].describe()
count 199986.000000
mean 1.682423
std 1.306692
min 0.000000
25% 1.000000
50% 1.000000
75% 2.000000
max 6.000000
Name: passenger_count, dtype: float64
Selanjutnya periksa kolom pickup_latitude dan pickup_longitudes
Game Bar
Starting background recording
Microphone recording is on.
Press + G for Game Bar
0s completed at 1:38 PM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File Edit View Insert Runtime Tools Help All changes saved
Comment Share
+ Code + Text
# mari kita eksplore kolom pickup latitude dan longitudes
train['pickup_latitude'].describe()
count 199986.000000
mean 39.922268
std 10.049296
min -3116.285383
25% 40.735086
50% 40.752761
75% 40.767126
max 1703.092772
Name: pickup_latitude, dtype: float64
Garis lintang berkisar dari -90 hingga 90.
Garis bujur berkisar dari -180 hingga 180.
Uraian di atas dengan jelas menunjukkan beberapa outlier. Mari kita saring mereka
[18] train[train['pickup_latitude']<-90]
key fare_amount pickup_datetime pickup_longitude pickup_latitude dropoff_longitude dropoff_latitude passenger_count
150559 2012-08-03 07:43:00.000000176 25.3 2012-08-03 07:43:00 UTC 0.0 -3116.285383 -73.9536 40.787998 1
+ Code + Text
[19] train[train['pickup_latitude']>90]
key fare_amount pickup_datetime pickup_longitude pickup_latitude dropoff_longitude dropoff_latitude passenger_count
5686 2011-07-30 11:15:00.00000082 3.3 2011-07-30 11:15:00 UTC -73.947235 401.083332 -73.951392 40.778927 1
174356 2011-11-21 21:36:00.00000081 9.7 2011-11-21 21:36:00 UTC 2140.601160 1703.092772 -1251.195890 -1189.615440 1
[20] # lalu kita hapus data outliers tsb
train = train.drop((train[train['pickup_latitude']<-90]).index|(train[train['pickup_latitude']>90]).index, axis = 0)
Game Bar
Starting background recording
Microphone recording is on.
Press + G for Game Bar
Snipping Tool
Screenshot copied to clipboard and saved
Select here to mark up and share the image
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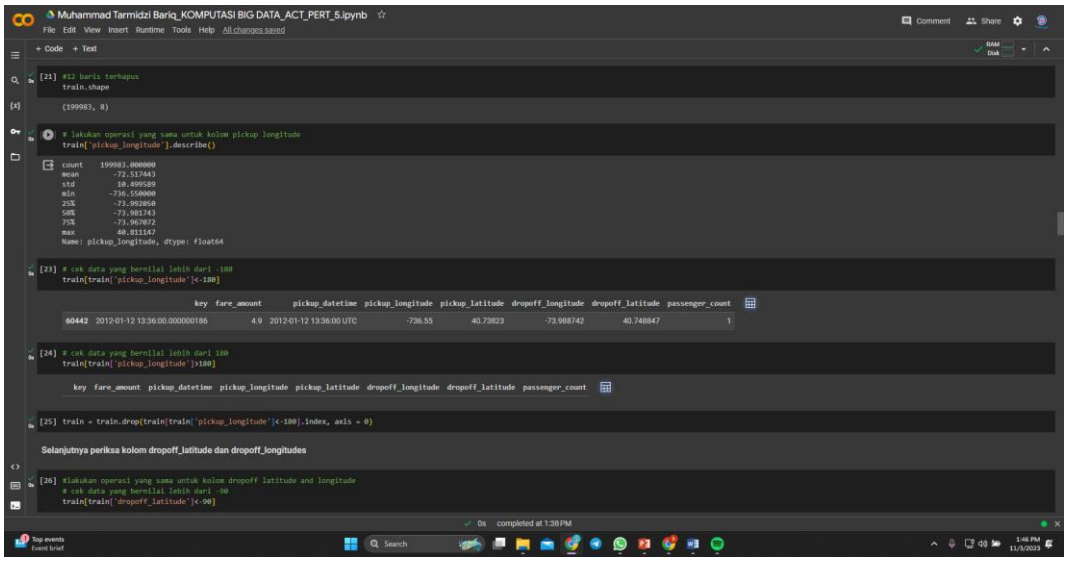
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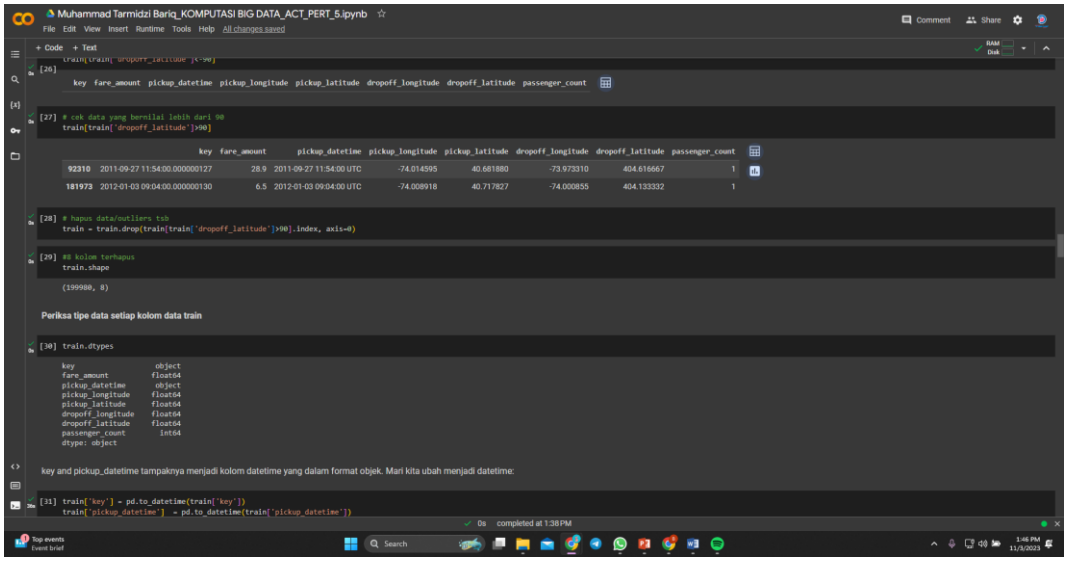
Comment Share
+ Code + Text
[21] #12 baris terhapus
train.shape
(199983, 8)
lakukan operasi yang sama untuk kolom pickup longitude
train['pickup_longitude'].describe()
count 199983.000000
mean -72.517443
std 10.499589
min -736.550000
25% -73.992050
50% -73.981743
75% -73.967072
max 40.811147
Name: pickup_longitude, dtype: float64
[23] # cek data yang bernilai lebih dari -180
train[train['pickup_longitude']<-180]
key fare_amount pickup_datetime pickup_longitude pickup_latitude dropoff_longitude dropoff_latitude passenger_count
60442 2012-01-12 13:36:00.000000186 4.9 2012-01-12 13:36:00 UTC -736.55 40.73823 -73.988742 40.748847 1
[24] # cek data yang bernilai lebih dari 180
train[train['pickup_longitude']>180]
key fare_amount pickup_datetime pickup_longitude pickup_latitude dropoff_longitude dropoff_latitude passenger_count
[25] train = train.drop(train[train['pickup_longitude']<-180].index, axis = 0)
Selanjutnya periksa kolom dropoff_latitude dan dropoff_longitudes
[26] #lakukan operasi yang sama untuk kolom dropoff latitude and longitude
cek data yang bernilai lebih dari -90
train[train['dropoff_latitude']<-90]
0s completed at 1:38 PM



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```
[26]
```

	key	fare_amount	pickup_datetime	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	passenger_count

```
[27] # cek data yang bernilai lebih dari 90
train[train['dropoff_latitude']>90]
```

	key	fare_amount	pickup_datetime	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	passenger_count
92310	2011-09-27 11:54:00.000000127	28.9	2011-09-27 11:54:00 UTC	-74.014595	40.681880	-73.973310	404.616667	1
181973	2012-01-03 09:04:00.000000130	6.5	2012-01-03 09:04:00 UTC	-74.008918	40.717827	-74.000855	404.133332	1

```
[28] # hapus data/outliers tsb
train = train.drop(train[train['dropoff_latitude']>90].index, axis=0)
```

```
[29] ## kolom terhapus
train.shape
```

```
(199980, 8)
```

Periksa tipe data setiap kolom data train

```
[30] train.dtypes
```

```
key                 object
fare_amount        float64
pickup_datetime     object
pickup_longitude   float64
pickup_latitude    float64
dropoff_longitude  float64
dropoff_latitude   float64
passenger_count      int64
dtype: object
```

key and pickup_datetime tampaknya menjadi kolom datetime yang dalam format objek. Mari kita ubah menjadi datetime:

```
[31] train['key'] = pd.to_datetime(train['key'])
     train['pickup_datetime']  = pd.to_datetime(train['pickup_datetime'])
```

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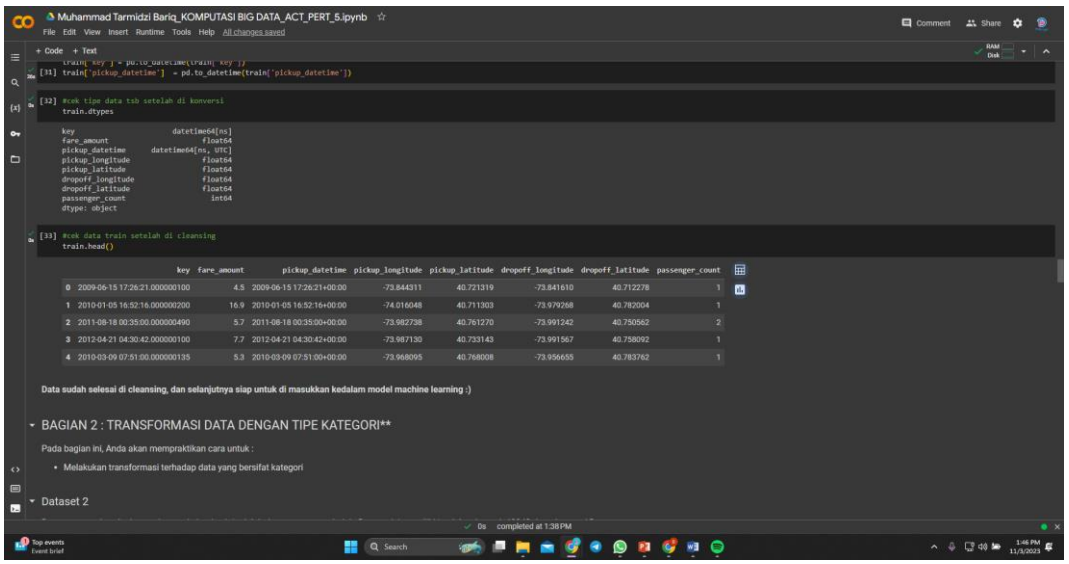

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```
[31] train['key'] = pd.to_datetime(train['key'])
     train['pickup_datetime']  = pd.to_datetime(train['pickup_datetime'])
```

```
[32] #cek tipe data tsb setelah di konversi
train.dtypes
```

```
key                          datetime64[ns]
fare_amount                         float64
pickup_datetime      datetime64[ns, UTC]
pickup_longitude                    float64
pickup_latitude                     float64
dropoff_longitude                   float64
dropoff_latitude                    float64
passenger_count                       int64
dtype: object
```

```
[33] #cek data train setelah di cleansing
train.head()
```

	key	fare_amount	pickup_datetime	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	passenger_count
0	2009-06-15 17:26:21.000000100	4.5	2009-06-15 17:26:21+00:00	-73.844311	40.721319	-73.841610	40.712278	1
1	2010-01-05 16:52:16.000000200	16.9	2010-01-05 16:52:16+00:00	-74.016048	40.711303	-73.979268	40.782004	1
2	2011-08-18 00:35:00.000000490	5.7	2011-08-18 00:35:00+00:00	-73.982738	40.761270	-73.991242	40.750562	2
3	2012-04-21 04:30:42.000000100	7.7	2012-04-21 04:30:42+00:00	-73.987130	40.733143	-73.991567	40.758092	1
4	2010-03-09 07:51:00.000000135	5.3	2010-03-09 07:51:00+00:00	-73.968095	40.768008	-73.956655	40.783762	1

Data sudah selesai di cleansing, dan selanjutnya siap untuk di masukkan kedalam model machine learning :)

BAGIAN 2 : TRANSFORMASI DATA DENGAN TIPE KATEGORI**

Pada bagian ini, Anda akan mempraktikan cara untuk :

- Melakukan transformasi terhadap data yang bersifat kategori

Dataset 2

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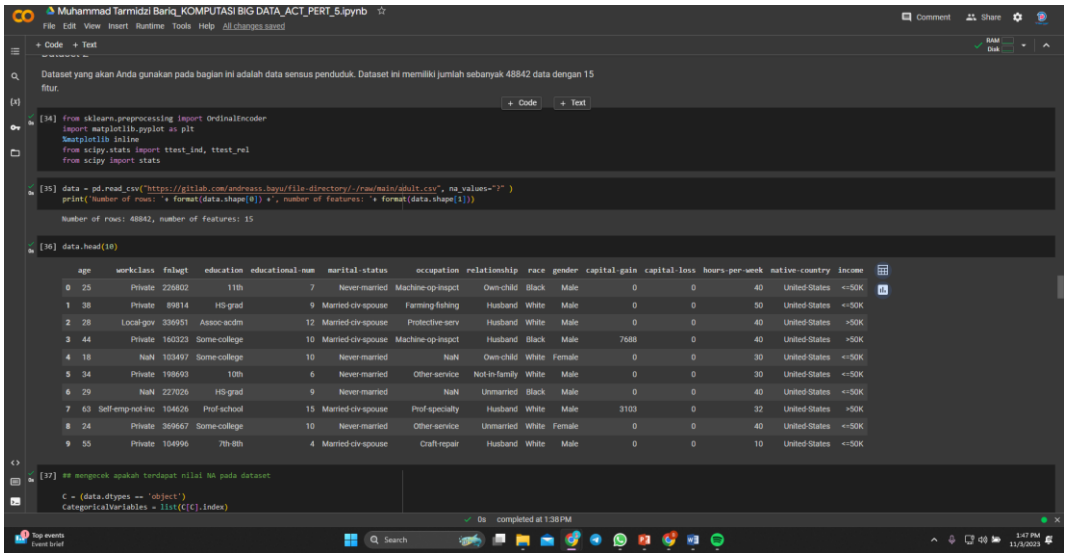

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Dataset yang akan Anda gunakan pada bagian ini adalah data sensus penduduk. Dataset ini memiliki jumlah sebanyak 48842 data dengan 15 fitur.

+ Code + Text

```
[34] from sklearn.preprocessing import OrdinalEncoder
     import matplotlib.pyplot as plt
     %matplotlib inline
     from scipy.stats import ttest_ind, ttest_rel
     from scipy import stats
```

```
[35] data = pd.read_csv("https://gitlab.com/andreass.bayu/file-directory/-/raw/main/adult.csv", na_values="?" )
     print('Number of rows: '+ format(data.shape[0]) +', number of features: '+ format(data.shape[1]))
```

```
Number of rows: 48842, number of features: 15
```

```
[36] data.head(10)
```

	age	workclass	fnlwgt	education	educational-num	marital-status	occupation	relationship	race	gender	capital-gain	capital-loss	hours-per-week	native-country	income
0	25	Private	226802	11th	7	Never-married	Machine-op-inspct	Own-child	Black	Male	0	0	40	United-States	<=50K
1	38	Private	89814	HS-grad	9	Married-civ-spouse	Farming-fishing	Husband	White	Male	0	0	50	United-States	<=50K
2	28	Local-gov	336951	Assoc-acdm	12	Married-civ-spouse	Protective-serv	Husband	White	Male	0	0	40	United-States	>50K
3	44	Private	160323	Some-college	10	Married-civ-spouse	Machine-op-inspct	Husband	Black	Male	7688	0	40	United-States	>50K
4	18	NaN	103497	Some-college	10	Never-married	NaN	Own-child	White	Female	0	0	30	United-States	<=50K
5	34	Private	198693	10th	6	Never-married	Other-service	Not-in-family	White	Male	0	0	30	United-States	<=50K
6	29	NaN	227026	HS-grad	9	Never-married	NaN	Unmarried	Black	Male	0	0	40	United-States	<=50K
7	63	Self-emp-not-inc	104626	Prof-school	15	Married-civ-spouse	Prof-specialty	Husband	White	Male	3103	0	32	United-States	>50K
8	24	Private	369667	Some-college	10	Never-married	Other-service	Unmarried	White	Female	0	0	40	United-States	<=50K
9	55	Private	104996	7th-8th	4	Married-civ-spouse	Craft-repair	Husband	White	Male	0	0	10	United-States	<=50K

```
[37] ## mengecek apakah terdapat nilai NA pada dataset

     C = (data.dtypes == 'object')
     CategoricalVariables = list(C[C].index)
```

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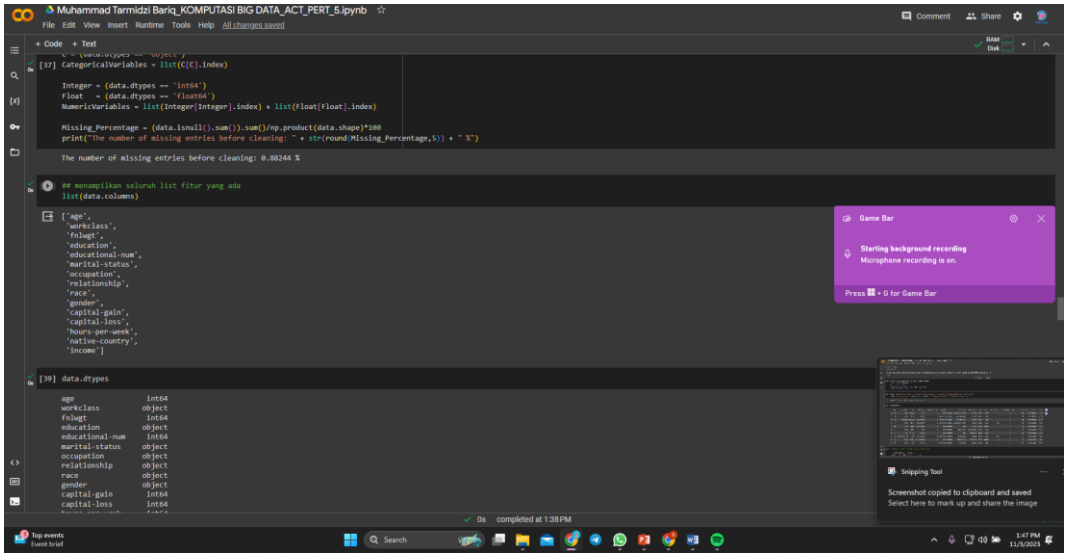
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[37] CategoricalVariables = list(C[C].index)
Integer = (data.dtypes == 'int64')
Float = (data.dtypes == 'float64')
NumericVariables = list(Integer[Integer].index) + list(Float[Float].index)
Missing_Percentage = (data.isnull().sum().sum()/np.product(data.shape)*100
print("The number of missing entries before cleaning: " + str(round(Missing_Percentage,5)) + " %")
The number of missing entries before cleaning: 0.88244 %
menampilkan seluruh list fitur yang ada
list(data.columns)
['age',
'workclass',
'fnlwgt',
'education',
'educational-num',
'marital-status',
'occupation',
'relationship',
'race',
'gender',
'capital-gain',
'capital-loss',
'hours-per-week',
'native-country',
'income']
[39] data.dtypes
age int64
workclass object
fnlwgt int64
education object
educational-num int64
marital-status object
occupation object
relationship object
race object
gender object
capital-gain int64
capital-loss int64
Game Bar
Starting background recording
Microphone recording is on.
Press + G for Game Bar
Snipping Tool
Screenshot copied to clipboard and saved
Select here to mark up and share the image
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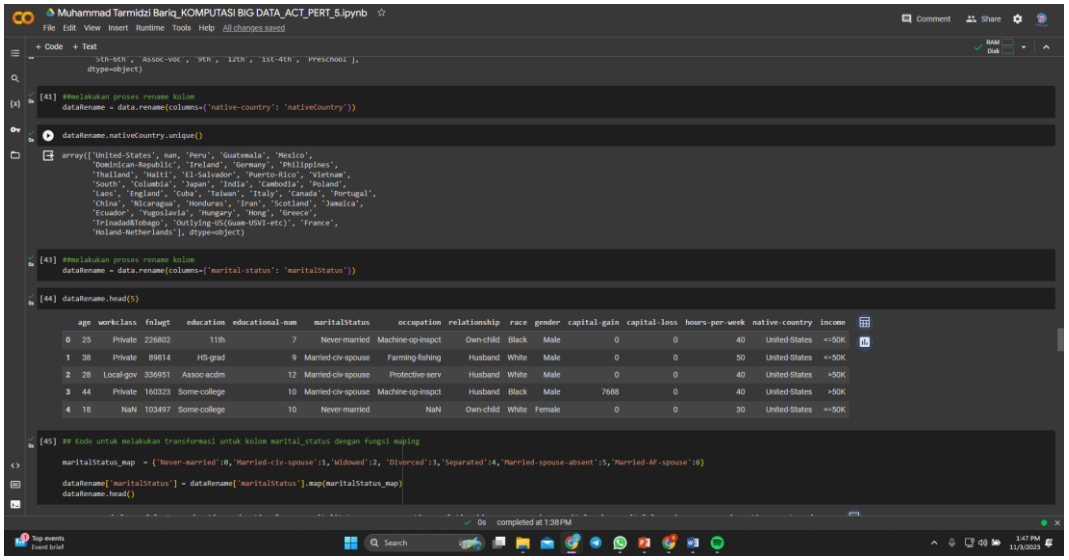
Muhammad Tarmidzi Bariq_KOMPUTASI BIG DATA_ACT_PERT_5.ipynb
File Edit View Insert Runtime Tools Help All changes saved
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+ Code + Text
[41] ##melakukan proses rename kolom
dataRename = data.rename(columns={'native-country': 'nativeCountry'})
dataRename.nativeCountry.unique()
array(['United-States', nan, 'Peru', 'Guatemala', 'Mexico',
'Dominican-Republic', 'Ireland', 'Germany', 'Philippines',
'Thailand', 'Haiti', 'El-Salvador', 'Puerto-Rico', 'Vietnam',
'South', 'Columbia', 'Japan', 'India', 'Cambodia', 'Poland',
'Laos', 'England', 'Cuba', 'Taiwan', 'Italy', 'Canada', 'Portugal',
'China', 'Nicaragua', 'Honduras', 'Iran', 'Scotland', 'Jamaica',
'Ecuador', 'Yugoslavia', 'Hungary', 'Hong', 'Greece',
'Trinadad&Tobago', 'Outlying-US(Guam-USVI-etc)', 'France',
'Holand-Netherlands'], dtype=object)
[43] ##melakukan proses rename kolom
dataRename = data.rename(columns={'marital-status': 'maritalStatus'})
[44] dataRename.head(5)
age workclass fnlwgt education educational-num maritalStatus occupation relationship race gender capital-gain capital-loss hours-per-week native-country income
0 25 Private 226802 11th 7 Never-married Machine-op-inspct Own-child Black Male 0 0 40 United-States <=50K
1 38 Private 89814 HS-grad 9 Married-civ-spouse Farming-fishing Husband White Male 0 0 50 United-States <=50K
2 28 Local-gov 336951 Assoc-acdm 12 Married-civ-spouse Protective-serv Husband White Male 0 0 40 United-States >50K
3 44 Private 160323 Some-college 10 Married-civ-spouse Machine-op-inspct Husband Black Male 7688 0 40 United-States >50K
4 18 NaN 103497 Some-college 10 Never-married NaN Own-child White Female 0 0 30 United-States <=50K
[45] ## Kode untuk melakukan transformasi untuk kolom marital_status dengan fungsi maping
maritalStatus_map = {'Never-married':0,'Married-civ-spouse':1,'Widowed':2, 'Divorced':3,'Separated':4,'Married-spouse-absent':5,'Married-AF-spouse':6}
dataRename['maritalStatus'] = dataRename['maritalStatus'].map(maritalStatus_map)
dataRename.head()
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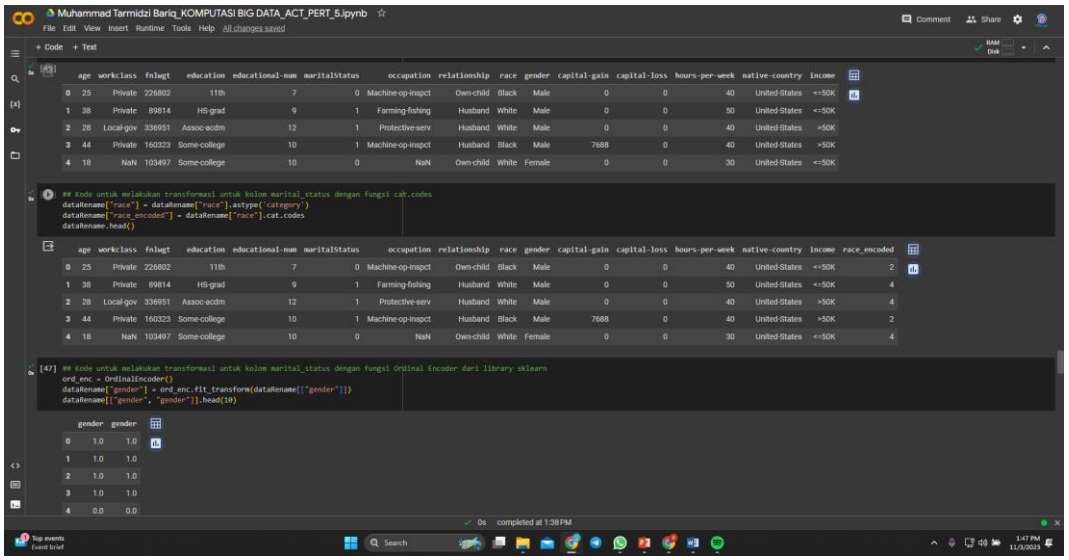
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File Edit View Insert Runtime Tools Help All changes saved
Comment Share
+ Code + Text
[43]
age workclass fnlwgt education educational-num maritalStatus occupation relationship race gender capital-gain capital-loss hours-per-week native-country income
0 25 Private 226802 11th 7 0 Machine-op-inspct Own-child Black Male 0 0 40 United-States <=50K
1 38 Private 89814 HS-grad 9 1 Farming-fishing Husband White Male 0 0 50 United-States <=50K
2 28 Local-gov 336951 Assoc-acdm 12 1 Protective-serv Husband White Male 0 0 40 United-States >50K
3 44 Private 160323 Some-college 10 1 Machine-op-inspct Husband Black Male 7688 0 40 United-States >50K
4 18 NaN 103497 Some-college 10 0 NaN Own-child White Female 0 0 30 United-States <=50K
Kode untuk melakukan transformasi untuk kolom marital_status dengan fungsi cat.codes
dataRename["race"] = dataRename["race"].astype('category')
dataRename["race_encoded"] = dataRename["race"].cat.codes
dataRename.head()
age workclass fnlwgt education educational-num maritalStatus occupation relationship race gender capital-gain capital-loss hours-per-week native-country income race_encoded
0 25 Private 226802 11th 7 0 Machine-op-inspct Own-child Black Male 0 0 40 United-States <=50K 2
1 38 Private 89814 HS-grad 9 1 Farming-fishing Husband White Male 0 0 50 United-States <=50K 4
2 28 Local-gov 336951 Assoc-acdm 12 1 Protective-serv Husband White Male 0 0 40 United-States >50K 4
3 44 Private 160323 Some-college 10 1 Machine-op-inspct Husband Black Male 7688 0 40 United-States >50K 2
4 18 NaN 103497 Some-college 10 0 NaN Own-child White Female 0 0 30 United-States <=50K 4
[47] ## Kode untuk melakukan transformasi untuk kolom marital_status dengan fungsi Ordinal Encoder dari library sklearn
ord_enc = OrdinalEncoder()
dataRename["gender"] = ord_enc.fit_transform(dataRename[["gender"]])
dataRename[["gender", "gender"]].head(10)
gender gender
0 1.0 1.0
1 1.0 1.0
2 1.0 1.0
3 1.0 1.0
4 0.0 0.0
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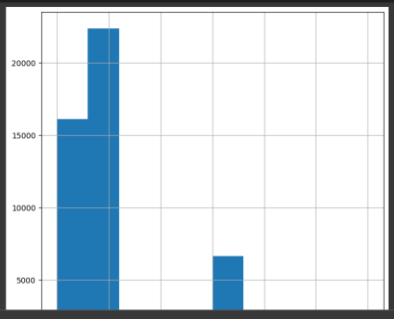
```
[47]  4   0.0   0.0
      5   1.0   1.0
      6   1.0   1.0
      7   1.0   1.0
      8   0.0   0.0
      9   1.0   1.0
```

```
[48] dataRename['maritalStatus'].hist(figsize=(8,8))
     plt.show()
```



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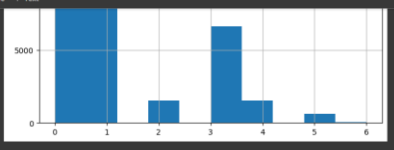


```
dataRename = dataRename.rename(columns={'capital-gain': 'capitalGain'})
dataRename['capitalGain'].describe()
```

```
count    48842.000000
mean      1079.067626
std       7452.019058
min          0.000000
25%          0.000000
50%          0.000000
75%          0.000000
max      99999.000000
Name: capitalGain, dtype: float64
```

Game Bar
Starting background recording
Microphone recording is on.
Press ■ + G for Game Bar

```
[50] dataRename.head(5)
```

	age	workclass	fnlwgt	education	educational-num	maritalStatus	occupation	relationship	race	gender	capitalGain	capital-loss	hours-per-week	native-country	income	race_encoded
0	25	Private	226802	11th	7	0	Machine-op-inspct	Own-child	Black	1.0	0	0	40	United-States	<=50K	2
1	38	Private	89814	HS-grad	9	1	Farming-fishing	Husband	White	1.0	0	0	50	United-States	<=50K	4
2	28	Local-gov	336951	Assoc-acdm	12	1	Protective-serv	Husband	White	1.0	0	0	40	United-States	>50K	4
3	44	Private	160323	Some-college	10	1	Machine-op-inspct	Husband	Black	1.0	7688	0	40	United-States	>50K	2
4	18	NaN	103497	Some-college	10	0	NaN	Own-child	White	0.0	0	0	30	United-States	<=50K	4

```
[51] dataRename.race.unique()
```

```
['Black', 'White', 'Asian-Pac-Islander', 'Other', 'Amer-Indian-Eskimo']
```

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```
[51] ['Black', 'White', 'Asian-Pac-Islander', 'Other', 'Amer-Indian-Eskimo']
     Categories (5, object): ['Amer-Indian-Eskimo', 'Asian-Pac-Islander', 'Black', 'Other', 'White']
```

```
[52] race1 = dataRename[dataRename["race_encoded"] == 1]
     race2 = dataRename[dataRename["race_encoded"] == 2]
     race3 = dataRename[dataRename["race_encoded"] == 3]
     race4 = dataRename[dataRename["race_encoded"] == 4]
     race5 = dataRename[dataRename["race_encoded"] == 5]
```

```
[53] race2.dtypes
```

```
age                int64
workclass         object
fnlwgt             int64
education         object
educational-num    int64
maritalStatus      int64
occupation        object
relationship      object
race            category
gender             float64
capitalGain          int64
capital-loss         int64
hours-per-week       int64
native-country    object
income            object
race_encoded         int8
dtype: object
```

Game Bar
Starting background recording
Microphone recording is on.
Press ■ + G for Game Bar

```
[54] race1.head(10)
```

	age	workclass	fnlwgt	education	educational-num	maritalStatus	occupation	relationship	race	gender	capitalGain	capital-loss	hours-per-week	native-country	income	race_encoded
19	40	Private	85019	Doctorate	16	1	Prof-specialty	Husband	Asian-Pac-Islander	1.0	0	0	45	NaN	>50K	1
141	18	Private	262118	Some-college	10	0	Adm-clerical	Own-child	Asian-Pac-Islander	0.0	0	0	22	Germany	<=50K	1
220	34	Private	162312	Bachelors	13	1	Adm-clerical	Husband	Asian-Pac-Islander	1.0	0	0	40	Philippines	<=50K	1
221	25	Private	77698	HS-grad	9	0	Machine-op-inspct	Not-in-family	Asian-Pac-Islander	0.0	0	0	40	Philippines	<=50K	1
232	55	Private	119751	Masters	14	0	Exec-managerial	Unmarried	Asian-Pac-Islander	0.0	0	0	50	Thailand	<=50K	1
309	51	Self-emp-not-inc	136708	HS-grad	9	1	Sales	Husband	Asian-Pac-Islander	1.0	3103	0	84	Vietnam	<=50K	1

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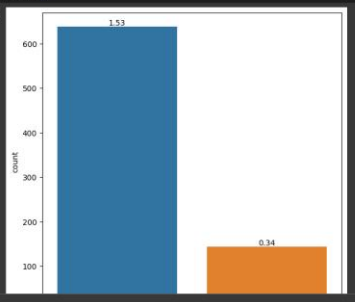
```
plt.figure(figsize=(7,7))
total = float(len(race4) )

ax = sns.countplot(x="income", data=race4[race4["age"]>70])
for p in ax.patches:
    height = p.get_height()
    ax.text(p.get_x()+p.get_width()/2.,
            height + 3,
            '{:1.2f}'.format((height/total)*100),
            ha="center")
plt.show()
```



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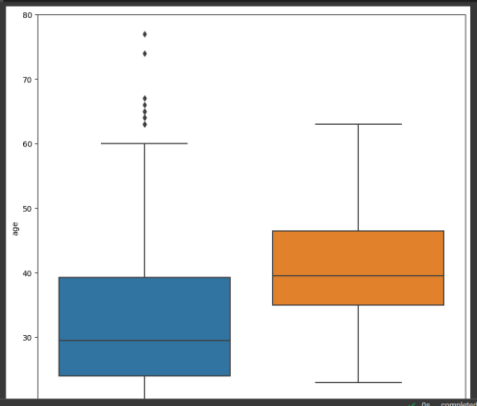
```
fig = plt.figure(figsize=(10,10))
sns.boxplot(x="income", y="age", data=race3)
plt.show()
```



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Instruksi Praktikum untuk mahasiswa FIKTI dan FTI (kecuali Teknik Industri, Teknik Mesin dan Agroteknologi)

- Lakukan teknik data cleaning untuk data yang bernilai NaN pada Dataset 2.
- Lakukan analisis histogram kolom income pada setiap kategori race, apakah yang dapat Anda simpulkan ?
- Ganti kolom hours-per-week dengan nama hoursPerWeek
- Berapa jumlah responden yang bekerja lebih dari 40 jam per minggunya untuk masing-masing kategori race?

Instruksi Praktikum mahasiswa Teknik Industri, Teknik Mesin, Agroteknologi, FTSP & FIKES

- Ganti kolom hours-per-week dengan nama hoursPerWeek
- Lakukan analisis histogram pada kolom hoursPerWeek pada setiap data race1, race2, race3, race4 dan race5. Informasi apa yang dapat Anda simpulkan ?
- Terdapat berapa kategori data yang mengisi kolom workclass? Apa saja kategori yang ada?
- Jelaskan hasil boxplot yang diperoleh untuk data income dan umur untuk data race1 !