k-Anonymity Library Demo with k=3

In [1]:

```python
import warnings
warnings.filterwarnings('ignore')
```

In [2]:

```python
import kAnonymityLib as daio_dpt
import pandas as pd
dai_anonymization = daio_dpt.kAnonymity()
print(dai_anonymization)
```

```
k-Anonymity Class Library with k=3
```

In [3]:

```python
names = ['age',
 'workclass',
 'fnlwgt',
 'education',
 'education-num',
 'marital-status',
 'occupation',
 'relationship',
 'race',
 'sex',
 'capital-gain',
 'capital-loss',
 'hours-per-week',
 'native-country',
 'income']
dai_anonymization.set_headers(names)
```

In [4]:

```python
dai_anonymization.read_datafile("adult-all.txt")
```

In [5]:

```python
df = dai_anonymization.dataframe
```

In [6]:

```python
age_range = lambda age: ("<= 20" if age <= 20
    else ("21 - 30" if age <= 30
    else ("31 - 40" if age <= 40
    else ("41 - 50" if age <= 50
    else ("51 - 60" if age <= 60
    else ("61 - 70" if age <= 70 else "> 70"))))))
```

In [7]:

```python
df["age"] = df.apply(lambda x: age_range(x.age), axis=1)
df["workclass"] = df.apply(lambda x: x.workclass.replace(" ",""), axis=1)
df["workclass"] = df.apply(lambda x: "Others" if x.workclass=="?" else x.workclass, ax
df["education"] = df.apply(lambda x: x.education.replace(" ",""), axis=1)
df["marital-status"] = df.apply(lambda x: x["marital-status"].replace(" ",""), axis=1)
df["occupation"] = df.apply(lambda x: x.occupation.replace(" ",""), axis=1)
df["occupation"] = df.apply(lambda x: "Others" if x.occupation=="?" else x.workclass,
df["relationship"] = df.apply(lambda x: x.relationship.replace(" ",""), axis=1)
df["race"] = df.apply(lambda x: x.race.replace(" ",""), axis=1)
df["sex"] = df.apply(lambda x: x.sex.replace(" ",""), axis=1)
df["native-country"] = df.apply(lambda x: x["native-country"].replace(" ",""), axis=1)
df["income"] = df.apply(lambda x: x.income.replace(" ",""), axis=1)
```

In [8]:

```
categorical = ['age',
 'workclass',
 'education',
 'marital-status',
 'occupation',
 'relationship',
 'race',
 'sex',
 'native-country',
 'income']
```

In [9]:

```
feature_columns = ['race', 'sex', 'age']
```

In [10]:

```
dai_anonymization.set_categorial(categorical)
```

In [11]:

```
dai_anonymization.set_feature_columns(feature_columns)
```

In [12]:

```
df.head()
```

Out[12]:

	age	workclass	fnlwgt	education	education-num	marital-status	occupation	relationship	race	sex
0	31-40	State-gov	77516	Bachelors	13	Never-married	State-gov	Not-in-family	White	Male
1	41-50	Self-emp-not-inc	83311	Bachelors	13	Married-civ-spouse	Self-emp-not-inc	Husband	White	Male
2	31-40	Private	215646	HS-grad	9	Divorced	Private	Not-in-family	White	Male
3	51-60	Private	234721	11th	7	Married-civ-spouse	Private	Husband	Black	Male
4	21-30	Private	338409	Bachelors	13	Married-civ-spouse	Private	Wife	Black	Female

In [13]:

```
dd = pd.Series({c: df[c].unique() for c in df})
print(dd)
```

```
age                 ['31 - 40', '41 - 50', '51 - 60', '21 - 30', '...
workclass           ['State-gov', 'Self-emp-not-inc', 'Private', '...
fnlwgt              [77516, 83311, 215646, 234721, 338409, 284582,...
education           ['Bachelors', 'HS-grad', '11th', 'Masters', '9...
education-num       [13, 9, 7, 14, 5, 10, 12, 11, 4, 16, 15, 3, 6,...
marital-status      ['Never-married', 'Married-civ-spouse', 'Divor...
occupation          ['State-gov', 'Self-emp-not-inc', 'Private', '...
relationship        ['Not-in-family', 'Husband', 'Wife', 'Own-chil...
race                ['White', 'Black', 'Asian-Pac-Islander', 'Amer...
sex                 ['Male', 'Female']
Categories (2, object): ['F...
capital-gain        [2174, 0, 14084, 5178, 5013, 2407, 14344, 1502...
capital-loss        [0, 2042, 1408, 1902, 1573, 1887, 1719, 1762, ...
hours-per-week      [40, 13, 16, 45, 50, 80, 30, 35, 60, 20, 52, 4...
native-country      ['United-States', 'Cuba', 'Jamaica', 'India', ...
income              ['<=50k', '>50k']
Categories (2, object): ['<=...
dtype: object
```

In [14]:

```
# dai_anonymization.partition_dataset()
# dai_anonymization.build_anonymized_dataset()
dai_anonymization.generate_anonymized_dataset()
```

In [15]:

```
print(f"population size = {df.age.size}")
results_df = dai_anonymization.results_df
print(f"anonymized dataset size = {results_df.age.size}")
deleted_df = dai_anonymization.removed_df
print(f"deleted dataset size = {deleted_df.age.size}")
```

```
population size = 48842
anonymized dataset size = 48837
deleted dataset size = 5
```

In [16]:

```
results_df.groupby(feature_columns).size()
```

Out[16]:

```
race                sex     age    
Amer-Indian-Eskimo  Female  21 - 30      51
                            31 - 40      51
                            41 - 50      34
                            51 - 60      24
                            61 - 70       4
                                       ... 
White               Male    41 - 50    6547
                            51 - 60    3959
                            61 - 70    1720
                            <= 20      1645
                            > 70        517
Length: 66, dtype: int64
```

In [17]:

```
deleted_df.head()
```

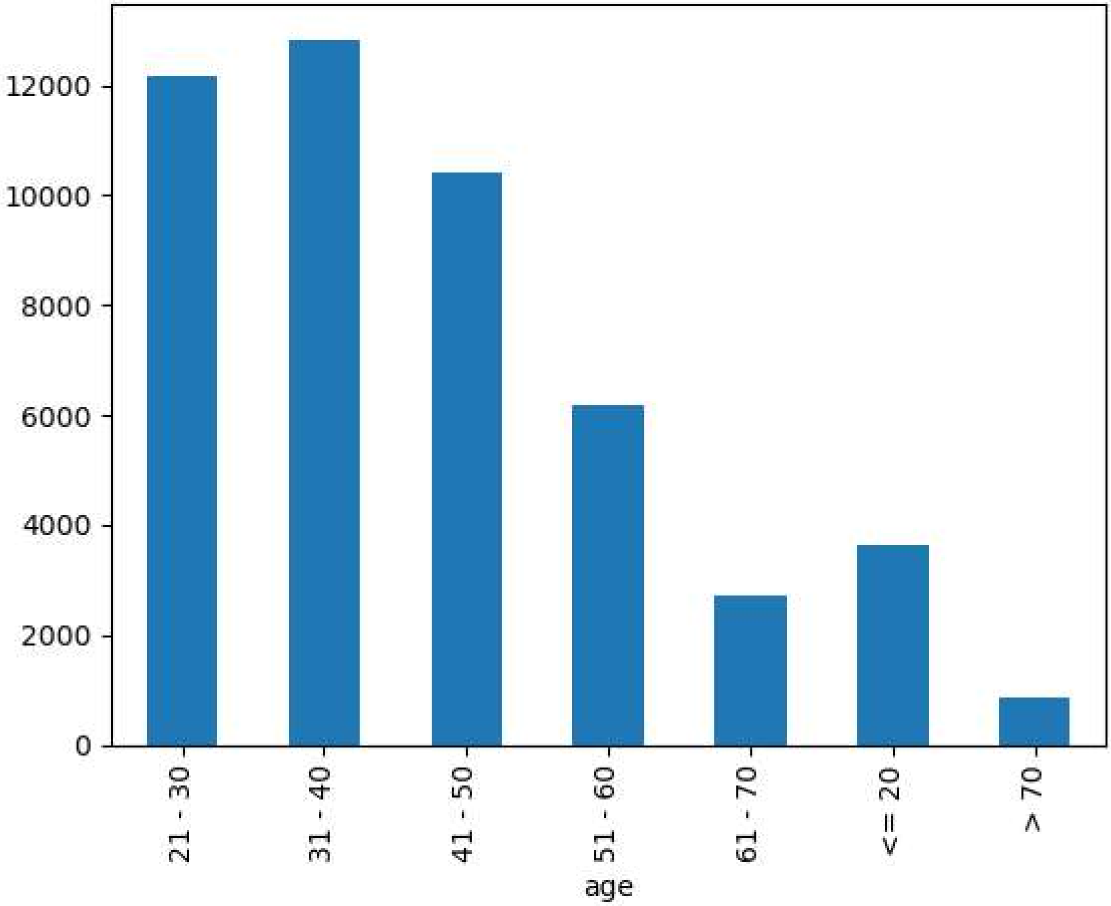
Out[17]:

	age	workclass	education	marital-status	occupation	relationship	race	sex	native-country	income
0	> 70	Local-gov	HS-grad	Widowed	Local-gov	Unmarried	Amer-Indian-Eskimo	Female	United-States	<=50k
1	61 - 70	Others	HS-grad	Widowed	Others	Not-in-family	Other	Female	Puerto-Rico	<=50k
2	61 - 70	Private	7th-8th	Separated	Private	Not-in-family	Other	Female	Mexico	<=50k
3	> 70	Others	Bachelors	Widowed	Others	Not-in-family	Other	Female	United-States	<=50k
4	> 70	Private	7th-8th	Married-civ-spouse	Private	Husband	Other	Male	United-States	<=50k

In [18]:

```python
results_df.groupby("age").size().plot.bar()
print(results_df.groupby("age").size())
```

```
age
21 - 30    12170
31 - 40    12838
41 - 50    10403
51 - 60     6202
61 - 70     2736
<= 20       3623
> 70         865
dtype: int64
```



In [19]:
```
results_df.to_csv("result.csv")
```

In [ ]:
```

```