In [1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

In [3]:

```
# Input dataset : https://www.kaggle.com/wenruliu/adult-income-dataset/versio
n/2
df = pd.read_csv('E:/adult-income-usa/adult-income-usa.csv')
df.head()
```

Out[3]:

	age	workclass	fnlwgt	education	educational-num	marital-status	occupation	relationship	r
0	25	Private	226802	11th	7	Never-married	Machine-op-inspct	Own-child	Bl
1	38	Private	89814	HS-grad	9	Married-civ-spouse	Farming-fishing	Husband	W
2	28	Local-gov	336951	Assoc-acdm	12	Married-civ-spouse	Protective-serv	Husband	W
3	44	Private	160323	Some-college	10	Married-civ-spouse	Machine-op-inspct	Husband	Bl
4	18	?	103497	Some-college	10	Never-married	?	Own-child	W

In [4]:

```
# Replacing '?' with Nan
df = df.replace('?',np.nan)
df.head()
```

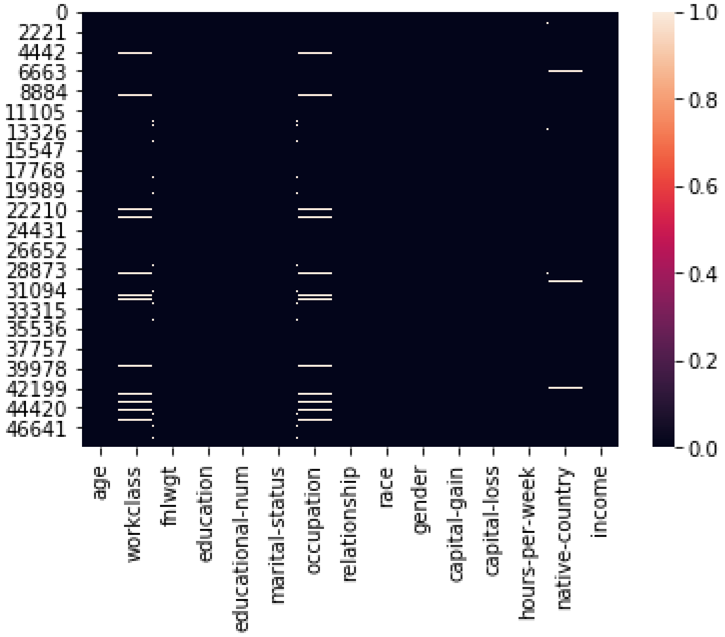
Out[4]:

	age	workclass	fnlwgt	education	educational-num	marital-status	occupation	relationship	r
0	25	Private	226802	11th	7	Never-married	Machine-op-inspct	Own-child	Bl
1	38	Private	89814	HS-grad	9	Married-civ-spouse	Farming-fishing	Husband	W
2	28	Local-gov	336951	Assoc-acdm	12	Married-civ-spouse	Protective-serv	Husband	W
3	44	Private	160323	Some-college	10	Married-civ-spouse	Machine-op-inspct	Husband	Bl
4	18	NaN	103497	Some-college	10	Never-married	NaN	Own-child	W

In [5]:

```
# Checking for null field values
sns.heatmap(df.isnull())
```

```
Out[5]: <matplotlib.axes._subplots.AxesSubplot at 0x90eb310>
```



In [6]:

```
df.isnull().sum()
```

Out[6]:

```
age                  0
workclass         2799
fnlwgt               0
education            0
educational-num      0
marital-status       0
occupation        2809
relationship         0
race                 0
gender               0
capital-gain         0
capital-loss         0
hours-per-week       0
native-country     857
income               0
dtype: int64
```

In [7]:

```
# Nan values are available in the fields - workclass, occupation and native-country.  Let us remove all rows containing null/Nan values
df.dropna(axis=0, inplace=True)
```

In [8]:

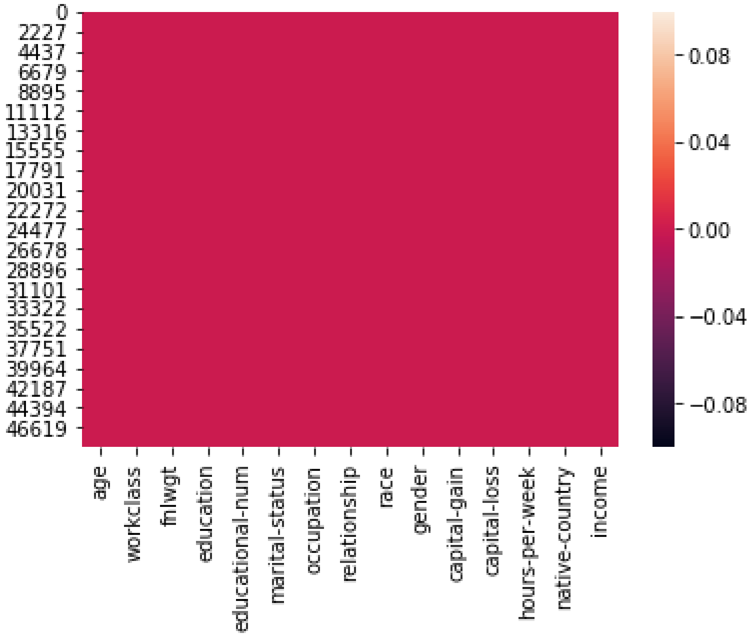
```
df.isnull().sum()
```

Out[8]:

```
age                0
workclass          0
fnlwgt             0
education          0
educational-num    0
marital-status     0
occupation         0
relationship       0
race               0
gender             0
capital-gain       0
capital-loss       0
hours-per-week     0
native-country     0
income             0
dtype: int64
```

In [9]:
```
# Rows containing Nan values are removed
sns.heatmap(df.isnull())
```

Out[9]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x911e730>
```



In [11]:
```
df.head()
```

Out[11]:

	age	workclass	fnlwgt	education	educational-num	marital-status	occupation	relationship	r
0	25	Private	226802	11th	7	Never-married	Machine-op-inspct	Own-child	Bl
1	38	Private	89814	HS-grad	9	Married-civ-spouse	Farming-fishing	Husband	W
2	28	Local-gov	336951	Assoc-acdm	12	Married-civ-spouse	Protective-serv	Husband	W
3	44	Private	160323	Some-college	10	Married-civ-spouse	Machine-op-inspct	Husband	Bl
5	34	Private	198693	10th	6	Never-married	Other-service	Not-in-family	W

In [13]:
```
# Imputing numerical value to the field workclass
# Field containing 'gov' will be given value as 1 and others as 0
workclass = df['workclass'].transform(lambda x : 1 if 'gov' in x else 0)
```

In [14]:
```
# imputing numerical value to the field marital-status
# Field containing 'Married-' are given as value 1 and others as 0
marital = df['marital-status'].transform(lambda x : 1 if 'Married-' in x else 0)
```

In [15]:
```
# Imputing numerical value to the field race
# Field containing 'White' will be given value as 1 and others as 0
race = df['race'].transform(lambda x : 1 if x == 'White' else 0)
```

In [16]:
```
# Imputing numerical value to the field gender
# Field containing 'Male' will be given value as 1 and female as 0
gender = pd.get_dummies(df['gender'], drop_first=True)
```

In [18]:
```
# Imputing numerical value to the field native-country
# Field containing 'United-States' will be given value as 1 and others as 0
native = df['native-country'].transform(lambda x : 1 if 'United-States' in x else 0)
```

In [19]:
```
# Imputing numerical value to the field income
# Field containing '>50K' will be given value as 1 and <=50K as 0
income = pd.get_dummies(df['income'], drop_first=True)
```

In [20]:
```
# Removing fields which are not needed to calculate logistic regression
df.drop(['education', 'occupation', 'relationship'], axis=1, inplace=True)
```

In [21]:
```
df.head()
```

Out[21]:

	age	workclass	fnlwgt	educational-num	marital-status	race	gender	capital-gain	capital-loss	hours-per-week
0	25	Private	226802	7	Never-married	Black	Male	0	0	40
1	38	Private	89814	9	Married-civ-spouse	White	Male	0	0	50
2	28	Local-gov	336951	12	Married-civ-spouse	White	Male	0	0	40
3	44	Private	160323	10	Married-civ-spouse	Black	Male	7688	0	40
5	34	Private	198693	6	Never-married	White	Male	0	0	30

In [22]:

```
# Replacing the fields workclass, marital-status, race, gender, native-country
 and income with the imputed field values
df.drop(['workclass', 'marital-status', 'race', 'gender', 'native-country', 'i
ncome'], axis=1, inplace=True)
df_concatenated = pd.concat([workclass, marital, race, gender, native, income
], axis=1)
df_final = pd.concat([df, df_concatenated], axis=1)
df_final.head()
```

Out[22]:

	age	fnlwgt	educational-num	capital-gain	capital-loss	hours-per-week	workclass	marital-status	race	Male	n co
0	25	226802	7	0	0	40	0	0	0	1	1
1	38	89814	9	0	0	50	0	1	1	1	1
2	28	336951	12	0	0	40	1	1	1	1	1
3	44	160323	10	7688	0	40	0	1	0	1	1
5	34	198693	6	0	0	30	0	0	1	1	1

In [23]:

```
# Writing the cleaned data to an output csv file
df_final.to_csv('E:/adult-income-usa/adult-income-usa-cleaned.csv')
```