```
import pandas as pd
import seaborn as sns
import numpy as np
import matplotlib.pyplot as plt
from sklearn.preprocessing import LabelEncoder
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.linear_model import LogisticRegression
from sklearn.naive_bayes import GaussianNB
from sklearn.model_selection import train_test_split,cross_val_score,KFold,GridSearchCV
from sklearn.metrics import confusion_matrix,classification_report,accuracy_score
# import scikitplot as skplt


dataset=pd.read_csv("/content/adult.csv")


print(dataset.isnull().sum())
print(dataset.dtypes)
```

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

```
dataset.head()
```

	age	workclass	fnlwgt	education	education.num	marital.status	occupation	relationship	race	sex	capital.gain	capital.loss
0	90	?	77053	HS-grad	9	Widowed	?	Not-in-family	White	Female	0	4356
1	82	Private	132870	HS-grad	9	Widowed	Exec-managerial	Not-in-family	White	Female	0	4356
2	66	?	186061	Some-college	10	Widowed	?	Unmarried	Black	Female	0	4356
3	54	Private	140359	7th-8th	4	Divorced	Machine-op-inspct	Unmarried	White	Female	0	3900
4	41	Private	264663	Some-college	10	Separated	Prof-specialty	Own-child	White	Female	0	3900

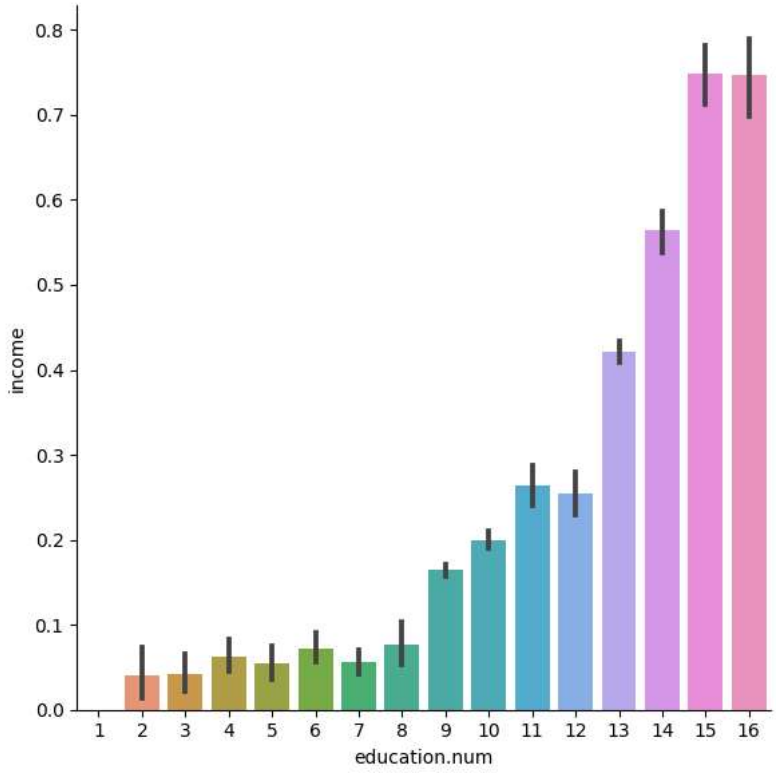
```
#removing '?' containing rows
dataset = dataset[(dataset != '?').all(axis=1)]
#label the income objects as 0 and 1
dataset['income']=dataset['income'].map({'<=50K': 0, '>50K': 1})
```

```
<ipython-input-6-39ed73805135>:4: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
```

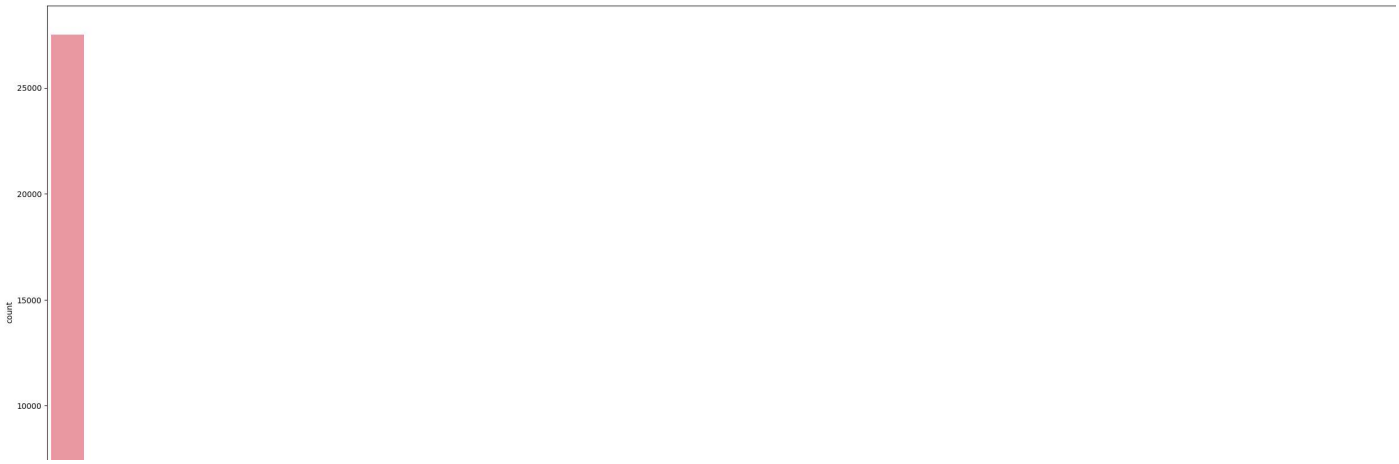
```
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-c
  dataset['income']=dataset['income'].map({'<=50K': 0, '>50K': 1})
```

```
sns.catplot(x='education.num',y='income',data=dataset,kind='bar',height=6)
plt.show()
```




```
#explore which country do most people belong
plt.figure(figsize=(38,14))
sns.countplot(x='native.country',data=dataset)
plt.show()
```




```
for column in dataset:
    enc=LabelEncoder()
    if dataset.dtypes[column]==np.object:
         dataset[column]=enc.fit_transform(dataset[column])
```

```
<ipython-input-10-5d7d7fe4d7c0>:3: DeprecationWarning: `np.object` is a deprecated alias for the builtin `object`. To silence this warn
Deprecated in NumPy 1.20; for more details and guidance: https://numpy.org/devdocs/release/1.20.0-notes.html#deprecations
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<ipython-input-10-5d7d7fe4d7c0>:3: DeprecationWarning: `np.object` is a deprecated alias for the builtin `object`. To silence this warn
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  if dataset.dtypes[column]==np.object:
```

```python
plt.figure(figsize=(14,10))
sns.heatmap(dataset.corr(),annot=True,fmt='.2f')
plt.show()
```


```python
dataset=dataset.drop(['occupation','fnlwgt','native.country'],axis=1)
```

```python
print(dataset.head())
```

```
   age  workclass  education.num  marital.status  race  sex  capital.gain  \
1   82          2              9               6     4    0             0
3   54          2              4               0     4    0             0
4   41          2             10               5     4    0             0
5   34          2              9               0     4    0             0
6   38          2              6               5     4    1             0

   capital.loss  hours.per.week  income
1          4356              18       0
3          3900              40       0
```

```
4          3900             40       0
5          3770             45       0
6          3770             40       0
```

```
X=dataset.iloc[:,0:-1]
y=dataset.iloc[:,-1]
print(X.head())
print(y.head())
x_train,x_test,y_train,y_test=train_test_split(X,y,test_size=0.33,shuffle=False)
```

```
   age  workclass  education.num  marital.status  race  sex  capital.gain  \
1   82          2              9               6     4    0             0
3   54          2              4               0     4    0             0
4   41          2             10               5     4    0             0
5   34          2              9               0     4    0             0
6   38          2              6               5     4    1             0

   capital.loss  hours.per.week
1          4356              18
3          3900              40
4          3900              40
5          3770              45
6          3770              40
1    0
3    0
4    0
5    0
6    0
Name: income, dtype: int64
```

```
import xgboost as xgb
xgb.__version__
```

```
'2.0.0'
```

```
dmat=xgb.DMatrix(x_train,y_train)
test_dmat=xgb.DMatrix(x_test)
```

```
from skopt import BayesSearchCV
import warnings
warnings.filterwarnings('ignore', message='The objective has been evaluated at this point before.')

params={'min_child_weight': (0, 10),
        'max_depth': (0, 30),
        'subsample': (0.5, 1.0, 'uniform'),
        'colsample_bytree': (0.5, 1.0, 'uniform'),
        'n_estimators':(50,100),
        'reg_lambda':(1,100,'log-uniform'),
        }

bayes=BayesSearchCV(estimator=xgb.XGBClassifier(objective='binary:logistic',eval_metric='error',eta=0.1),search_spaces=params,n_iter=50,scori
res=bayes.fit(x_train,y_train)
print(res.best_params_)
print(res.best_score_)
```

{'colsample_bytree': 1.0, 'max_depth': 30, 'min_child_weight': 0, 'n_estimators': 50, 'reg_lambda': 100.0, 'subsample': 0.5} 0.7750395882818686

```
final_clf=xgb.train(params=final_p,dtrain=dmat,num_boost_round=837)
pred=final_clf.predict(test_dmat)
print(pred)
pred[pred > 0.5 ] = 1
pred[pred <= 0.5] = 0
print(pred)
print(accuracy_score(y_test,pred)*100)
```

[8.5713279e-01 7.6487666e-01 5.4465812e-01 ... 2.9337847e-01 3.4949776e-02 5.5424345e-04] [1. 1. 1. ... 0. 0. 0.] 85.01105083383564