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```
       1, 0, 1, 0, 1, 0, 1, 2, 2, 1, 2, 2, 2, 0, 0, 0, 2, 1, 2, 0, 0, 0,
       0, 2, 1, 0, 2, 2, 0, 2, 1, 0])
```

```
from sklearn.datasets import load_digits
digits=load_digits()
digits
```

```
{'data': array([[ 0.,  0.,  5., ...,  0.,  0.,  0.],
        [ 0.,  0.,  0., ..., 10.,  0.,  0.],
        [ 0.,  0.,  0., ..., 16.,  9.,  0.],
        ...,
        [ 0.,  0.,  1., ...,  6.,  0.,  0.],
        [ 0.,  0.,  2., ..., 12.,  0.,  0.],
        [ 0.,  0., 10., ..., 12.,  1.,  0.]]),
 'target': array([0, 1, 2, ..., 8, 9, 8]),
 'frame': None,
 'feature_names': ['pixel_0_0',
  'pixel_0_1',
  'pixel_0_2',
  'pixel_0_3',
  'pixel_0_4',
  'pixel_0_5',
  'pixel_0_6',
  'pixel_0_7',
  'pixel_1_0',
  'pixel_1_1',
  'pixel_1_2'
```

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```
        'pixel_7_4',
        'pixel_7_5',
        'pixel_7_6',
        'pixel_7_7'],
       'target_names': array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9]),
       'images': array([[[ 0.,  0.,  5., ...,  1.,  0.,  0.],
               [ 0.,  0., 13., ..., 15.,  5.,  0.],
               [ 0.,  3., 15., ..., 11.,  8.,  0.],
               ...,
               [ 0.,  4., 11., ..., 12.,  7.,  0.],
               [ 0.,  2., 14., ..., 12.,  0.,  0.],
               [ 0.,  0.,  6., ...,  0.,  0.,  0.]],

              [[ 0.,  0.,  0., ...,  5.,  0.,  0.],
               [ 0.,  0.,  0., ...,  9.,  0.,  0.],
               [ 0.,  0.,  3., ...,  6.,  0.,  0.],
               ...,
               [ 0.,  0.,  1., ...,  6.,  0.,  0.],
               [ 0.,  0.,  1., ...,  6.,  0.,  0.],
               [ 0.,  0.,  0., ..., 10.,  0.,  0.]],
```

[4]
```
a=digits.data
b=digits.target
```

[6]
```
from sklearn.model_selection import train_test_split
```

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```
[6] from sklearn.model_selection import train_test_split
    x_train,x_test,y_train,y_test=train_test_split(a,b,test_size=0.3)
```

```
[7] from sklearn.neighbors import KNeighborsClassifier
    z=KNeighborsClassifier(n_neighbors=10)
    y=z.fit(x_train,y_train)
    y
```

```
KNeighborsClassifier
KNeighborsClassifier(n_neighbors=10)
```

```
[8] y.score(x_test,y_test)
```

```
0.9740740740740741
```

```
[10] k=y.predict(x_test)
     k
```

```
array([1, 2, 3, 6, 7, 2, 2, 9, 6, 1, 2, 4, 3, 2, 6, 8, 6, 0, 3, 8, 5, 3,
       6, 0, 8, 2, 3, 9, 6, 5, 9, 7, 9, 0, 8, 5, 9, 0, 6, 6, 6, 7, 0, 4,
       4, 2, 5, 7, 9, 9, 6, 8, 1, 7, 7, 0, 8, 7, 2, 6, 3, 6, 1, 3, 8, 3,
```

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```
[12] from sklearn.metrics import classification_report
     g=classification_report(y_test,k)
     print(g)
```

```
              precision    recall  f1-score   support

           0       0.98      1.00      0.99        46
           1       0.93      0.98      0.95        54
           2       1.00      1.00      1.00        52
           3       0.97      1.00      0.98        58
           4       1.00      0.96      0.98        55
           5       0.96      0.95      0.95        55
           6       1.00      0.98      0.99        60
           7       0.96      1.00      0.98        50
           8       1.00      0.93      0.96        57
           9       0.94      0.94      0.94        53

    accuracy                           0.97       540
   macro avg       0.97      0.97      0.97       540
weighted avg       0.97      0.97      0.97       540
```

```
[14] from sklearn.metrics import confusion_matrix
     m=confusion_matrix(y_test,k)
     m
```

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```
weighted avg       0.97      0.97      0.97       540
```

[14]
```
from sklearn.metrics import confusion_matrix
m=confusion_matrix(y_test,k)
m
```

```
array([[46,  0,  0,  0,  0,  0,  0,  0,  0,  0],
       [ 0, 53,  0,  0,  0,  1,  0,  0,  0,  0],
       [ 0,  0, 52,  0,  0,  0,  0,  0,  0,  0],
       [ 0,  0,  0, 58,  0,  0,  0,  0,  0,  0],
       [ 0,  1,  0,  0, 53,  0,  0,  1,  0,  0],
       [ 0,  0,  0,  0,  0, 52,  0,  0,  0,  3],
       [ 0,  1,  0,  0,  0,  0, 59,  0,  0,  0],
       [ 0,  0,  0,  0,  0,  0,  0, 50,  0,  0],
       [ 0,  2,  0,  1,  0,  0,  0,  1, 53,  0],
       [ 1,  0,  0,  1,  0,  1,  0,  0,  0, 50]])
```

[15]
```
import seaborn as sns
sns.heatmap(m,annot=True)
```

```
<Axes: >
```

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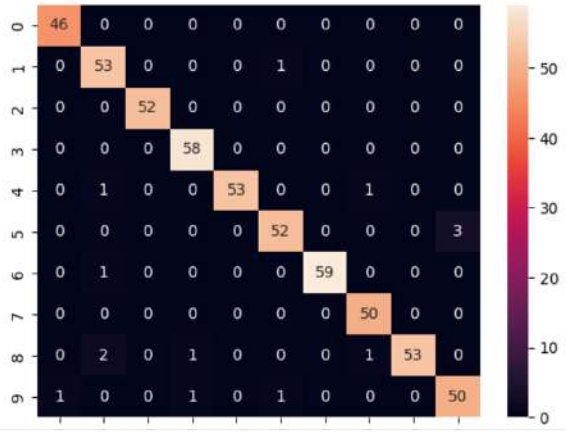
```
[15] import seaborn as sns
     sns.heatmap(m,annot=True)
```

```
<Axes: >
```



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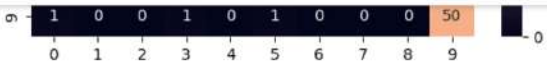


```
import seaborn as sns
a=sns.get_dataset_names()
a
```

```
['anagrams',
 'anscombe',
 'attention',
 'brain_networks',
 'car_crashes',
 'diamonds',
 'dots',
 'dowjones',
 'exercise',
 'flights',
 'fmri',
 'geyser',
 'glue',
 'healthexp',
 'iris',
 'mpg',
 'penguins',
 'planets',
```

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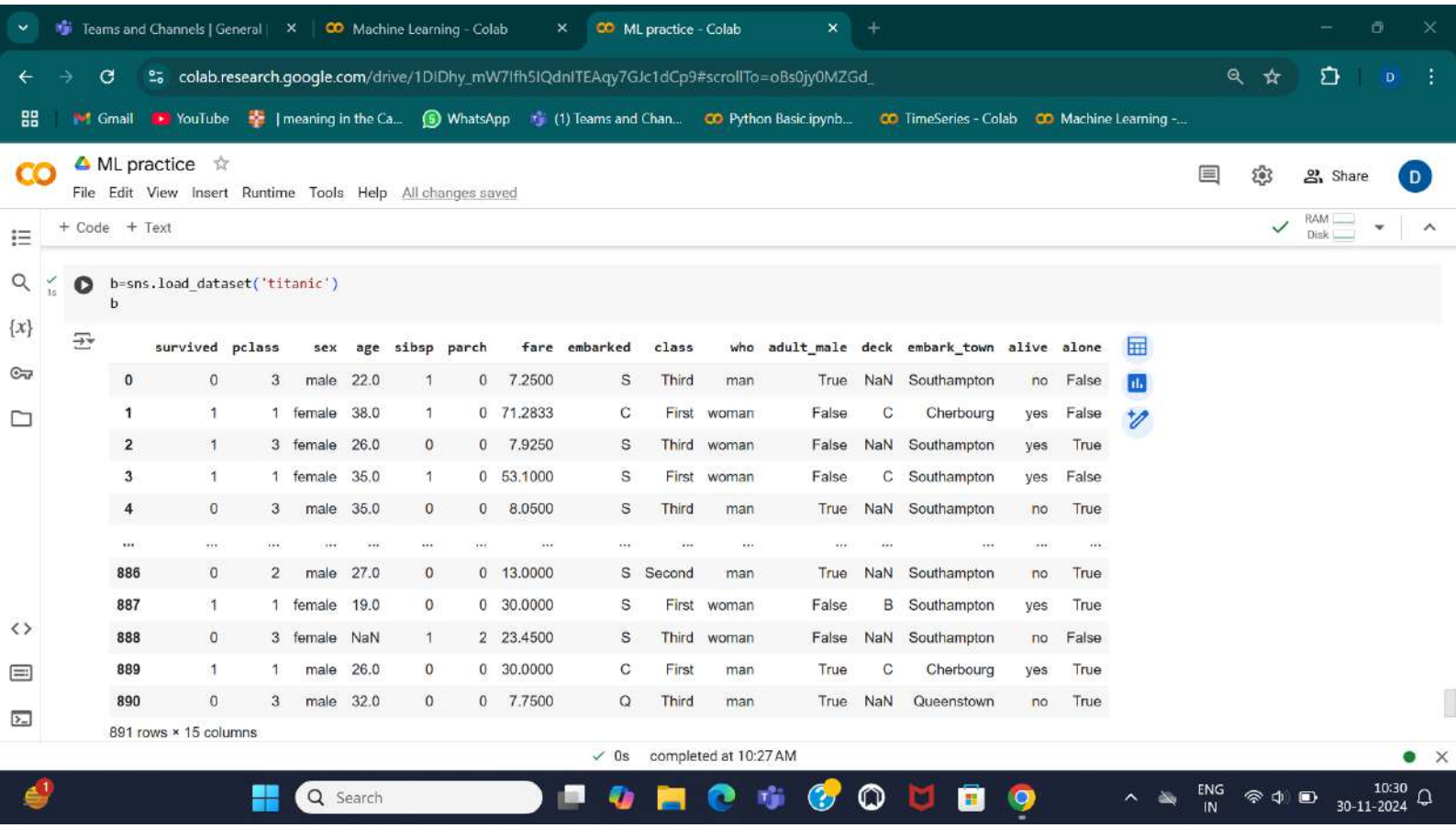
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b=sns.load_dataset('titanic')
b
survived pclass sex age sibsp parch fare embarked class who adult_male deck embark_town alive alone
0 0 3 male 22.0 1 0 7.2500 S Third man True NaN Southampton no False
1 1 1 female 38.0 1 0 71.2833 C First woman False C Cherbourg yes False
2 1 3 female 26.0 0 0 7.9250 S Third woman False NaN Southampton yes True
3 1 1 female 35.0 1 0 53.1000 S First woman False C Southampton yes False
4 0 3 male 35.0 0 0 8.0500 S Third man True NaN Southampton no True
... ...
886 0 2 male 27.0 0 0 13.0000 S Second man True NaN Southampton no True
887 1 1 female 19.0 0 0 30.0000 S First woman False B Southampton yes True
888 0 3 female NaN 1 2 23.4500 S Third woman False NaN Southampton no False
889 1 1 male 26.0 0 0 30.0000 C First man True C Cherbourg yes True
890 0 3 male 32.0 0 0 7.7500 Q Third man True NaN Queenstown no True
891 rows × 15 columns
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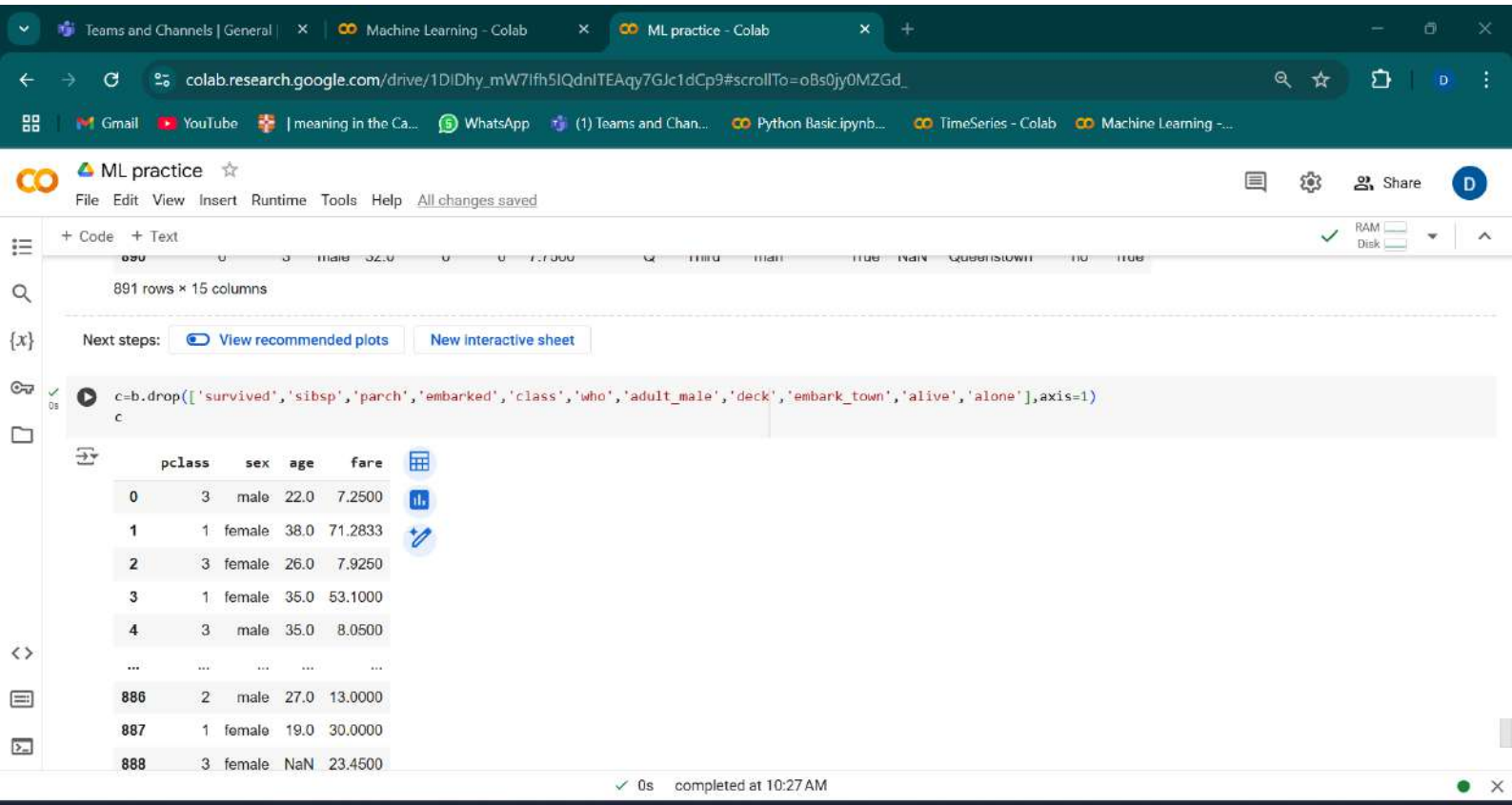
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Disk
891 rows × 15 columns
Next steps: View recommended plots New interactive sheet
c=b.drop(['survived','sibsp','parch','embarked','class','who','adult_male','deck','embark_town','alive','alone'],axis=1)
c
pclass sex age fare
0 3 male 22.0 7.2500
1 1 female 38.0 71.2833
2 3 female 26.0 7.9250
3 1 female 35.0 53.1000
4 3 male 35.0 8.0500
... ...
886 2 male 27.0 13.0000
887 1 female 19.0 30.0000
888 3 female NaN 23.4500
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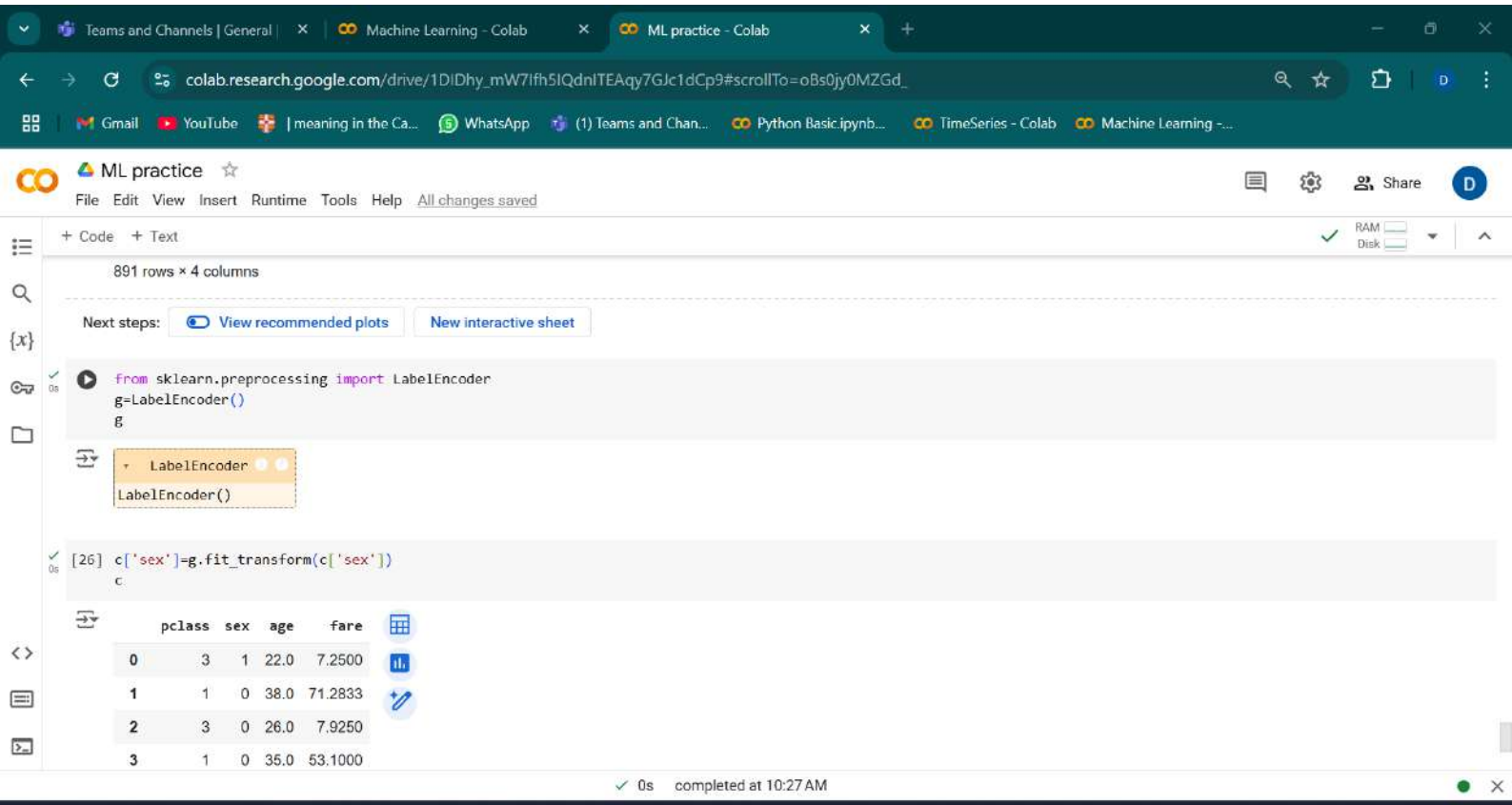
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891 rows × 4 columns
Next steps: View recommended plots New interactive sheet
from sklearn.preprocessing import LabelEncoder
g=LabelEncoder()
g
LabelEncoder
LabelEncoder()
[26] c['sex']=g.fit_transform(c['sex'])
c
pclass sex age fare
0 3 1 22.0 7.2500
1 1 0 38.0 71.2833
2 3 0 26.0 7.9250
3 1 0 35.0 53.1000
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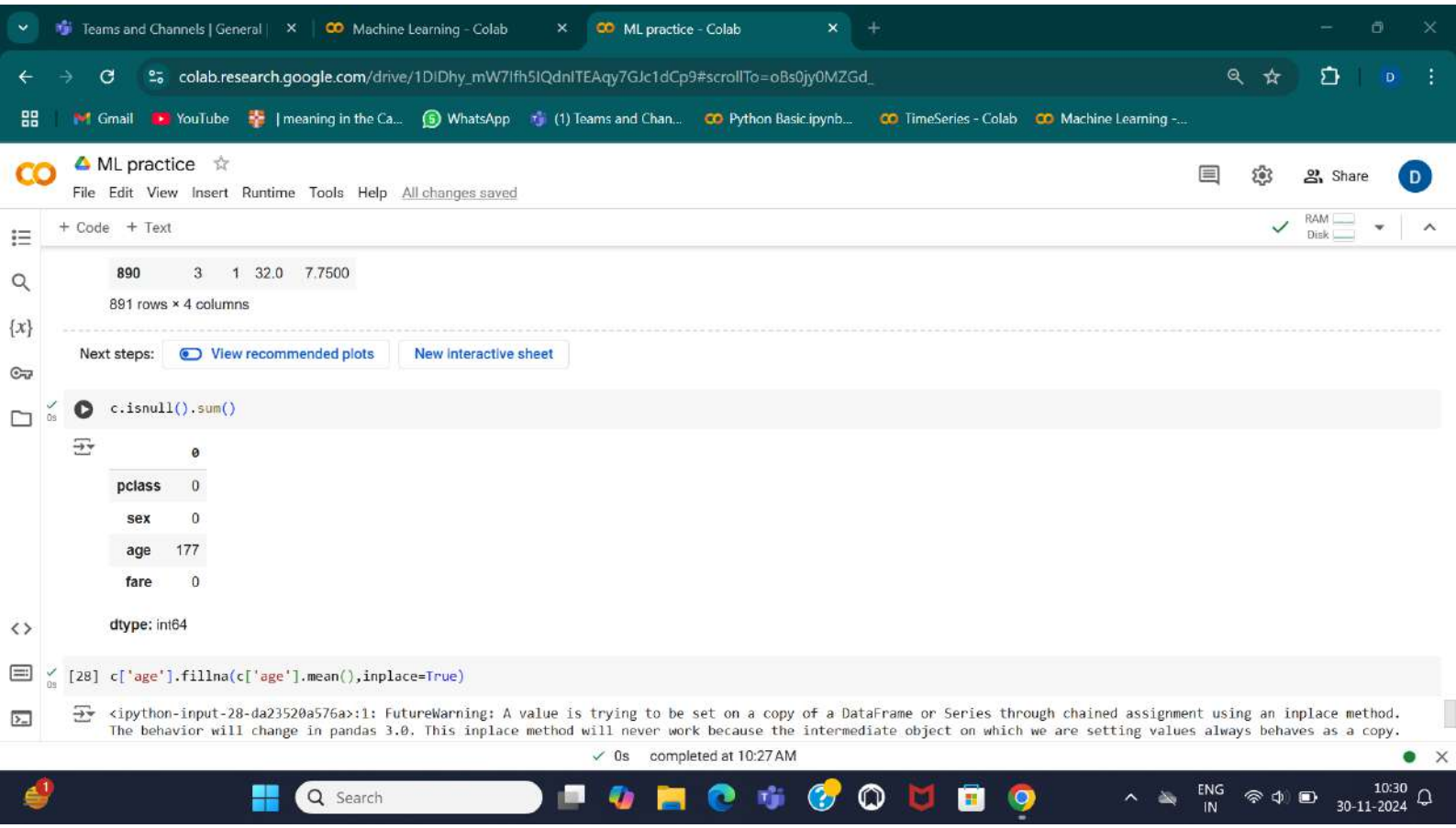
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890 3 1 32.0 7.7500
891 rows × 4 columns
Next steps: View recommended plots New interactive sheet
c.isnull().sum()
0
pclass 0
sex 0
age 177
fare 0
dtype: int64
[28] c['age'].fillna(c['age'].mean(),inplace=True)
<ipython-input-28-da23520a576a>:1: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setting values always behaves as a copy.
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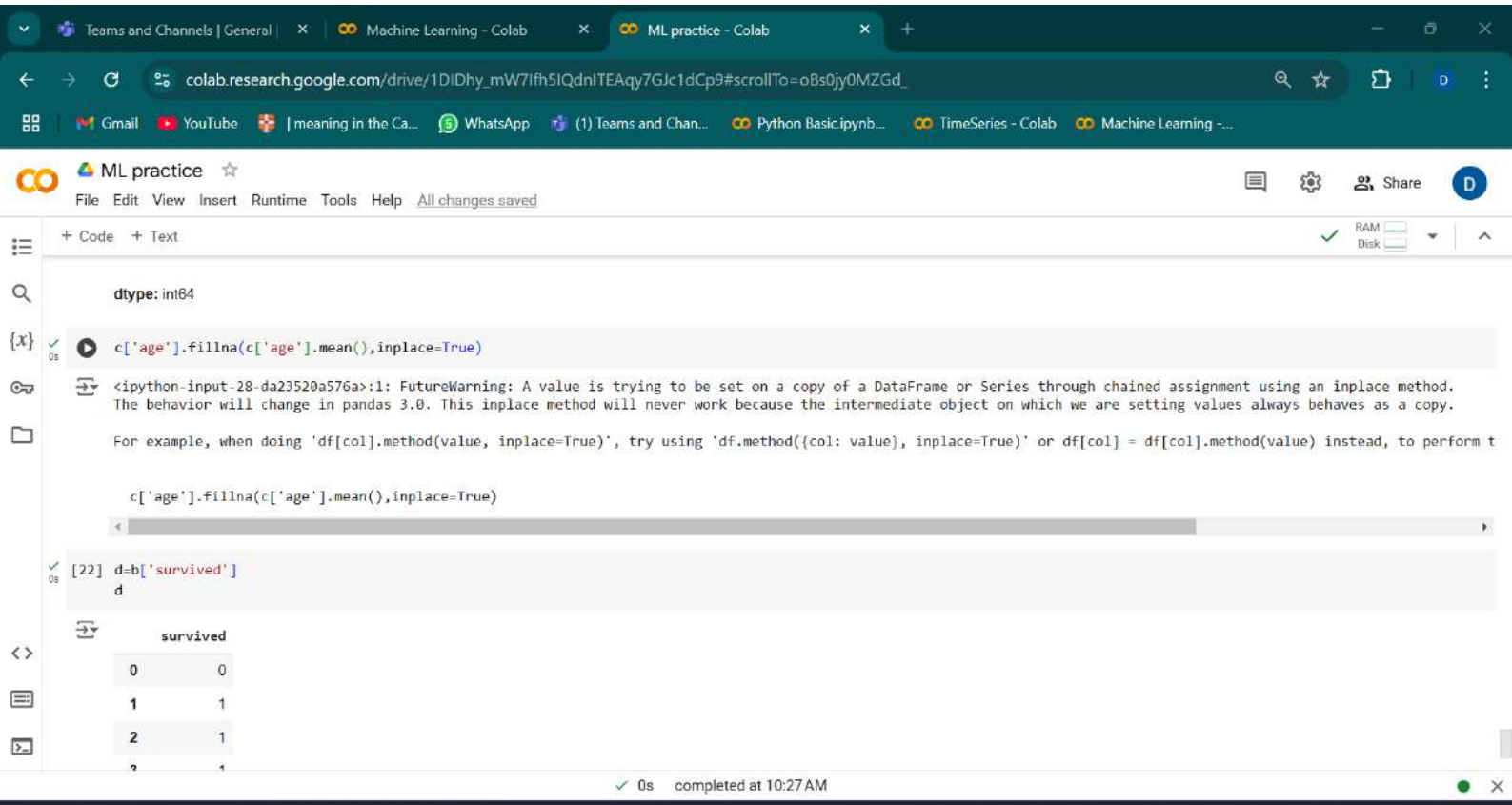
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dtype: int64
c['age'].fillna(c['age'].mean(),inplace=True)
<ipython-input-28-da23520a576a>:1: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setting values always behaves as a copy.
For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[col].method(value) instead, to perform t
c['age'].fillna(c['age'].mean(),inplace=True)
[22] d=b['survived']
d
survived
0 0
1 1
2 1
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```
[29] from sklearn.model_selection import train_test_split
     x_train,x_test,y_train,y_test=train_test_split(c,d,test_size=0.3)
```

```
from sklearn.tree import DecisionTreeClassifier
z=DecisionTreeClassifier()
y=z.fit(x_train,y_train)
y
```

```
DecisionTreeClassifier()
```

```
[31] y.score(x_test,y_test)
```

```
0.7649253731343284
```

```
[32] k=y.predict(x_test)
     k
```

```
array([0, 0, 1, 0, 0, 1, 0, 0, 0, 0, 1, 1, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0,
       1, 0, 0, 0, 1, 0, 1, 1, 1, 0, 0, 1, 1, 0, 0, 1, 1, 1, 1, 0, 0, 0,
       1, 0, 1, 0, 1, 1, 1, 0, 1, 0, 0, 1, 1, 0, 0, 1, 1, 1, 1, 1, 1, 1,
```

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```
       0, 1, 1, 0, 0, 1, 1, 1, 0, 1, 0, 1, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0,
       0, 1, 1, 0, 1, 0, 1, 0, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 0, 0, 0, 1,
       1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 1, 0, 0, 1, 0, 1, 1,
       1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 1, 0, 0, 0, 0, 1, 1, 0, 0, 0, 1,
       0, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 1, 1, 1, 0, 1, 1, 1, 0, 0, 0, 0,
       1, 0, 1, 1])
```

```
from sklearn.metrics import classification_report
g=classification_report(y_test,k)
print(g)
```

```
              precision    recall  f1-score   support

           0       0.81      0.80      0.81       164
           1       0.69      0.71      0.70       104

    accuracy                           0.76       268
   macro avg       0.75      0.76      0.75       268
weighted avg       0.77      0.76      0.77       268
```

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