## 📦 Import Required Libraries

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.impute import KNNImputer
from sklearn.model_selection import train_test_split
```

```
df=pd.read_csv("/content/titanic_toy.csv")
```

```
df.sample(5)
```

| | Age | Fare | Family | Survived |
|---|---|---|---|---|
| **239** | 33.0 | 12.275 | 0 | 0 |
| **555** | 62.0 | 26.550 | 0 | 0 |
| **768** | NaN | 24.150 | 1 | 0 |
| **394** | 24.0 | 16.700 | 2 | 1 |
| **126** | NaN | 7.750 | 0 | 0 |

```
df.drop(columns=['Family'],inplace=True)
```

## 🔀 Feature–Target Split & Train–Test Split

```
x=df.drop(columns=['Survived'])
y=df['Survived']
```

```
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=2)
```

## 🗒️ Apply Imputation & Restore Feature Names

```
knn=KNNImputer(n_neighbors=5,weights='distance')
x_train_trf=knn.fit_transform(x_train)
x_test_trf=knn.transform(x_test)
```

```
x_train_trf
```

```
array([[ 40.        ,  27.7208    ],
       [  4.        ,  16.7       ],
       [ 47.        ,   9.        ],
       ...,
       [ 71.        ,  49.5042    ],
       [ 29.53007554, 221.7792    ],
       [ 48.58823529,  25.925     ]])
```

```
x_train_trf=pd.DataFrame(x_train_trf,columns=x_train.columns)
x_test_trf=pd.DataFrame(x_test_trf,columns=x_test.columns)
```

```
x_train_trf.isnull().sum()
```

| | 0 |
|---|---|
| **Age** | 0 |
| **Fare** | 0 |

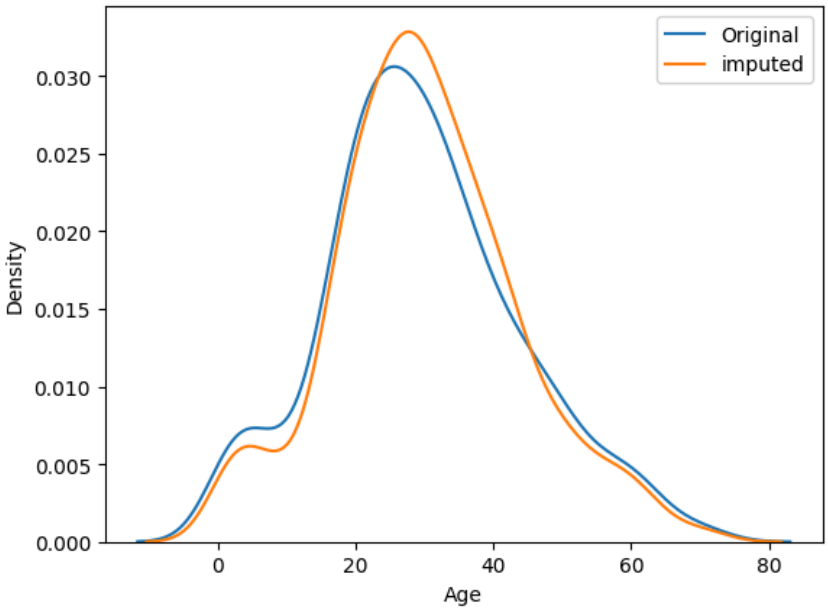
**dtype:** int64

## 📊 Distribution Comparison: Before vs After Imputation

```
sns.distplot(x_train['Age'],label='Original',hist=False)
sns.distplot(x_train_trf['Age'],label='imputed',hist=False)
```

```
plt.legend()
plt.show()
```

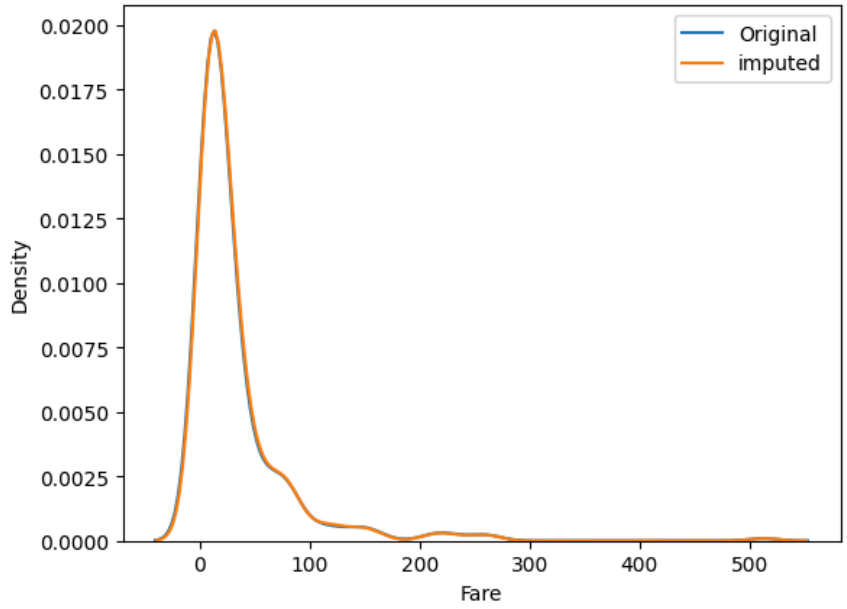
```
/tmp/ipython-input-3837049370.py:1: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `kdeplot` (an axes-level function for kernel density plots).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(x_train['Age'],label='Original',hist=False)
/tmp/ipython-input-3837049370.py:2: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `kdeplot` (an axes-level function for kernel density plots).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(x_train_trf['Age'],label='imputed',hist=False)
```




```
sns.distplot(x_train['Fare'],label='Original',hist=False)
sns.distplot(x_train_trf['Fare'],label='imputed',hist=False)
plt.legend()
plt.show()
```

```
/tmp/ipython-input-2277472793.py:1: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `kdeplot` (an axes-level function for kernel density plots).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(x_train['Fare'],label='Original',hist=False)
/tmp/ipython-input-2277472793.py:2: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `kdeplot` (an axes-level function for kernel density plots).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751
```

```
sns.distplot(x_train_trf['Fare'],label='imputed',hist=False)
```




## Missing Value Imputation (Iterative Imputer)

```
from sklearn.experimental import enable_iterative_imputer
from sklearn.impute import IterativeImputer
```

```
imputer=IterativeImputer(estimator=None,max_iter=100,random_state=2)
```

```
x_train_ii=imputer.fit_transform(x_train)
x_test_ii=imputer.transform(x_test)
```

```
x_train_ii=pd.DataFrame(x_train_ii,columns=x_train.columns)
x_test_ii=pd.DataFrame(x_test_ii,columns=x_test.columns)
```

```
Start coding or generate with AI.
```

| | 0 |
|---|---|
| **Age** | 0 |
| **Fare** | 0 |

**dtype:** int64

## Distribution Comparison: Before vs After Imputation

```
sns.distplot(x_train['Age'],label='Original',hist=False)
sns.distplot(x_train_ii['Age'],label='imputed',hist=False)
plt.legend()
plt.show()
```

```
/tmp/ipython-input-3158451574.py:1: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `kdeplot` (an axes-level function for kernel density plots).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(x_train['Age'],label='Original',hist=False)
/tmp/ipython-input-3158451574.py:2: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `kdeplot` (an axes-level function for kernel density plots).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(x_train_ii['Age'],label='imputed',hist=False)
```