231501010
Akshaya B

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EDA – Data Cleaning

Aim: To perform data cleaning by handling missing values, removing duplicates, converting data types, and normalizing data.

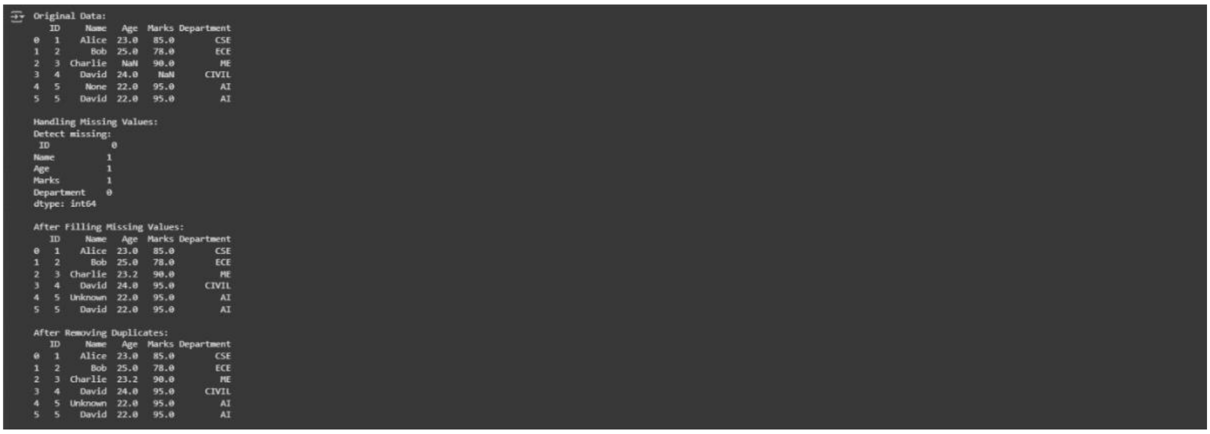
Code:

```
import pandas as pd import numpy as np from sklearn.preprocessing

import StandardScaler, MinMaxScaler


# Step 1: Create sample dataset data

= {

   "ID": [1, 2, 3, 4, 5, 5],

   "Name": ["Alice", "Bob", "Charlie", "David", None, "David"],

   "Age": [23, 25, np.nan, 24, 22, 22],

   "Marks": [85, 78, 90, np.nan, 95, 95],

   "Department": ["CSE", "ECE", "ME", "CIVIL", "AI", "AI"]

}

df = pd.DataFrame(data)

print("Original Data:") print(df)  #

        Step 2: Handling missing
```

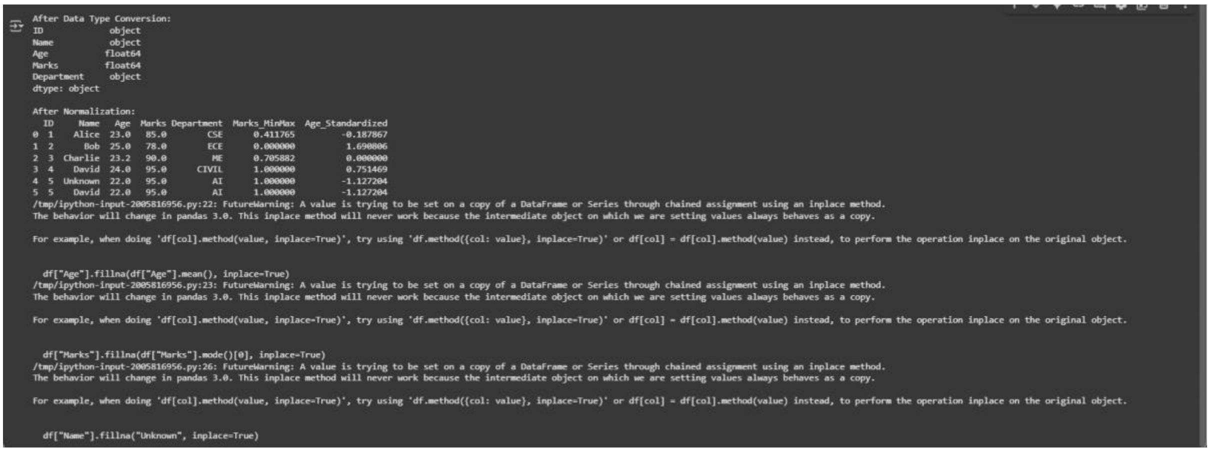
```
    values print("\nHandling Missing

    Values:")

print("Detect missing:\n", df.isnull().sum())


# Fill missing with mean for Age, fill with mode for Marks

df["Age"].fillna(df["Age"].mean(), inplace=True)

df["Marks"].fillna(df["Marks"].mode()[0], inplace=True)


# Fill missing Name with "Unknown" df["Name"].fillna("Unknown", inplace=True)


print("\nAfter Filling Missing Values:") print(df)


# Step 3: Remove duplicates df = df.drop_duplicates()

    print("\nAfter

Removing Duplicates:") print(df)


# Step 4: Data type conversion df["ID"] = df["ID"].astype(str)

    #     Convert     ID     to     string print("\nAfter

    Data   Type   Conversion:")

print(df.dtypes)
```

```
# Step 5: Normalization scaler = MinMaxScaler()

df["Marks_MinMax"] = scaler.fit_transform(df[["Marks"]])

standard_scaler = StandardScaler() df["Age_Standardized"] =

standard_scaler.fit_transform(df[["Age"]])

print("\nAfter Normalization:") print(df)
```

Output:



```
Original Data:
   ID     Name   Age  Marks Department
0   1    Alice  23.0   85.0        CSE
1   2      Bob  25.0   78.0        ECE
2   3  Charlie   NaN   90.0         ME
3   4    David  24.0    NaN      CIVIL
4   5     None  22.0   95.0         AI
5   5    David  22.0   95.0         AI

Handling Missing Values:
Detect missing:
 ID           0
Name          1
Age           1
Marks         1
Department    0
dtype: int64

After Filling Missing Values:
   ID     Name   Age  Marks Department
0   1    Alice  23.0   85.0        CSE
1   2      Bob  25.0   78.0        ECE
2   3  Charlie  23.2   90.0         ME
3   4    David  24.0   95.0      CIVIL
4   5  Unknown  22.0   95.0         AI
5   5    David  22.0   95.0         AI

After Removing Duplicates:
   ID     Name   Age  Marks Department
0   1    Alice  23.0   85.0        CSE
1   2      Bob  25.0   78.0        ECE
2   3  Charlie  23.2   90.0         ME
3   4    David  24.0   95.0      CIVIL
4   5  Unknown  22.0   95.0         AI
5   5    David  22.0   95.0         AI
```



```
After Data Type Conversion:
ID              object
Name            object
Age            float64
Marks          float64
Department      object
dtype: object

After Normalization:
  ID     Name   Age  Marks Department  Marks_MinMax  Age_Standardized
0  1    Alice  23.0   85.0        CSE      0.411765         -0.187867
1  2      Bob  25.0   78.0        ECE      0.000000          1.690806
2  3  Charlie  23.2   90.0         ME      0.705882          0.000000
3  4    David  24.0   95.0      CIVIL      1.000000          0.751469
4  5  Unknown  22.0   95.0         AI      1.000000         -1.127204
5  5    David  22.0   95.0         AI      1.000000         -1.127204
/tmp/ipython-input-2005816956.py:22: 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 the operation inplace on the original object.


  df["Age"].fillna(df["Age"].mean(), inplace=True)
/tmp/ipython-input-2005816956.py:23: 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 the operation inplace on the original object.


  df["Marks"].fillna(df["Marks"].mode()[0], inplace=True)
/tmp/ipython-input-2005816956.py:26: 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 the operation inplace on the original object.


  df["Name"].fillna("Unknown", inplace=True)
```

Result: Successfully cleaned the dataset by handling missing values, removing duplicates, converting data types, and normalizing data.