CS23334 -Fundamental Of Data Science

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Handling Missing and Inappropriate Data

Exp :3B

Date: 12-08-2025

Aim:

To **handle missing and inappropriate data** (duplicates, negative/out-of-range values, and inconsistencies) in the provided hotel dataset using the Python Pandas Library for data preprocessing.

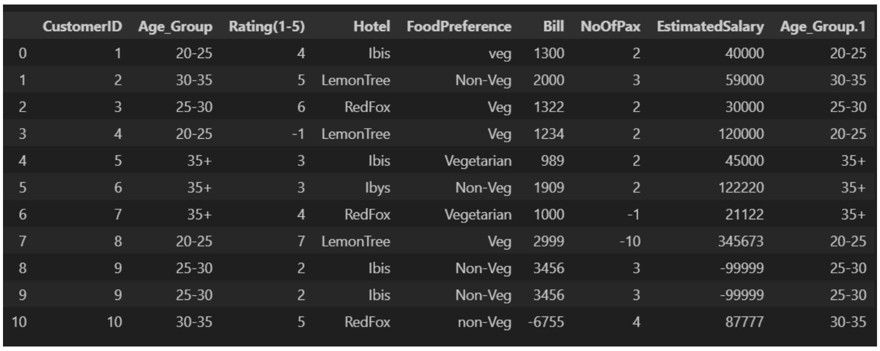
Algorithm:

1. Load the dataset, **remove duplicates**, and reset the index.
2. Drop the redundant Age_Group.1 column.
3. Replace negative/out-of-range numerical values in Bill, EstimatedSalary, Rating(1-5), and NoOfPax with NaN.
4. **Standardize inconsistent** categories (e.g., Ibys to Ibis,veg to Veg).
5. **Impute missing numerical continuous data** using the **mean** (Bill, EstimatedSalary).
6. **Impute missing numerical discrete data** using the **median** (NoOfPax, Rating(1-5)).

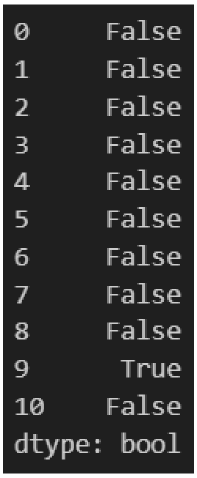
Code:

```
import numpy as np

import pandas as pd

df = pd.read_csv("Hotel_Dataset.csv")

df.drop_duplicates(inplace=True)

index=np.array(list(range(0,len(df))))

df.set_index(index,inplace=True)

df.drop(['Age_Group.1'],axis=1,inplace=True)
df.CustomerID.loc[df.CustomerID<0]=np.nan

df.Bill.loc[df.Bill<0]=np.nan

df.EstimatedSalary.loc[df.EstimatedSalary<0]=np.nan

df['NoOfPax'].loc[(df['NoOfPax']<1) | (df['NoOfPax']>20)]=np.nan

df.Hotel.replace(['Ibys'],'Ibis',inplace=True)

df.FoodPreference.replace(['Vegetarian','veg'],'Veg',inplace=True)

df.FoodPreference.replace(['non-Veg'],'Non-Veg',inplace=True)

df.EstimatedSalary.fillna(round(df.EstimatedSalary.mean()),inplace=True)

df.NoOfPax.fillna(round(df.NoOfPax.median()),inplace=True)

df['Rating(1-5)'].fillna(round(df['Rating(1-5)'].median()), inplace=True)

df.Bill.fillna(round(df.Bill.mean()),inplace=True)

print(df)
```

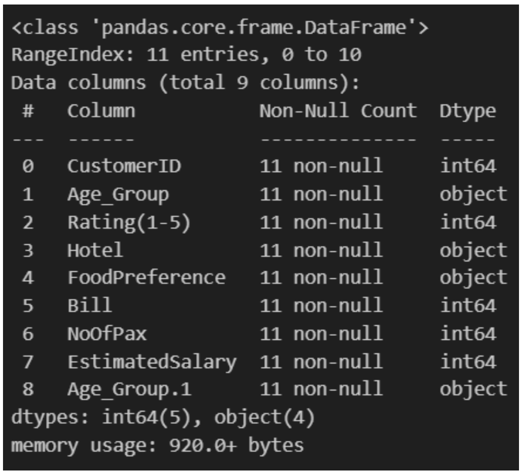
Output:



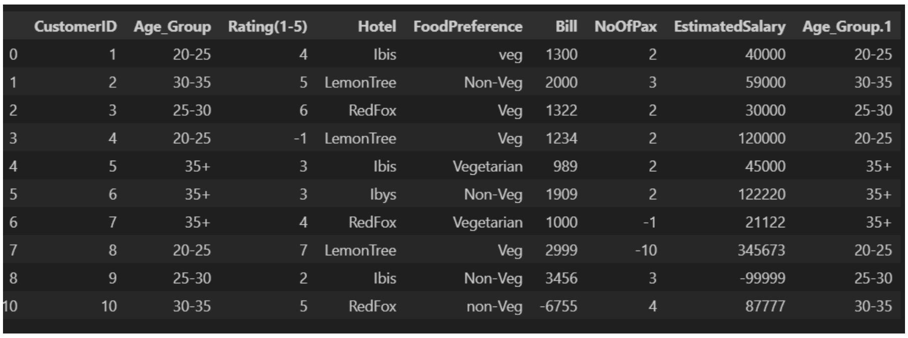
	CustomerID	Age_Group	Rating(1-5)	Hotel	FoodPreference	Bill	NoOfPax	EstimatedSalary	Age_Group.1
0	1	20-25	4	Ibis	veg	1300	2	40000	20-25
1	2	30-35	5	LemonTree	Non-Veg	2000	3	59000	30-35
2	3	25-30	6	RedFox	Veg	1322	2	30000	25-30
3	4	20-25	-1	LemonTree	Veg	1234	2	120000	20-25
4	5	35+	3	Ibis	Vegetarian	989	2	45000	35+
5	6	35+	3	Ibys	Non-Veg	1909	2	122220	35+
6	7	35+	4	RedFox	Vegetarian	1000	-1	21122	35+
7	8	20-25	7	LemonTree	Veg	2999	-10	345673	20-25
8	9	25-30	2	Ibis	Non-Veg	3456	3	-99999	25-30
9	9	25-30	2	Ibis	Non-Veg	3456	3	-99999	25-30
10	10	30-35	5	RedFox	non-Veg	-6755	4	87777	30-35



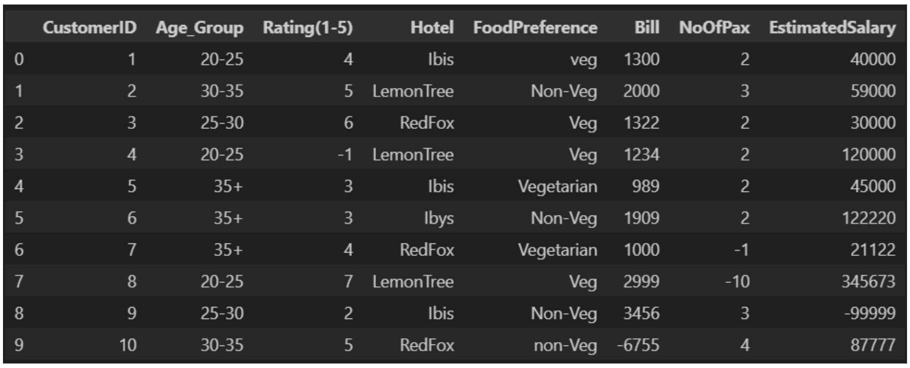
```
0     False
1     False
2     False
3     False
4     False
5     False
6     False
7     False
8     False
9      True
10    False
dtype: bool
```



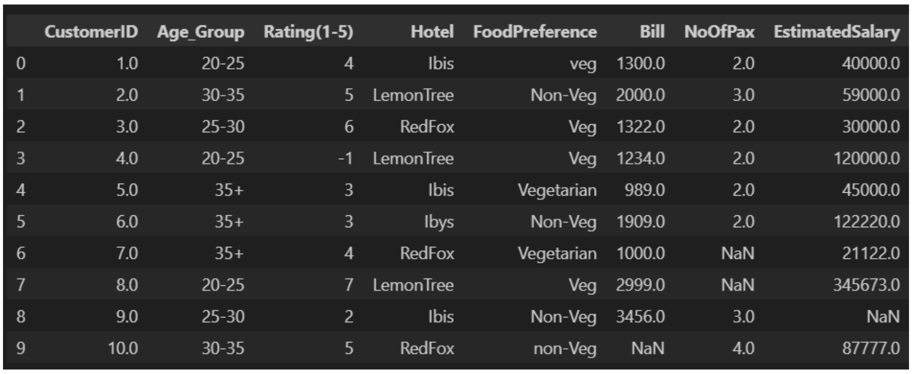
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 11 entries, 0 to 10
Data columns (total 9 columns):
 #   Column           Non-Null Count  Dtype
---  ------           --------------  -----
 0   CustomerID       11 non-null     int64
 1   Age_Group        11 non-null     object
 2   Rating(1-5)      11 non-null     int64
 3   Hotel            11 non-null     object
 4   FoodPreference   11 non-null     object
 5   Bill             11 non-null     int64
 6   NoOfPax          11 non-null     int64
 7   EstimatedSalary  11 non-null     int64
 8   Age_Group.1      11 non-null     object
dtypes: int64(5), object(4)
memory usage: 920.0+ bytes
```



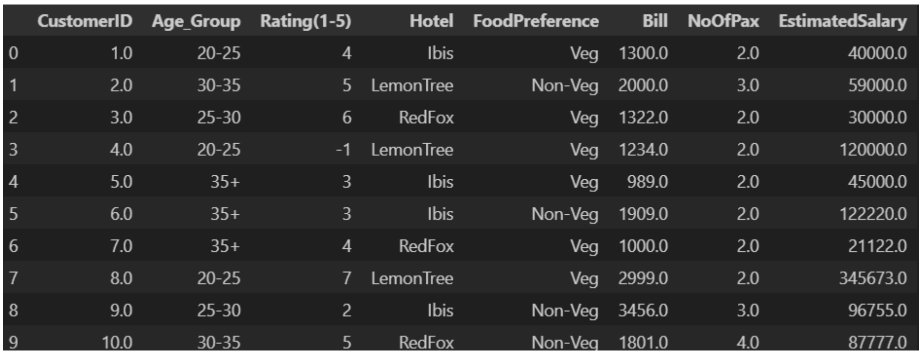
```
    CustomerID Age_Group  Rating(1-5)       Hotel FoodPreference  Bill  NoOfPax  EstimatedSalary Age_Group.1
0            1     20-25            4        Ibis            veg  1300        2            40000       20-25
1            2     30-35            5  LemonTree        Non-Veg  2000        3            59000       30-35
2            3     25-30            6      RedFox            Veg  1322        2            30000       25-30
3            4     20-25           -1  LemonTree            Veg  1234        2           120000       20-25
4            5       35+            3        Ibis     Vegetarian   989        2            45000         35+
5            6       35+            3        Ibys        Non-Veg  1909        2           122220         35+
6            7       35+            4      RedFox     Vegetarian  1000       -1            21122         35+
7            8     20-25            7  LemonTree            Veg  2999      -10           345673       20-25
8            9     25-30            2        Ibis        Non-Veg  3456        3           -99999       25-30
10          10     30-35            5      RedFox        non-Veg -6755        4            87777       30-35
```



```
   CustomerID Age_Group  Rating(1-5)       Hotel FoodPreference  Bill  NoOfPax  EstimatedSalary
0           1     20-25            4        Ibis            veg  1300        2            40000
1           2     30-35            5  LemonTree        Non-Veg  2000        3            59000
2           3     25-30            6      RedFox            Veg  1322        2            30000
3           4     20-25           -1  LemonTree            Veg  1234        2           120000
4           5       35+            3        Ibis     Vegetarian   989        2            45000
5           6       35+            3        Ibys        Non-Veg  1909        2           122220
6           7       35+            4      RedFox     Vegetarian  1000       -1            21122
7           8     20-25            7  LemonTree            Veg  2999      -10           345673
8           9     25-30            2        Ibis        Non-Veg  3456        3           -99999
9          10     30-35            5      RedFox        non-Veg -6755        4            87777
```



```
   CustomerID Age_Group  Rating(1-5)       Hotel FoodPreference    Bill  NoOfPax  EstimatedSalary
0         1.0     20-25            4        Ibis            veg  1300.0      2.0          40000.0
1         2.0     30-35            5  LemonTree        Non-Veg  2000.0      3.0          59000.0
2         3.0     25-30            6      RedFox            Veg  1322.0      2.0          30000.0
3         4.0     20-25           -1  LemonTree            Veg  1234.0      2.0         120000.0
4         5.0       35+            3        Ibis     Vegetarian   989.0      2.0          45000.0
5         6.0       35+            3        Ibys        Non-Veg  1909.0      2.0         122220.0
6         7.0       35+            4      RedFox     Vegetarian  1000.0      NaN          21122.0
7         8.0     20-25            7  LemonTree            Veg  2999.0      NaN         345673.0
8         9.0     25-30            2        Ibis        Non-Veg  3456.0      3.0              NaN
9        10.0     30-35            5      RedFox        non-Veg     NaN      4.0          87777.0
```



```
   CustomerID Age_Group  Rating(1-5)       Hotel FoodPreference    Bill  NoOfPax  EstimatedSalary
0         1.0     20-25            4        Ibis            Veg  1300.0      2.0          40000.0
1         2.0     30-35            5  LemonTree        Non-Veg  2000.0      3.0          59000.0
2         3.0     25-30            6      RedFox            Veg  1322.0      2.0          30000.0
3         4.0     20-25           -1  LemonTree            Veg  1234.0      2.0         120000.0
4         5.0       35+            3        Ibis            Veg   989.0      2.0          45000.0
5         6.0       35+            3        Ibis        Non-Veg  1909.0      2.0         122220.0
6         7.0       35+            4      RedFox            Veg  1000.0      2.0          21122.0
7         8.0     20-25            7  LemonTree            Veg  2999.0      2.0         345673.0
8         9.0     25-30            2        Ibis        Non-Veg  3456.0      3.0          96755.0
9        10.0     30-35            5      RedFox        Non-Veg  1801.0      4.0          87777.0
```

Result:

The experiment successfully **cleaned the dataset** by removing duplicates, standardizing inconsistent categories, and replacing inappropriate numerical values with NaN. All missing values were then **imputed** using the **mean** (continuous data) or **median** (discrete data). Thus the python program was executed successfully, and the output is verified.