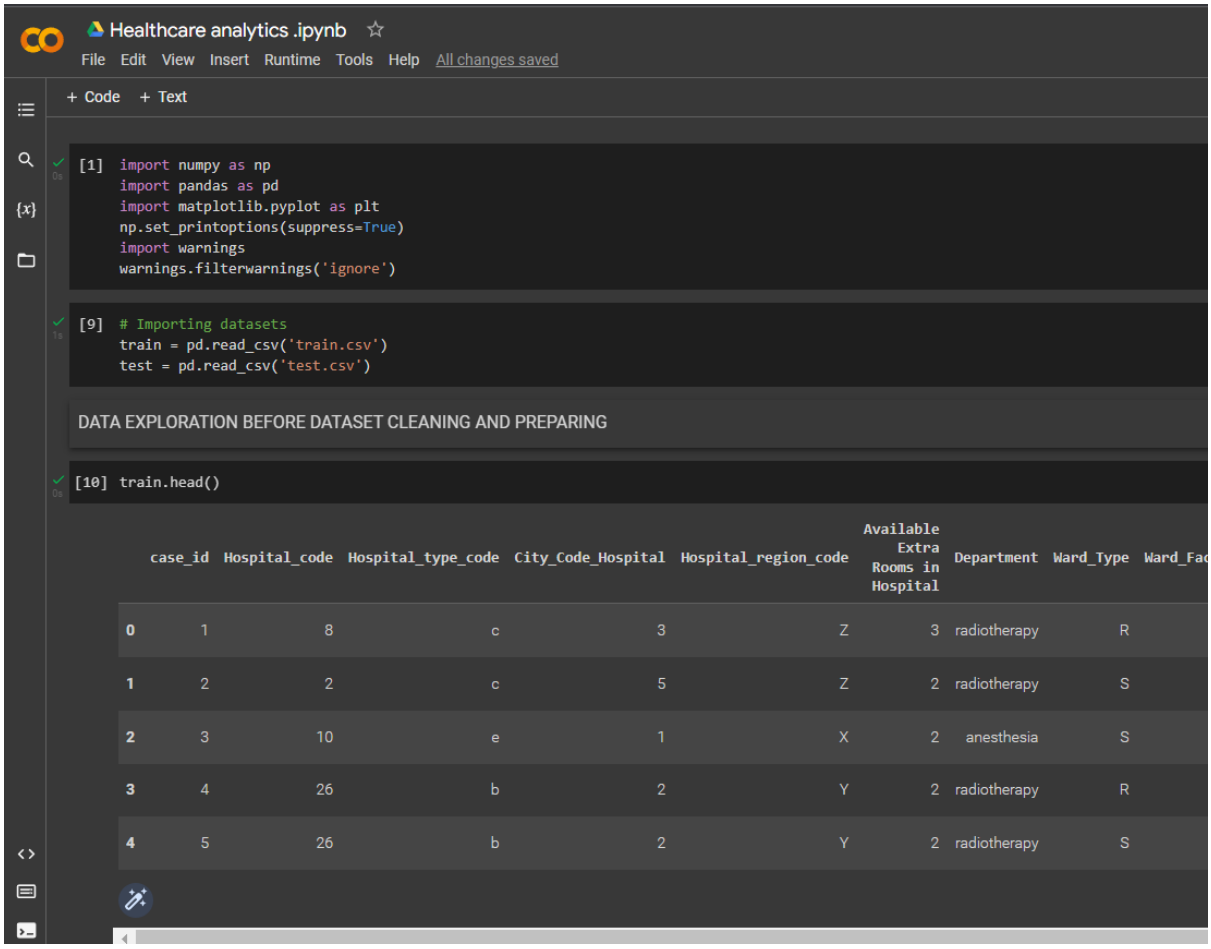
SPRINT 2

Date	07-11-2022
Team ID	PNT2022TMID53225
Project Title	Analytics for Hospitals' Health-Care Data
Team Members	Kamalesh P, Krishnaraj K, Ashwath S, Dheeraaj P

Data Exploration in python



Healthcare analytics .ipynb

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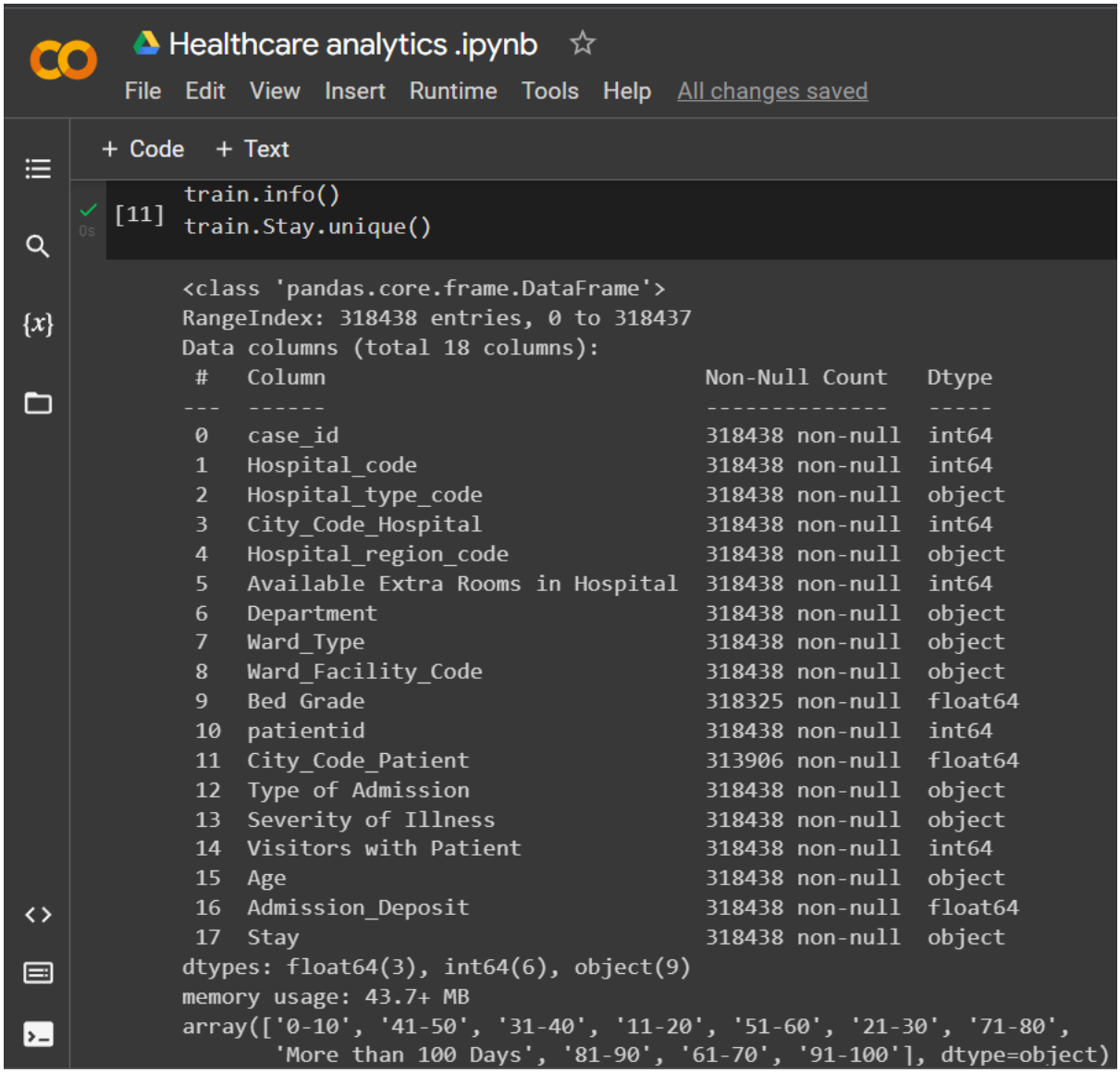
```
[1] import numpy as np
    import pandas as pd
    import matplotlib.pyplot as plt
    np.set_printoptions(suppress=True)
    import warnings
    warnings.filterwarnings('ignore')
```

```
[9] # Importing datasets
    train = pd.read_csv('train.csv')
    test = pd.read_csv('test.csv')
```

DATA EXPLORATION BEFORE DATASET CLEANING AND PREPARING

```
[10] train.head()
```

	case_id	Hospital_code	Hospital_type_code	City_Code_Hospital	Hospital_region_code	Available Extra Rooms in Hospital	Department	Ward_Type	Ward_Fac
0	1	8	c	3	Z	3	radiotherapy	R	
1	2	2	c	5	Z	2	radiotherapy	S	
2	3	10	e	1	X	2	anesthesia	S	
3	4	26	b	2	Y	2	radiotherapy	R	
4	5	26	b	2	Y	2	radiotherapy	S	


Healthcare analytics .ipynb
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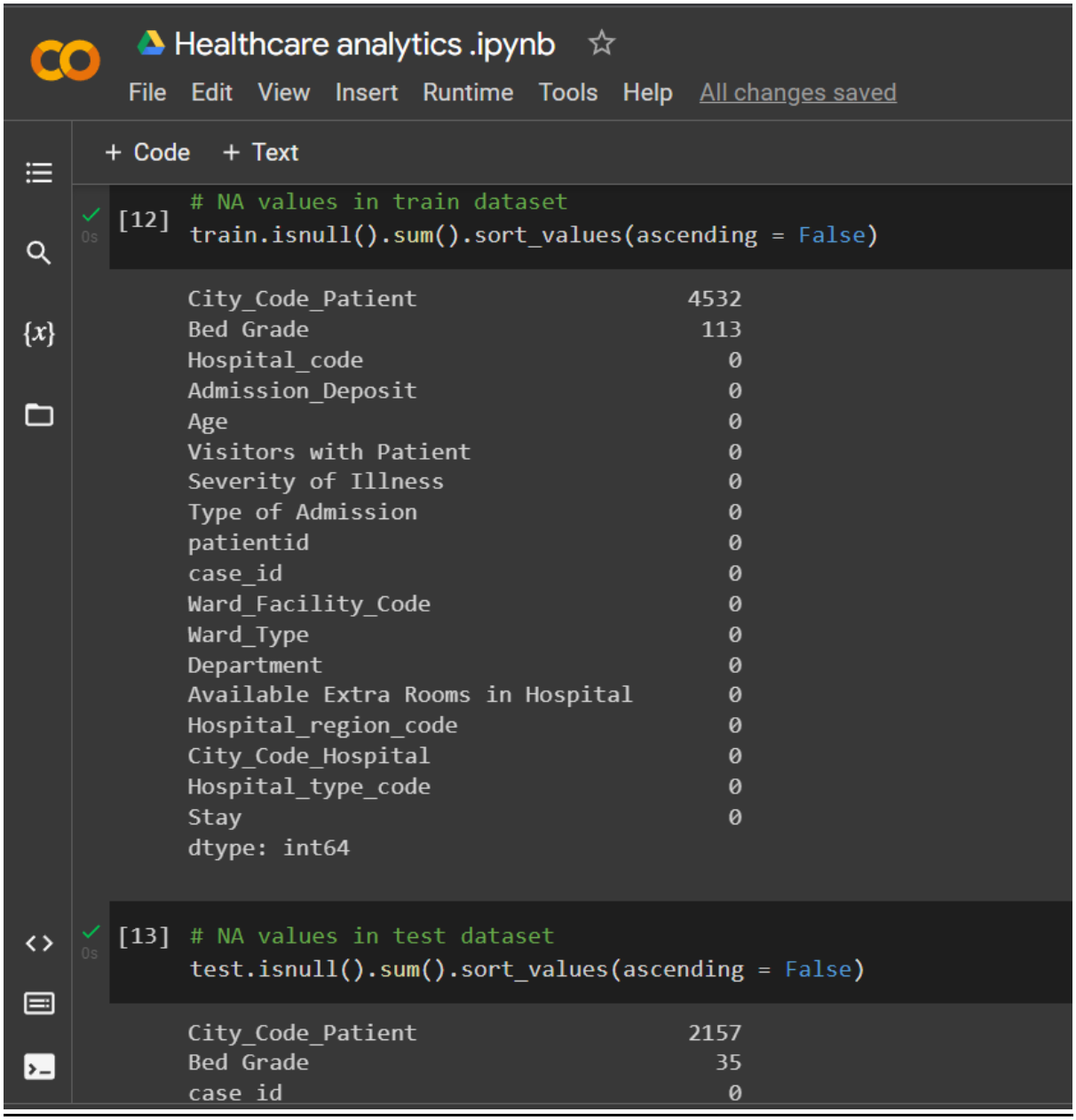
+ Code + Text
[11]
train.info()
train.Stay.unique()
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 318438 entries, 0 to 318437
Data columns (total 18 columns):
Column Non-Null Count Dtype
--- ------ -------------- -----
0 case_id 318438 non-null int64
1 Hospital_code 318438 non-null int64
2 Hospital_type_code 318438 non-null object
3 City_Code_Hospital 318438 non-null int64
4 Hospital_region_code 318438 non-null object
5 Available Extra Rooms in Hospital 318438 non-null int64
6 Department 318438 non-null object
7 Ward_Type 318438 non-null object
8 Ward_Facility_Code 318438 non-null object
9 Bed Grade 318325 non-null float64
10 patientid 318438 non-null int64
11 City_Code_Patient 313906 non-null float64
12 Type of Admission 318438 non-null object
13 Severity of Illness 318438 non-null object
14 Visitors with Patient 318438 non-null int64
15 Age 318438 non-null object
16 Admission_Deposit 318438 non-null float64
17 Stay 318438 non-null object
dtypes: float64(3), int64(6), object(9)
memory usage: 43.7+ MB
array(['0-10', '41-50', '31-40', '11-20', '51-60', '21-30', '71-80',
'More than 100 Days', '81-90', '61-70', '91-100'], dtype=object)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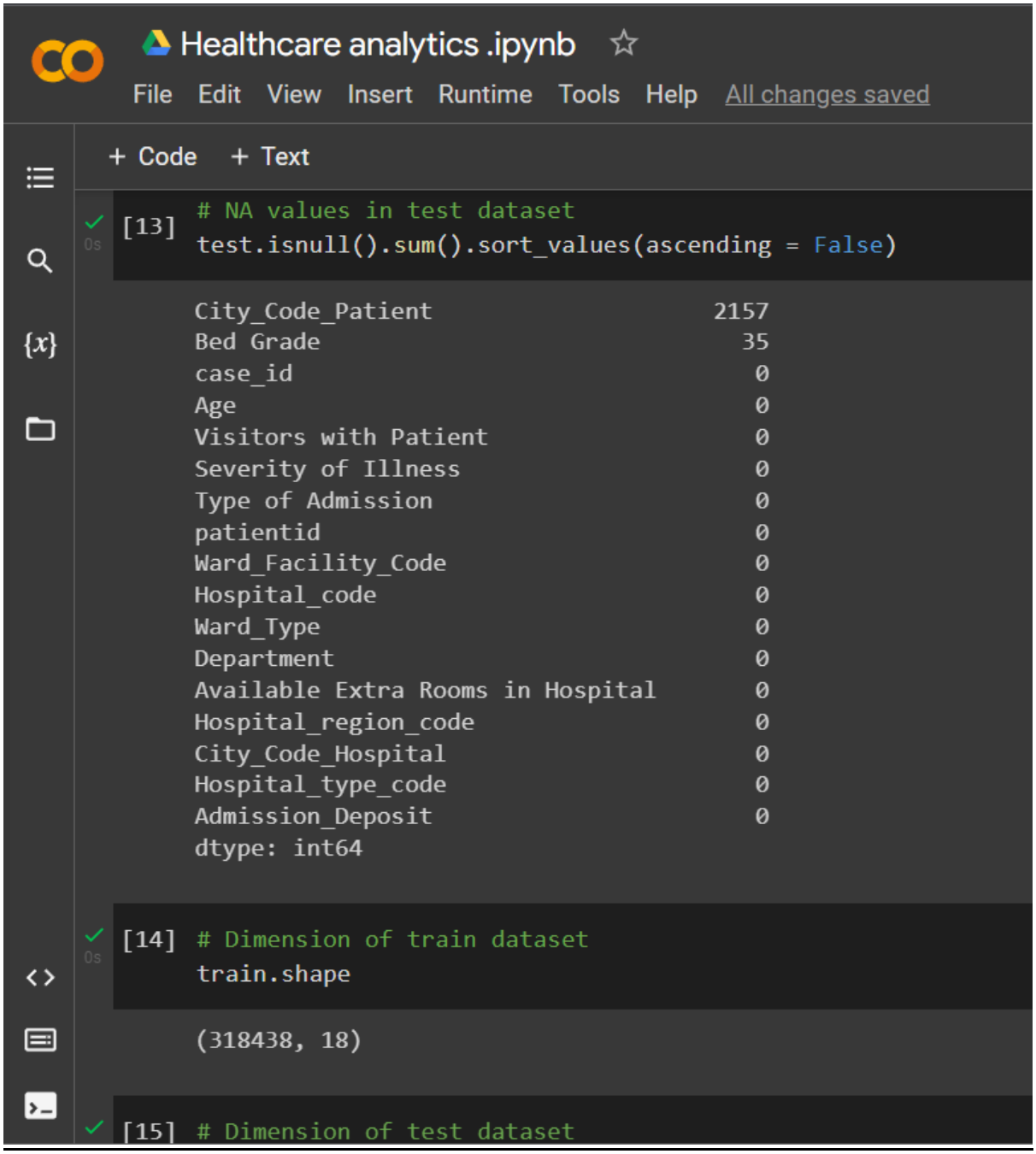
+ Code + Text
[12] # NA values in train dataset
train.isnull().sum().sort_values(ascending = False)
City_Code_Patient 4532
Bed Grade 113
Hospital_code 0
Admission_Deposit 0
Age 0
Visitors with Patient 0
Severity of Illness 0
Type of Admission 0
patientid 0
case_id 0
Ward_Facility_Code 0
Ward_Type 0
Department 0
Available Extra Rooms in Hospital 0
Hospital_region_code 0
City_Code_Hospital 0
Hospital_type_code 0
Stay 0
dtype: int64
[13] # NA values in test dataset
test.isnull().sum().sort_values(ascending = False)
City_Code_Patient 2157
Bed Grade 35
case_id 0


Healthcare analytics .ipynb
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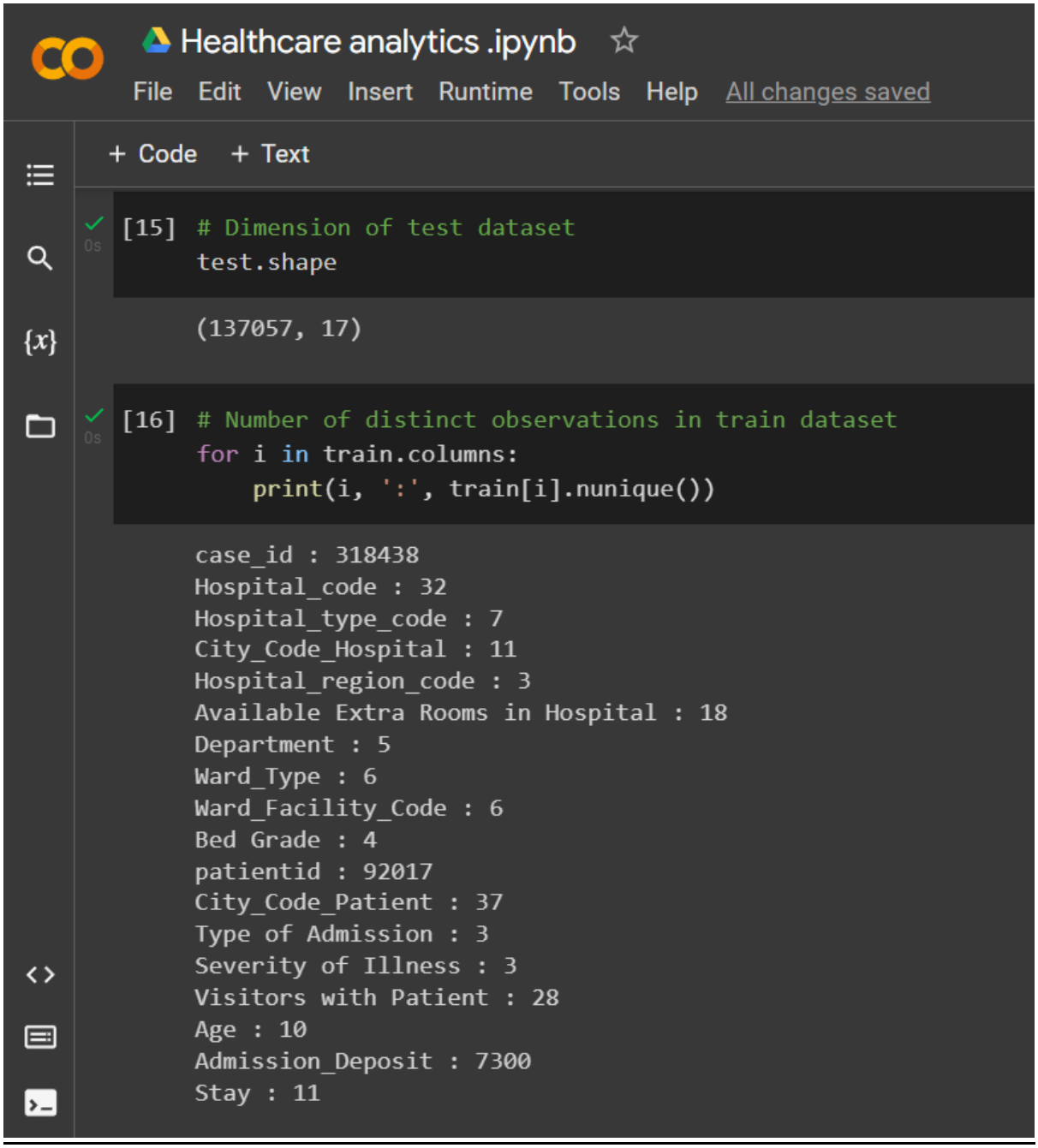
[13] # NA values in test dataset
test.isnull().sum().sort_values(ascending = False)
City_Code_Patient 2157
Bed Grade 35
case_id 0
Age 0
Visitors with Patient 0
Severity of Illness 0
Type of Admission 0
patientid 0
Ward_Facility_Code 0
Hospital_code 0
Ward_Type 0
Department 0
Available Extra Rooms in Hospital 0
Hospital_region_code 0
City_Code_Hospital 0
Hospital_type_code 0
Admission_Deposit 0
dtype: int64
[14] # Dimension of train dataset
train.shape
(318438, 18)
[15] # Dimension of test dataset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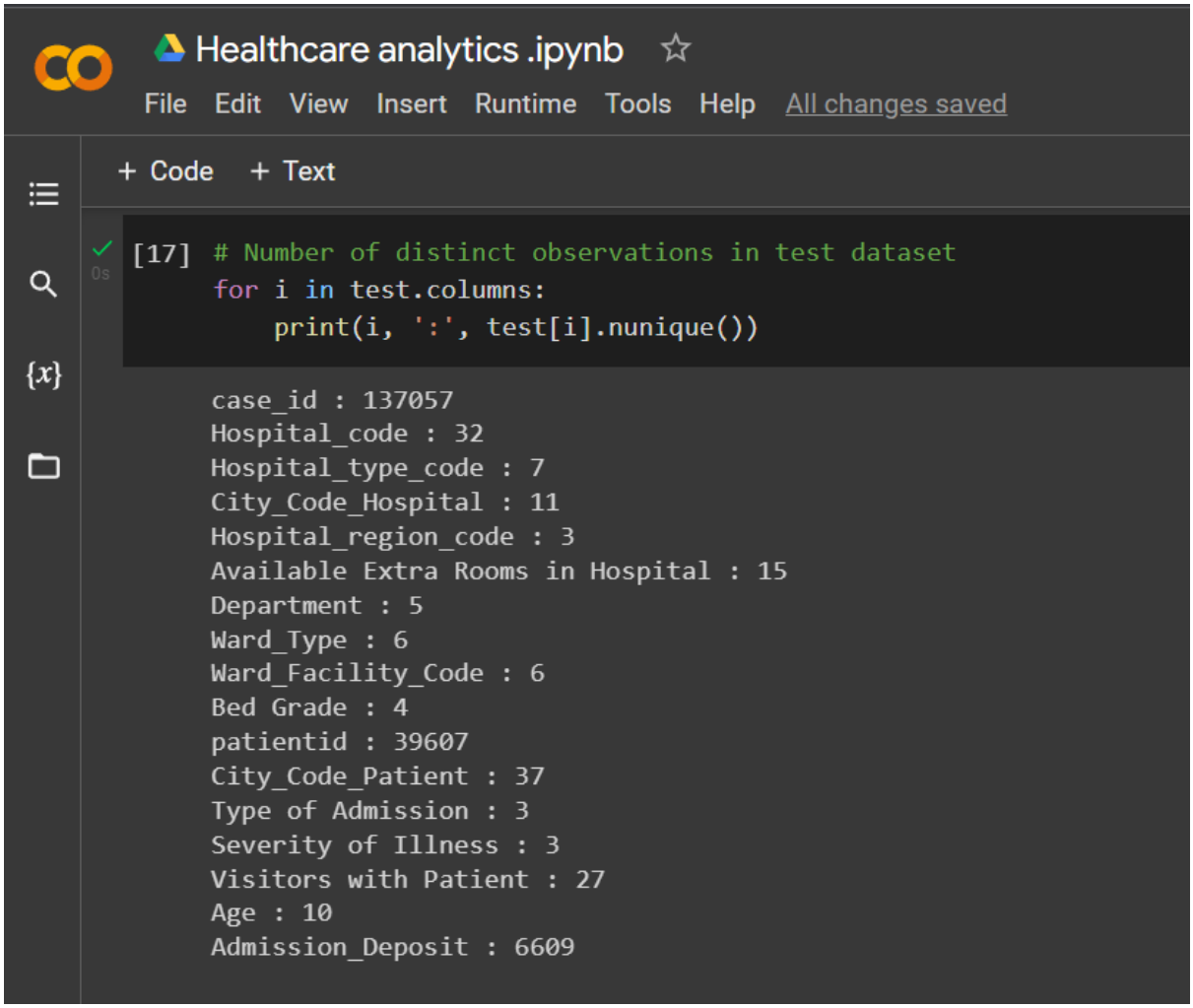
[15] # Dimension of test dataset
test.shape
(137057, 17)
[16] # Number of distinct observations in train dataset
for i in train.columns:
print(i, ':', train[i].nunique())
case_id : 318438
Hospital_code : 32
Hospital_type_code : 7
City_Code_Hospital : 11
Hospital_region_code : 3
Available Extra Rooms in Hospital : 18
Department : 5
Ward_Type : 6
Ward_Facility_Code : 6
Bed Grade : 4
patientid : 92017
City_Code_Patient : 37
Type of Admission : 3
Severity of Illness : 3
Visitors with Patient : 28
Age : 10
Admission_Deposit : 7300
Stay : 11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[17] # Number of distinct observations in test dataset
for i in test.columns:
print(i, ':', test[i].nunique())
case_id : 137057
Hospital_code : 32
Hospital_type_code : 7
City_Code_Hospital : 11
Hospital_region_code : 3
Available Extra Rooms in Hospital : 15
Department : 5
Ward_Type : 6
Ward_Facility_Code : 6
Bed Grade : 4
patientid : 39607
City_Code_Patient : 37
Type of Admission : 3
Severity of Illness : 3
Visitors with Patient : 27
Age : 10
Admission_Deposit : 6609

DATA PREPARATION

Healthcare analytics .ipynb

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DATA PREPARATION

```
[18] #Replacing NA values in Bed Grade Column for both Train and Test datssets
     train['Bed Grade'].fillna(train['Bed Grade'].mode()[0], inplace = True)
     test['Bed Grade'].fillna(test['Bed Grade'].mode()[0], inplace = True)
```

```
[19] #Replacing NA values in  City_Code_Patient Column for both Train and Test datssets
     train['City_Code_Patient'].fillna(train['City_Code_Patient'].mode()[0], inplace = True)
     test['City_Code_Patient'].fillna(test['City_Code_Patient'].mode()[0], inplace = True)
```

```
[20] # Label Encoding Stay column in train dataset
     from sklearn.preprocessing import LabelEncoder
     le = LabelEncoder()
     train['Stay'] = le.fit_transform(train['Stay'].astype('str'))
```

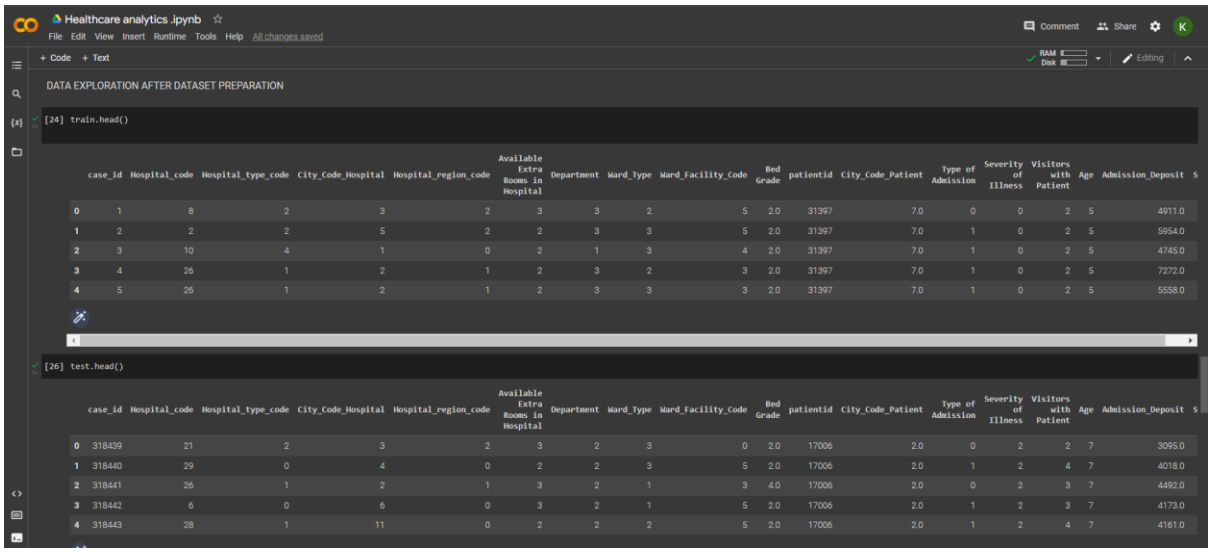
```
[21] #Imputing dummy Stay column in test datset to concatenate with train dataset
     test['Stay'] = -1
     df = pd.concat([train, test])
     df.shape
```

```
(455495, 18)
```

```
[22] #Label Encoding all the columns in Train and test datasets
     for i in ['Hospital_type_code', 'Hospital_region_code', 'Department',
               'Ward_Type', 'Ward_Facility_Code', 'Type of Admission', 'Severity of Illness', 'Age']:
         le = LabelEncoder()
         df[i] = le.fit_transform(df[i].astype(str))
```

```
[23] #Separating Train and Test Datasets
     train = df[df['Stay']!=-1]
     test = df[df['Stay']==-1]
```

Data exploration after preparing:



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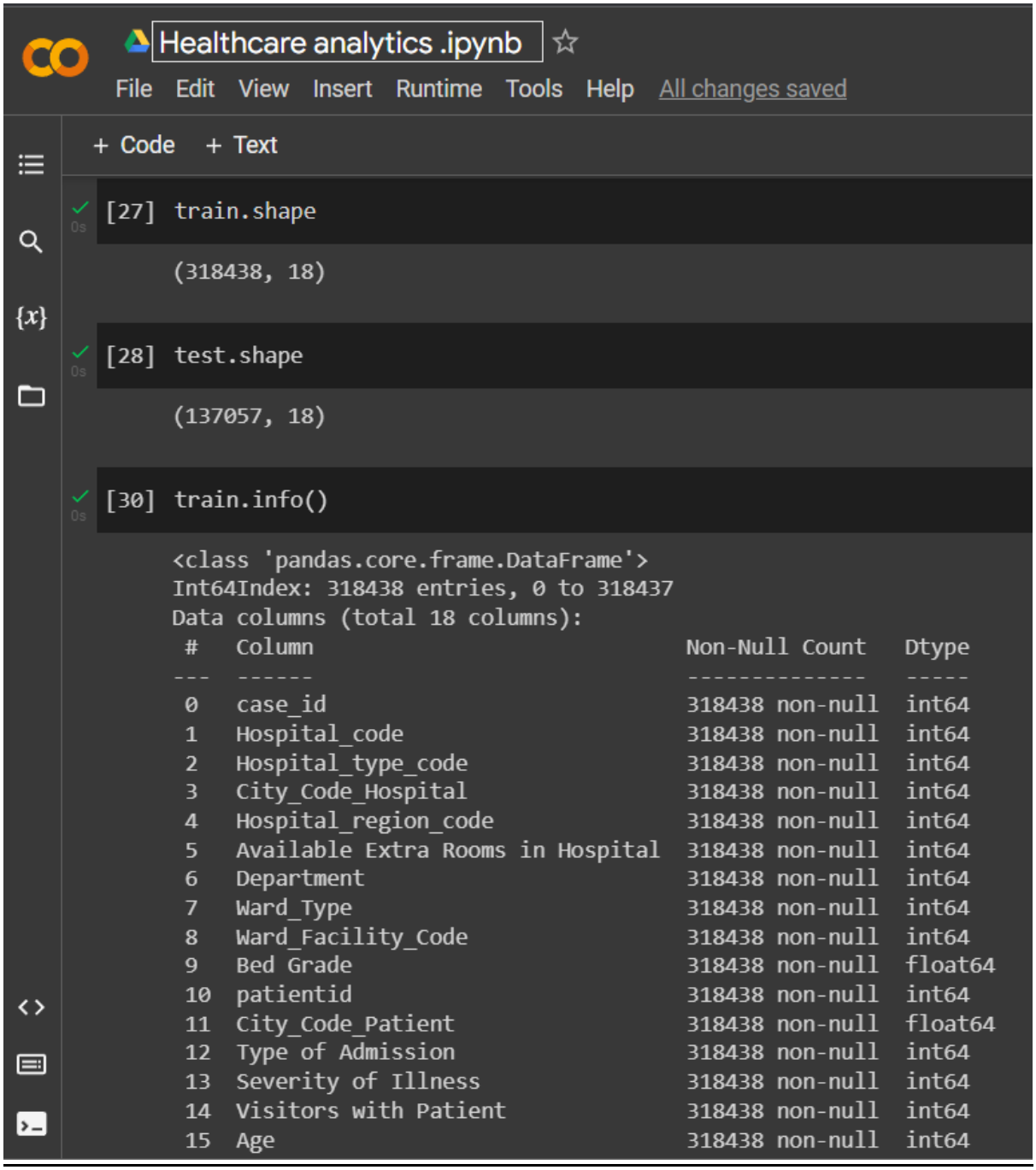
DATA EXPLORATION AFTER DATASET PREPARATION

[24] train.head()

	case_id	Hospital_code	Hospital_type_code	City_Code_Hospital	Hospital_region_code	Available Extra Rooms in Hospital	Department	Ward_Type	Ward_Facility_Code	Bed Grade	patientid	City_Code_Patient	Type of Admission	Severity of Illness	Visitors with Patient	Age	Admission_Deposit	S
0	1	8	2	3	2	3	3	2	5	2.0	31397	7.0	0	0	2	5	4911.0	
1	2	2	2	5	2	2	3	3	5	2.0	31397	7.0	1	0	2	5	5954.0	
2	3	10	4	1	0	2	1	3	4	2.0	31397	7.0	1	0	2	5	4745.0	
3	4	26	1	2	1	2	3	2	3	2.0	31397	7.0	1	0	2	5	7272.0	
4	5	26	1	2	1	2	3	3	3	2.0	31397	7.0	1	0	2	5	5558.0	

[26] test.head()

	case_id	Hospital_code	Hospital_type_code	City_Code_Hospital	Hospital_region_code	Available Extra Rooms in Hospital	Department	Ward_Type	Ward_Facility_Code	Bed Grade	patientid	City_Code_Patient	Type of Admission	Severity of Illness	Visitors with Patient	Age	Admission_Deposit	S
0	318439	21	2	3	2	3	2	3	0	2.0	17006	2.0	0	2	2	7	3095.0	
1	318440	29	0	4	0	2	2	3	5	2.0	17006	2.0	1	2	4	7	4018.0	
2	318441	26	1	2	1	3	2	1	3	4.0	17006	2.0	0	2	3	7	4492.0	
3	318442	6	0	6	0	3	2	1	5	2.0	17006	2.0	1	2	3	7	4173.0	
4	318443	28	1	11	0	2	2	2	5	2.0	17006	2.0	1	2	4	7	4161.0	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File Edit View Insert Runtime Tools Help All changes saved
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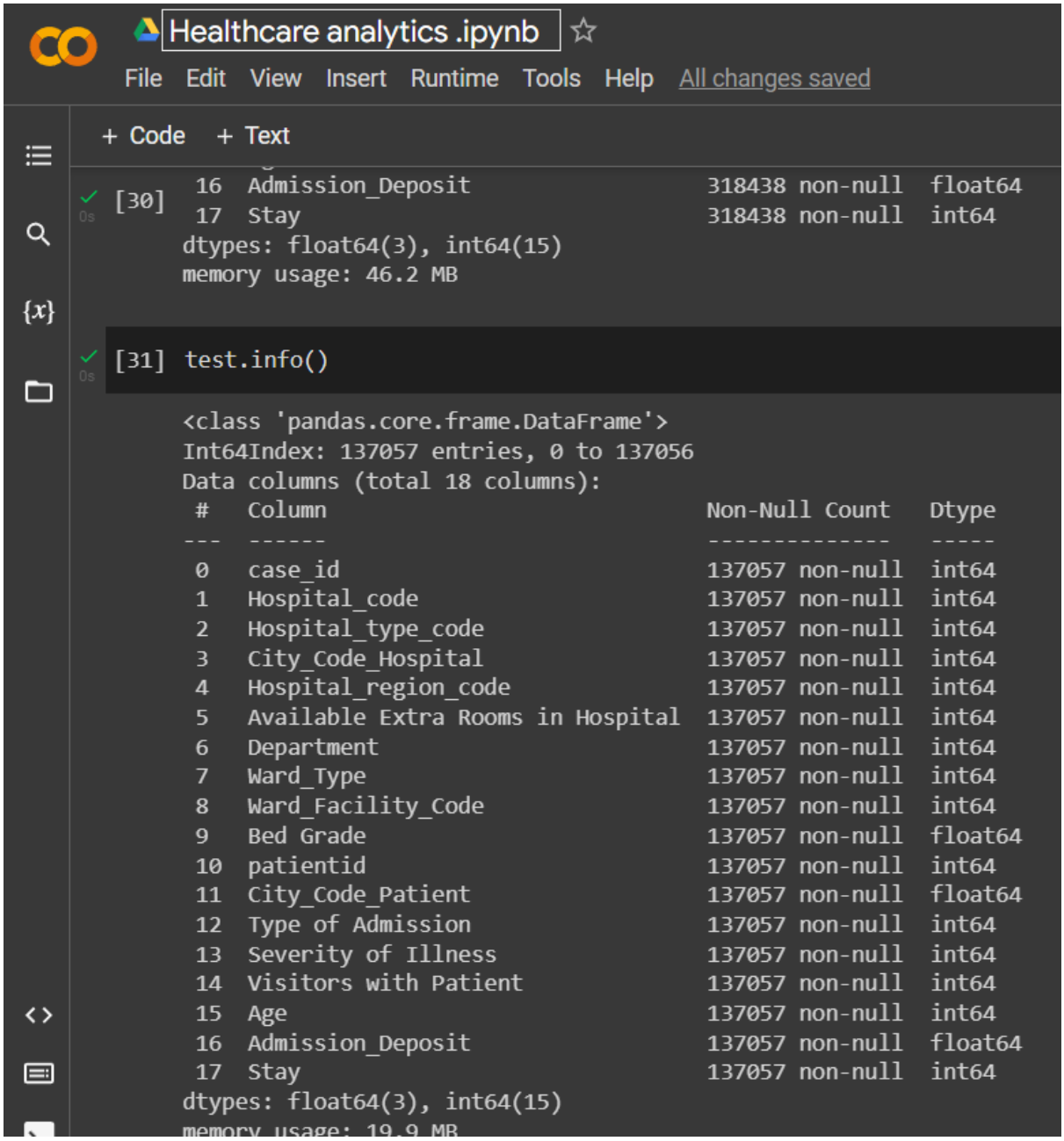
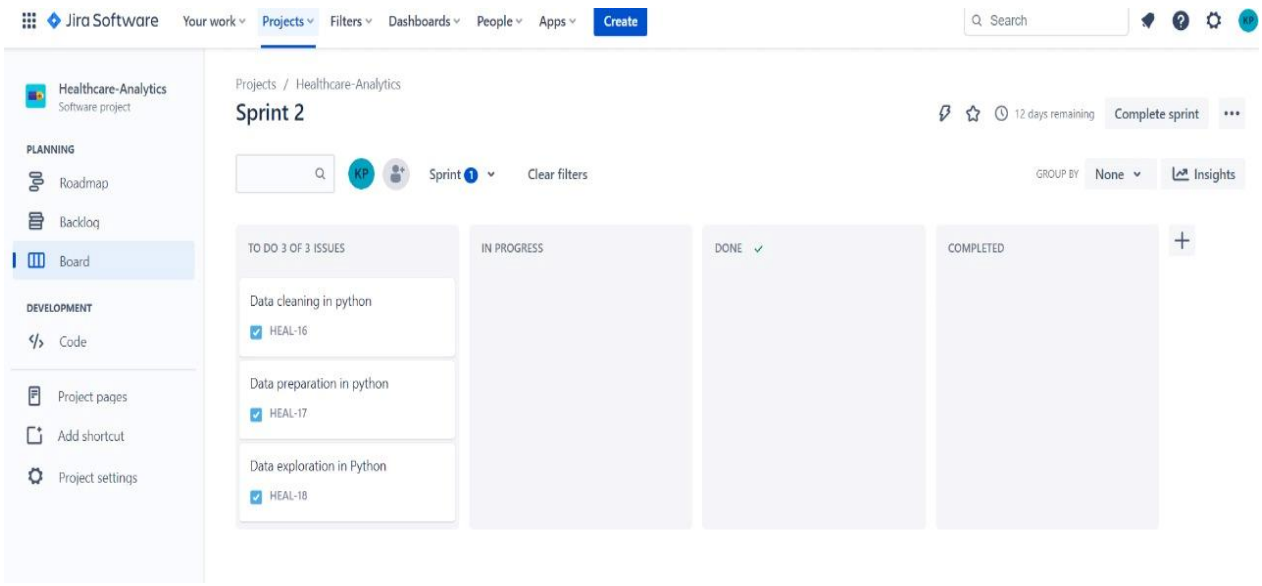
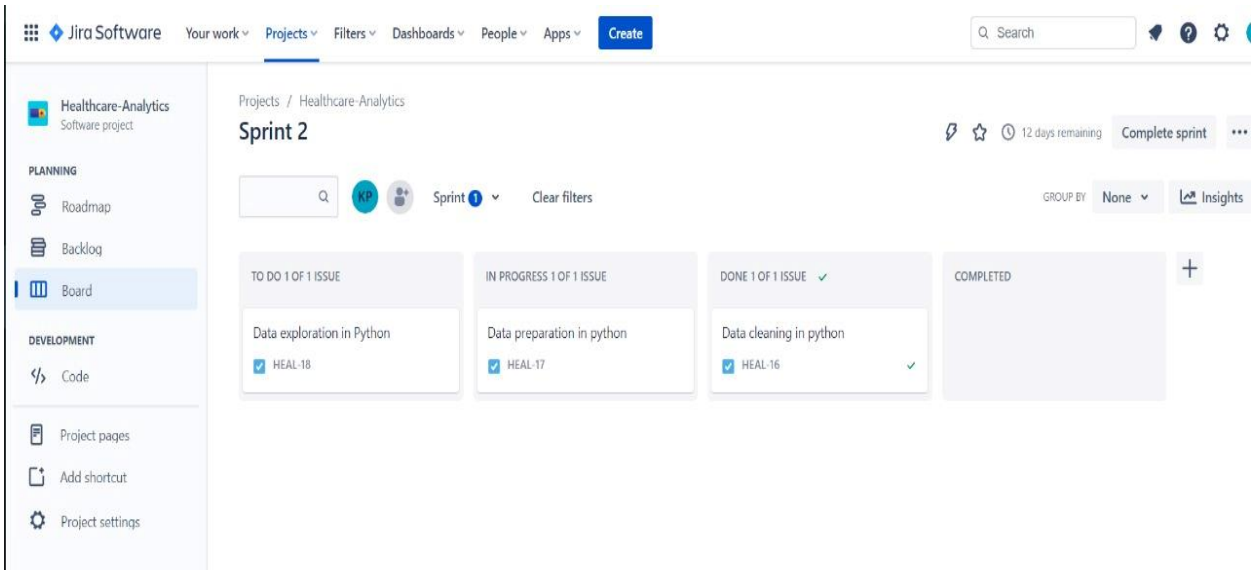
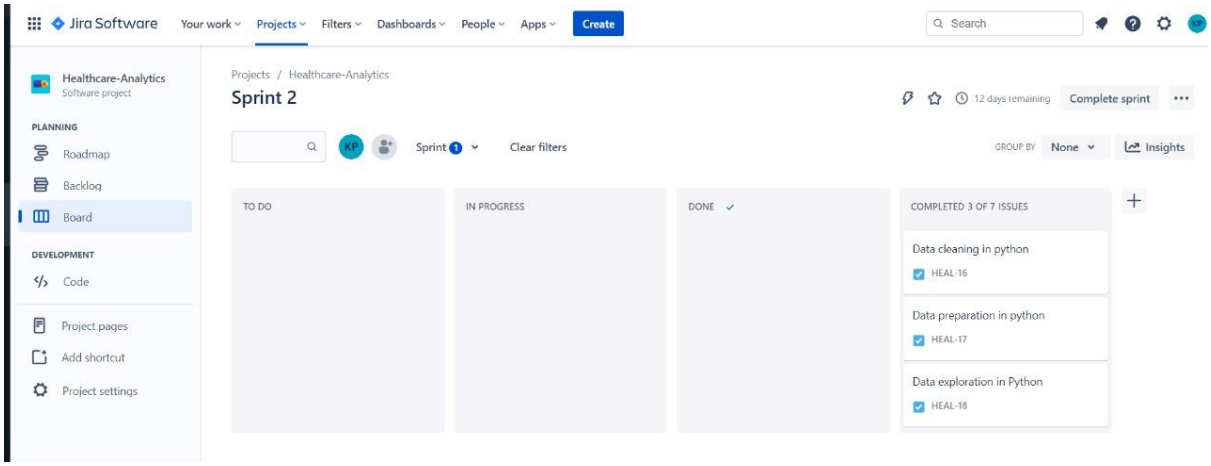
[27] train.shape
(318438, 18)
[28] test.shape
(137057, 18)
[30] train.info()
<class 'pandas.core.frame.DataFrame'>
Int64Index: 318438 entries, 0 to 318437
Data columns (total 18 columns):
Column Non-Null Count Dtype
--- ------ -------------- -----
0 case_id 318438 non-null int64
1 Hospital_code 318438 non-null int64
2 Hospital_type_code 318438 non-null int64
3 City_Code_Hospital 318438 non-null int64
4 Hospital_region_code 318438 non-null int64
5 Available Extra Rooms in Hospital 318438 non-null int64
6 Department 318438 non-null int64
7 Ward_Type 318438 non-null int64
8 Ward_Facility_Code 318438 non-null int64
9 Bed Grade 318438 non-null float64
10 patientid 318438 non-null int64
11 City_Code_Patient 318438 non-null float64
12 Type of Admission 318438 non-null int64
13 Severity of Illness 318438 non-null int64
14 Visitors with Patient 318438 non-null int64
15 Age 318438 non-null int64


Healthcare analytics .ipynb
File Edit View Insert Runtime Tools Help All changes saved
+ Code + Text
[30]
16 Admission_Deposit 318438 non-null float64
17 Stay 318438 non-null int64
dtypes: float64(3), int64(15)
memory usage: 46.2 MB
[31] test.info()
<class 'pandas.core.frame.DataFrame'>
Int64Index: 137057 entries, 0 to 137056
Data columns (total 18 columns):
Column Non-Null Count Dtype
--- ------ -------------- -----
0 case_id 137057 non-null int64
1 Hospital_code 137057 non-null int64
2 Hospital_type_code 137057 non-null int64
3 City_Code_Hospital 137057 non-null int64
4 Hospital_region_code 137057 non-null int64
5 Available Extra Rooms in Hospital 137057 non-null int64
6 Department 137057 non-null int64
7 Ward_Type 137057 non-null int64
8 Ward_Facility_Code 137057 non-null int64
9 Bed Grade 137057 non-null float64
10 patientid 137057 non-null int64
11 City_Code_Patient 137057 non-null float64
12 Type of Admission 137057 non-null int64
13 Severity of Illness 137057 non-null int64
14 Visitors with Patient 137057 non-null int64
15 Age 137057 non-null int64
16 Admission_Deposit 137057 non-null float64
17 Stay 137057 non-null int64
dtypes: float64(3), int64(15)
memory usage: 19.9 MB

Jira Sprint 2 Tracking:







“Uploaded ipynb file in the sprint 2 folder in github.”