

Courses

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Practice

Data Structures

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Python

Competitive Programming

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Puzzles

GFG School

Projects

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Grid

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Difference between loc() and iloc() in Pandas DataFrame

Select Rows & Columns by Name or Index in Pandas DataFrame using [], loc & iloc

Decimal Functions in Python | Set 2 (logical\_and(), normalize(), quantize(), rotate() ...)

NetworkX : Python software package for study of complex networks

Directed Graphs, Multigraphs and Visualization in Networkx

Python | Visualize graphs generated in NetworkX using Matplotlib

Visualize Graphs in Python

Graph Plotting in Python | Set 1

Graph Plotting in Python | Set 2

Graph Plotting in Python | Set 3

Plotting graph using Seaborn | Python

Box plot visualization with Pandas and Seaborn

Box Plot in Python using Matplotlib

How to get column names in Pandas dataframe

Python program to find number of days between two given dates

Python | Difference between two dates (in minutes) using datetime.timedelta() method

Python | datetime.timedelta() function

Comparing dates in Python

Python | Convert string to DateTime and vice-versa

Convert the column type from string to datetime format in Pandas dataframe

Adding new column to existing DataFrame in Pandas

Create a new column in Pandas DataFrame based on the existing columns

Python | Creating a Pandas dataframe column based on a given condition

Selecting rows in pandas DataFrame based on conditions

Python | Pandas DataFrame.where()

Python map() function

Taking input in Python

Read JSON file using Python

Difference between loc() and iloc() in Pandas DataFrame

Difficulty Level : Easy

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Pandas library of python is very useful for the manipulation of mathematical data and is widely used in the field of machine learning. It comprises of many methods for its proper functioning. **loc()** and **iloc()** are one of those methods. These are used in slicing of data from the Pandas DataFrame. They help in the convenient selection of data from the DataFrame. They are used in filtering the data according to some conditions. Working of both of these methods is explained in the sample dataset of cars.

```
# importing the module
import pandas as pd

# creating a sample dataframe
data = pd.DataFrame({'Brand' : ['Maruti', 'Hyundai', 'Tata',
                                'Mahindra', 'Maruti', 'Hyundai',
                                'Renault', 'Tata', 'Maruti'],
                    'Year' : [2012, 2014, 2011, 2015, 2012,
                                2016, 2014, 2018, 2019],
                    'Kms Driven' : [50000, 30000, 60000,
                                    25000, 10000, 40000,
                                    31000, 15000, 12000],
                    'City' : ['Gurgaon', 'Delhi', 'Mumbai',
                                'Delhi', 'Mumbai', 'Delhi',
                                'Mumbai', 'Chennai', 'Ghaziabad'],
                    'Mileage' : [28, 27, 25, 26, 28,
                                29, 24, 21, 24]})

# displaying the DataFrame
display(data)
```

Output :

	Brand	Year	Kms Driven	City	Mileage
0	Maruti	2012	50000	Gurgaon	28
1	Hyundai	2014	30000	Delhi	27
2	Tata	2011	60000	Mumbai	25
3	Mahindra	2015	25000	Delhi	26
4	Maruti	2012	10000	Mumbai	28
5	Hyundai	2016	40000	Delhi	29
6	Renault	2014	31000	Mumbai	24
7	Tata	2018	15000	Chennai	21
8	Maruti	2019	12000	Ghaziabad	24

**loc()** : loc() is label based data selecting method which means that we have to pass the name of the row or column which we want to select. This method includes the last element of the range passed in it, unlike iloc(). loc() can accept the boolean data unlike iloc(). Many operations can be performed using the loc() method like-

1. Selecting data according to some conditions :

```
# selecting cars with brand 'Maruti' and Mileage > 25
display(data.loc[(data.Brand == 'Maruti') & (data.Mileage > 25)])
```

Output :

	Brand	Year	Kms Driven	City	Mileage
0	Maruti	2012	50000	Gurgaon	28
4	Maruti	2012	10000	Mumbai	28

2. Selecting a range of rows from the DataFrame :

```
# selecting range of rows from 2 to 5
display(data.loc[2 : 5])
```

Output :

	Brand	Year	Kms Driven	City	Mileage
2	Tata	2011	60000	Mumbai	25
3	Mahindra	2015	25000	Delhi	26
4	Maruti	2012	10000	Mumbai	28
5	Hyundai	2016	40000	Delhi	29

3. Updating the value of any column :

```
# updating values of Mileage if Year < 2015
data.loc[(data.Year < 2015), ['Mileage']] = 22
display(data)
```

Output :

	Brand	Year	Kms Driven	City	Mileage
0	Maruti	2012	50000	Gurgaon	22
1	Hyundai	2014	30000	Delhi	22
2	Tata	2011	60000	Mumbai	22
3	Mahindra	2015	25000	Delhi	26
4	Maruti	2012	10000	Mumbai	22
5	Hyundai	2016	40000	Delhi	29
6	Renault	2014	31000	Mumbai	22
7	Tata	2018	15000	Chennai	21
8	Maruti	2019	12000	Ghaziabad	24

**iloc()** : iloc() is a indexed based selecting method which means that we have to pass integer index in the method to select specific row/column. This method does not include the last element of the range passed in it unlike loc(). iloc() does not accept the boolean data unlike loc(). Operations performed using iloc() are:

1. Selecting rows using integer indices:

```
# selecting 8th, 2th, 4th, and 7th index rows
display(data.iloc[[0, 2, 4, 7]])
```

Output :

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1/2

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0	Maruti	2012	50000	Gurgaon	22
2	Tata	2011	60000	Mumbai	22
4	Maruti	2012	10000	Mumbai	22
7	Tata	2018	15000	Chennai	21

2. Selecting a range of columns and rows simultaneously:

```
# selecting rows from 1 to 4 and columns from 2 to 4
display(data.iloc[1 : 5, 2 : 5])
```

Output :

	Kms Driven	City	Mileage
1	30000	Delhi	22
2	60000	Mumbai	22
3	25000	Delhi	26
4	10000	Mumbai	22

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