Data Structures in Pandas

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Pandas is an open-source library that uses for working with relational or labeled data both easily and intuitively. It provides various data structures and operations for manipulating numerical data and time series. It offers a tool for cleaning and processes your data. It is the most popular Python library that is used for data analysis. In this article, We are going to learn about Pandas Data structure.

It supports two data structures:

- Series
- Dataframe

Series

Pandas is a one-dimensional labeled array and capable of holding data of any type (integer, string, float, python objects, etc.)

Syntax: *pandas.Series(data=None, index=None, dtype=None, name=None, copy=False, fastpath=False)*

Parameters:

- ***data****: array- Contains data stored in Series.*
- ***index****: array-like or Index (1d)*
- ***dtype****: str, numpy.dtype, or ExtensionDtype, optional*
- ***name****: str, optional*

- ***copy**: bool, default False*

Example 1: Series holding the char data type.

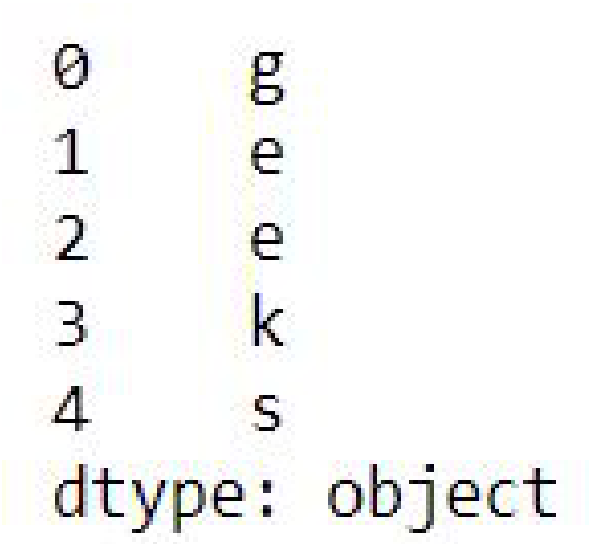
Python3

```
import pandas as pd

# a simple char list
list = ['g', 'e', 'e', 'k', 's']

# create series form a char list
res = pd.Series(list)
print(res)
```

Output:



Example 2: Series holding the Int data type.

Python3

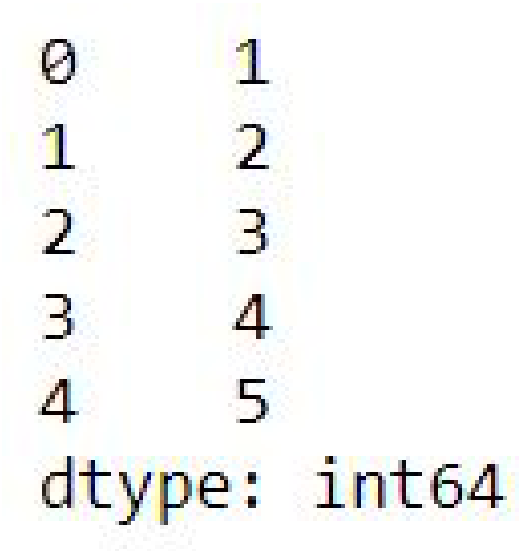
```
import pandas as pd

# a simple int list
```

```
list = [1,2,3,4,5]

# create series form a int list
res = pd.Series(list)
print(res)
```

Output:



Example 3: Series holding the dictionary.

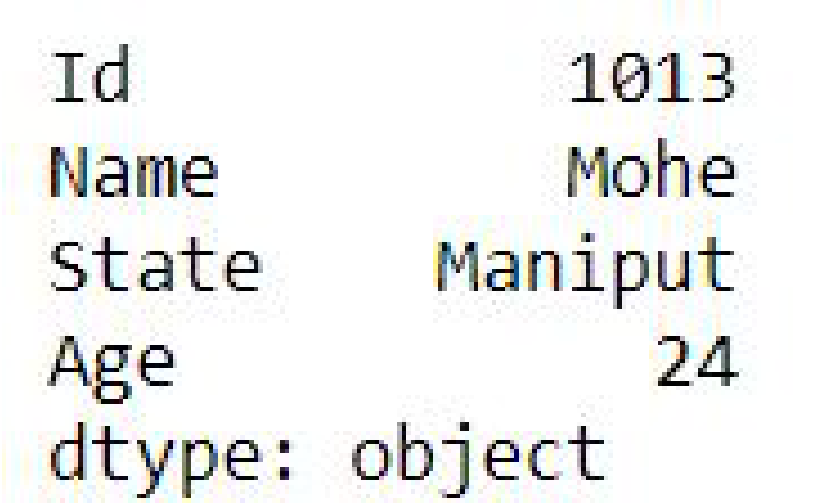
Python3

```
import pandas as pd

dic = { 'Id': 1013, 'Name': 'MOhe',
       'State': 'Maniput','Age': 24}

res = pd.Series(dic)
print(res)
```

Output:



Dataframe

Pandas DataFrame is a two-dimensional size-mutable, potentially heterogeneous tabular data structure with labeled axes (rows and columns). A Data frame is a two-dimensional data structure, i.e., data is aligned in a tabular fashion in rows and columns like a spreadsheet or SQL table, or a dict of Series objects. . Pandas DataFrame consists of three principal components, the **data**, **rows**, and **columns**.

Creating a Pandas DataFrame

In the real world, a Pandas DataFrame will be created by loading the datasets from existing storage, storage can be SQL Database, CSV file, and Excel file. Pandas DataFrame can be created from the lists, dictionary, and from a list of dictionary etc. Dataframe can be created in different ways here are some ways by which we create a dataframe:

Example 1: DataFrame can be created using a single list or a list of lists.

Python3

```
# import pandas as pd
import pandas as pd

# list of strings
lst = ['Geeks', 'For', 'Geeks', 'is',
            'portal', 'for', 'Geeks']

# Calling DataFrame constructor on list
df = pd.DataFrame(lst)
display(df)
```

Output:

	0
0	Geeks
1	For
2	Geeks
3	is
4	portal
5	for
6	Geeks

Example 2: Creating DataFrame from dict of ndarray/lists.

To create DataFrame from dict of narray/list, all the narray must be of same length. If index is passed then the length index should be equal to the length of arrays. If no index is passed, then by default, index will be range(n) where n is the array length.

Python3

```
# Python code demonstrate creating
# DataFrame from dict narray / lists
# By default addresses.

import pandas as pd

# initialise data of lists.
data = {'Name':['Tom', 'nick', 'krish', 'jack'],
        'Age':[20, 21, 19, 18]}

# Create DataFrame
df = pd.DataFrame(data)

# Print the output.
display(df)
```

Output:

	Name	Age
0	Tom	20
1	nick	21
2	krish	19
3	jack	18

Dealing with a column and row in DataFrame

Selection of column: In Order to select a column in Pandas DataFrame, we can either access the columns by calling them by their columns name.

Python3

```
# Import pandas package
import pandas as pd

# Define a dictionary containing employee data
data = {'Name':['Jai', 'Princi', 'Gaurav', 'Anuj'],
        'Age':[27, 24, 22, 32],
        'Address':['Delhi', 'Kanpur', 'Allahabad', 'Kannauj'],
        'Qualification':['Msc', 'MA', 'MCA', 'Phd']}

# Convert the dictionary into DataFrame
df = pd.DataFrame(data)

# select two columns
print(df[['Name', 'Qualification']])
```

Output:

	Name	Qualification
0	Jai	Msc
1	Princi	MA
2	Gaurav	MCA
3	Anuj	Phd

How to Select Rows and Column from Pandas DataFrame?

Example 1: Selecting rows.

pandas.DataFrame.loc is a function used to select rows from Pandas DataFrame based on the condition provided.

> ***Syntax:*** *df.loc[df['cname'] 'condition']*
>
> ***Parameters:***
>
> - ***df:*** *represents data frame*
> - ***cname:*** *represents column name*
> - ***condition:*** *represents condition on which rows has to be selected*

Python3

```
# Importing pandas as pd
from pandas import DataFrame

# Creating a data frame
Data = {'Name': ['Mohe', 'Shyni', 'Parul', 'Sam'],
        'ID': [12, 43, 54, 32],
        'Place': ['Delhi', 'Kochi', 'Pune', 'Patna']
       }

df = DataFrame(Data, columns = ['Name', 'ID', 'Place'])

# Print original data frame
print("Original data frame:\n")
display(df)
```

```
# Selecting the product of Electronic Type
select_prod = df.loc[df['Name'] == 'Mohe']

print("\n")

# Print selected rows based on the condition
print("Selecting rows:\n")
display (select_prod)
```

Output:

```
Original data frame:
```

	Name	ID	Place
0	Mohe	12	Delhi
1	Shyni	43	Kochi
2	Parul	54	Pune
3	Sam	32	Patna

```
Selecting rows:
```

	Name	ID	Place
0	Mohe	12	Delhi

Example 2: Selecting column.

Python3

```
# Importing pandas as pd
from pandas import DataFrame

# Creating a data frame
Data = {'Name': ['Mohe', 'Shyni', 'Parul', 'Sam'],
        'ID': [12, 43, 54, 32],
        'Place': ['Delhi', 'Kochi', 'Pune', 'Patna']
       }

df = DataFrame(Data, columns = ['Name', 'ID', 'Place'])

# Print original data frame
print("Original data frame:")
display(df)

print("Selected column: ")
display(df[['Name', 'ID']] )
```

Output:

Original data frame:

	Name	ID	Place
0	Mohe	12	Delhi
1	Shyni	43	Kochi
2	Parul	54	Pune
3	Sam	32	Patna

Selected column:

	Name	ID
0	Mohe	12
1	Shyni	43
2	Parul	54
3	Sam	32

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