Python Libraries

16 August 2022 11:11

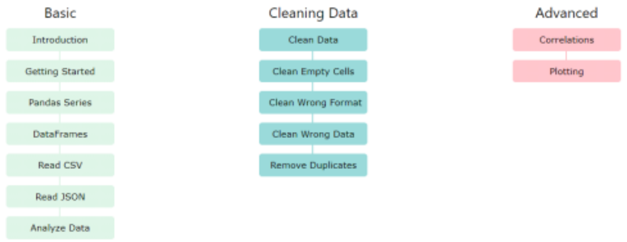
Pandas

- Pandas is a Python library used for working with data sets
- It has functions for analysing, cleaning, exploring, and manipulating data.
- it offers data structures and operations for manipulating numerical tables and time series.

Series - Column of Table
- 1-D Array

Data Frame- Multi-Dimension Tables

Series is like a column, a Data Frame is the whole table.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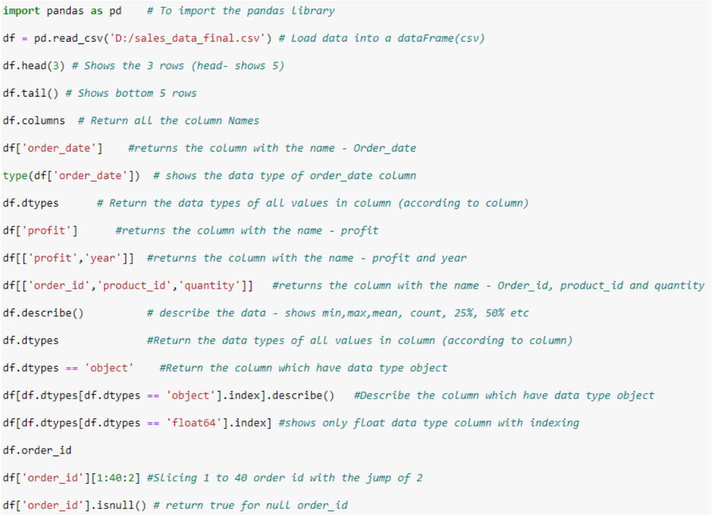
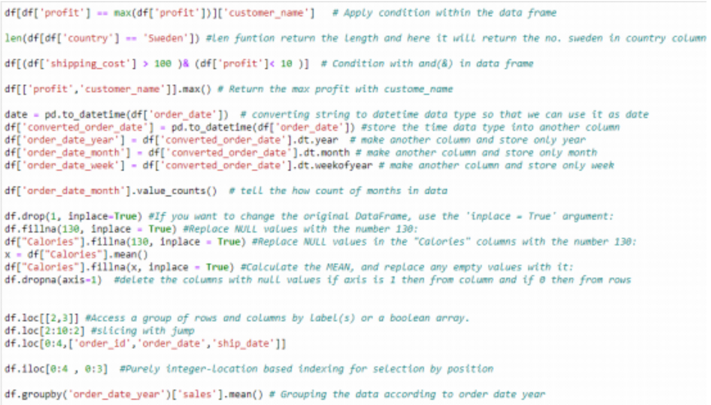
Pandas Series
DataFrames
Read CSV
Read JSON
Analyze Data

Cleaning Data
Clean Data
Clean Empty Cells
Clean Wrong Format
Clean Wrong Data
Remove Duplicates

Advanced
Correlations
Plotting



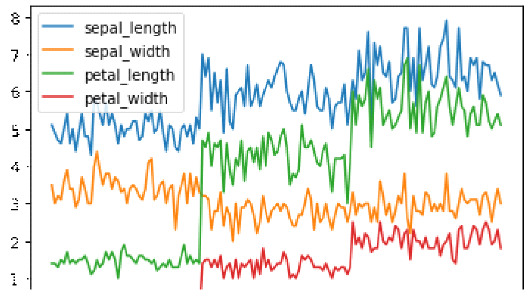
```
import pandas as pd    # To import the pandas library

df = pd.read_csv('D:/sales_data_final.csv') # Load data into a dataFrame(csv)

df.head(3) # Shows the 3 rows (head- shows 5)

df.tail() # Shows bottom 5 rows

df.columns  # Return all the column Names

df['order_date']    #returns the column with the name - Order_date

type(df['order_date'])  # shows the data type of order_date column

df.dtypes      # Return the data types of all values in column (according to column)

df['profit']      #returns the column with the name - profit

df[['profit','year']]  #returns the column with the name - profit and year

df[['order_id','product_id','quantity']]   #returns the column with the name - Order_id, product_id and quantity

df.describe()          # describe the data - shows min,max,mean, count, 25%, 50% etc

df.dtypes              #Return the data types of all values in column (according to column)

df.dtypes == 'object'    #Return the column which have data type object

df[df.dtypes[df.dtypes == 'object'].index].describe()   #Describe the column which have data type object

df[df.dtypes[df.dtypes == 'float64'].index] #shows only float data type column with indexing

df.order_id

df['order_id'][1:40:2] #Slicing 1 to 40 order id with the jump of 2

df['order_id'].isnull() # return true for null order_id
```



```
df[df['profit'] == max(df['profit'])]['customer_name']   # Apply condition within the data frame

len(df[df['country'] == 'Sweden']) #len funtion return the length and here it will return the no. sweden in country column

df[(df['shipping_cost'] > 100 )& (df['profit']< 10 )]  # Condition with and(&) in data frame

df[['profit','customer_name']].max() # Return the max profit with custome_name

date = pd.to_datetime(df['order_date'])  # converting string to datetime data type so that we can use it as date
df['converted_order_date'] = pd.to_datetime(df['order_date']) #store the time data type into another column
df['order_date_year'] = df['converted_order_date'].dt.year  # make another column and store only year
df['order_date_month'] = df['converted_order_date'].dt.month # make another column and store only month
df['order_date_week'] = df['converted_order_date'].dt.weekofyear # make another column and store only week

df['order_date_month'].value_counts()  # tell the how count of months in data

df.drop(1, inplace=True) #If you want to change the original DataFrame, use the 'inplace = True' argument:
df.fillna(130, inplace = True) #Replace NULL values with the number 130:
df["Calories"].fillna(130, inplace = True) #Replace NULL values in the "Calories" columns with the number 130:
x = df["Calories"].mean()
df["Calories"].fillna(x, inplace = True) #Calculate the MEAN, and replace any empty values with it:
df.dropna(axis=1)  #delete the columns with null values if axis is 1 then from column and if 0 then from rows


df.loc[[2,3]] #Access a group of rows and columns by label(s) or a boolean array.
df.loc[2:10:2] #slicing with jump
df.loc[0:4,['order_id','order_date','ship_date']]

df.iloc[0:4 , 0:3]  #Purely integer-location based indexing for selection by position

df.groupby('order_date_year')['sales'].mean() # Grouping the data according to order date year
```

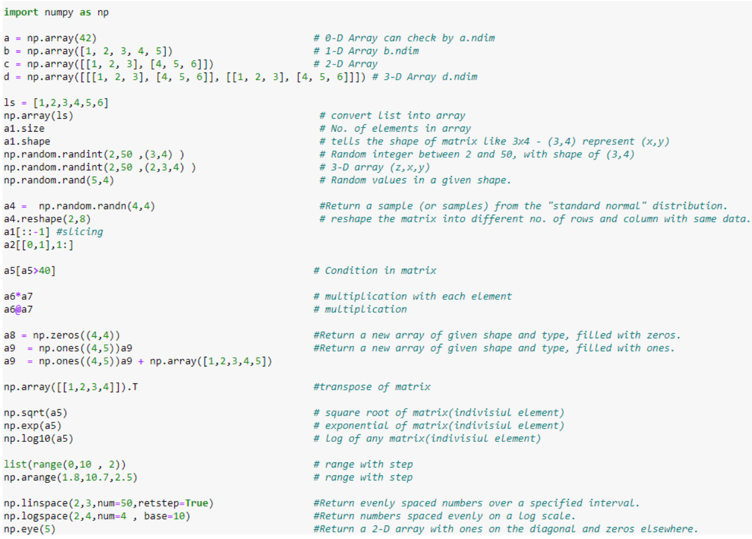
Merge - left will do Later

df.plot()



NumPy

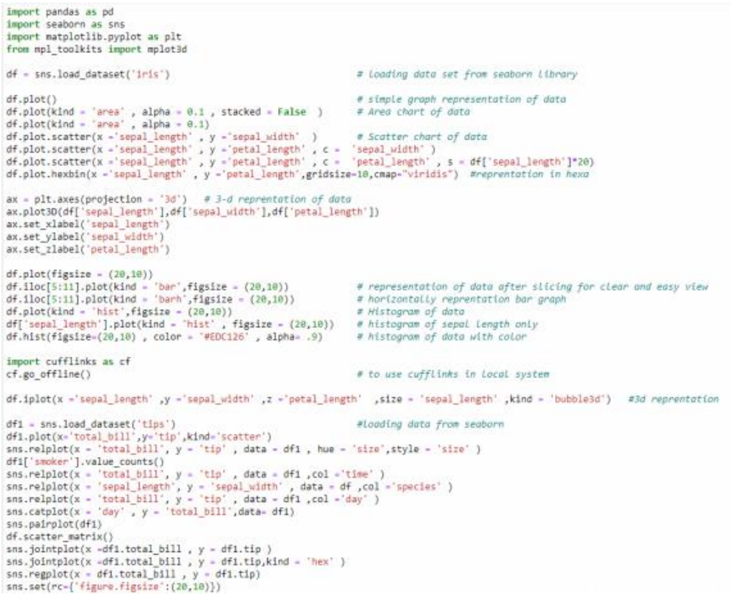
- NumPy is Python Library used for working with arrays.
- NumPy stands for Numerical Python, used in linear algebra and Matrices.
- Array object in NumPy is called ndarray, 50x faster than list.



```
import numpy as np

a = np.array(42)                                        # 0-D Array can check by a.ndim
b = np.array([1, 2, 3, 4, 5])                           # 1-D Array b.ndim
c = np.array([[1, 2, 3], [4, 5, 6]])                    # 2-D Array
d = np.array([[[1, 2, 3], [4, 5, 6]], [[1, 2, 3], [4, 5, 6]]]) # 3-D Array d.ndim

ls = [1,2,3,4,5,6]
np.array(ls)                                             # convert list into array
a1.size                                                  # No. of elements in array
a1.shape                                                 # tells the shape of matrix like 3x4 - (3,4) represent (x,y)
np.random.randint(2,50 ,(3,4) )                          # Random integer between 2 and 50, with shape of (3,4)
np.random.randint(2,50 ,(2,3,4) )                        # 3-D array (z,x,y)
np.random.rand(5,4)                                      # Random values in a given shape.

a4 =  np.random.randn(4,4)                               #Return a sample (or samples) from the "standard normal" distribution.
a4.reshape(2,8)                                          # reshape the matrix into different no. of rows and column with same data.
a1[::-1] #slicing
a2[[0,1],1:]

a5[a5>40]                                               # Condition in matrix

a6*a7                                                   # multiplication with each element
a6@a7                                                   # multiplication

a8 = np.zeros((4,4))                                    #Return a new array of given shape and type, filled with zeros.
a9  = np.ones((4,5))a9                                  #Return a new array of given shape and type, filled with ones.
a9  = np.ones((4,5))a9 + np.array([1,2,3,4,5])

np.array([[1,2,3,4]]).T                                 #transpose of matrix

np.sqrt(a5)                                             # square root of matrix(indivisiul element)
np.exp(a5)                                              # exponential of matrix(indivisiul element)
np.log10(a5)                                            # log of any matrix(indivisiul element)

list(range(0,10 , 2))                                   # range with step
np.arange(1.8,10.7,2.5)                                 # range with step

np.linspace(2,3,num=50,retstep=True)                    #Return evenly spaced numbers over a specified interval.
np.logspace(2,4,num=4 , base=10)                        #Return numbers spaced evenly on a log scale.
np.eye(5)                                               #Return a 2-D array with ones on the diagonal and zeros elsewhere.
```

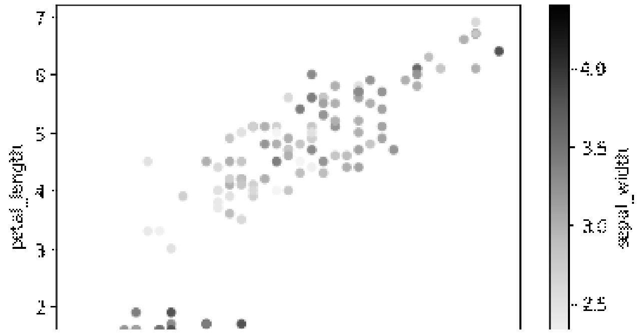
Visualization Libraries

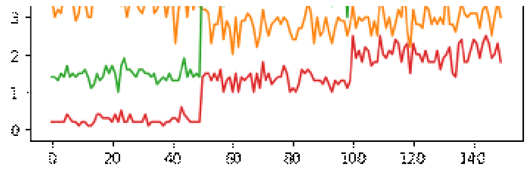
Matplotlib		Seaborn		Cufflinks

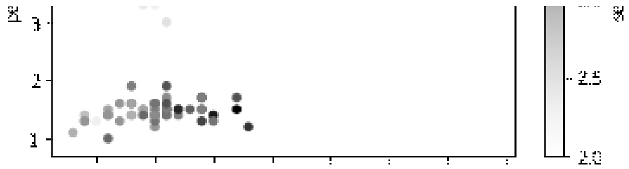


```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from mpl_toolkits import mplot3d

df = sns.load_dataset('iris')                                    # Loading data set from seaborn library

df.plot()                                                        # simple graph representation of data
df.plot(kind = 'area' , alpha = 0.1 , stacked = False  )         # Area chart of data
df.plot(kind = 'area' , alpha = 0.1)
df.plot.scatter(x ='sepal_length' , y ='sepal_width'  )          # Scatter chart of data
df.plot.scatter(x ='sepal_length' , y ='petal_length' , c =  'sepal_width' )
df.plot.scatter(x ='sepal_length' , y ='petal_length' , c =  'petal_length' , s = df['sepal_length']*20)
df.plot.hexbin(x ='sepal_length' , y ='petal_length',gridsize=10,cmap="viridis")  #reprentation in hexa

ax = plt.axes(projection = '3d')   # 3-d reprentation of data
ax.plot3D(df['sepal_length'],df['sepal_width'],df['petal_length'])
ax.set_xlabel('sepal_length')
ax.set_ylabel('sepal_width')
ax.set_zlabel('petal_length')

df.plot(figsize = (20,10))
df.iloc[5:11].plot(kind = 'bar',figsize = (20,10))               # representation of data after slicing for clear and easy view
df.iloc[5:11].plot(kind = 'barh',figsize = (20,10))              # horizontally reprentation bar graph
df.plot(kind = 'hist',figsize = (20,10))                         # Histogram of data
df['sepal_length'].plot(kind = 'hist' , figsize = (20,10))       # histogram of sepal length only
df.hist(figsize=(20,10) , color = '#EDC126' , alpha= .9)         # histogram of data with color

import cufflinks as cf
cf.go_offline()                                                  # to use cufflinks in local system

df.iplot(x ='sepal_length' ,y ='sepal_width' ,z ='petal_length'  ,size = 'sepal_length' ,kind = 'bubble3d')   #3d reprentation

df1 = sns.load_dataset('tips')                                   #loading data from seaborn
df1.plot(x='total_bill',y='tip',kind='scatter')
sns.relplot(x = 'total_bill', y = 'tip' , data = df1 , hue = 'size',style = 'size' )
df1['smoker'].value_counts()
sns.relplot(x = 'total_bill', y = 'tip' , data = df1 ,col ='time' )
sns.relplot(x = 'sepal_length', y = 'sepal_width' , data = df ,col ='species' )
sns.relplot(x = 'total_bill', y = 'tip' , data = df1 ,col ='day' )
sns.catplot(x = 'day' , y = 'total_bill',data= df1)
sns.pairplot(df1)
df.scatter_matrix()
sns.jointplot(x =df1.total_bill , y = df1.tip )
sns.jointplot(x =df1.total_bill , y = df1.tip,kind = 'hex' )
sns.regplot(x = df1.total_bill , y = df1.tip)
sns.set(rc={'figure.figsize':(20,10)})
```

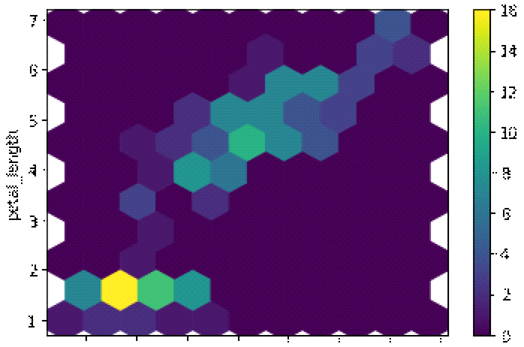
Plot.Scatter Graph



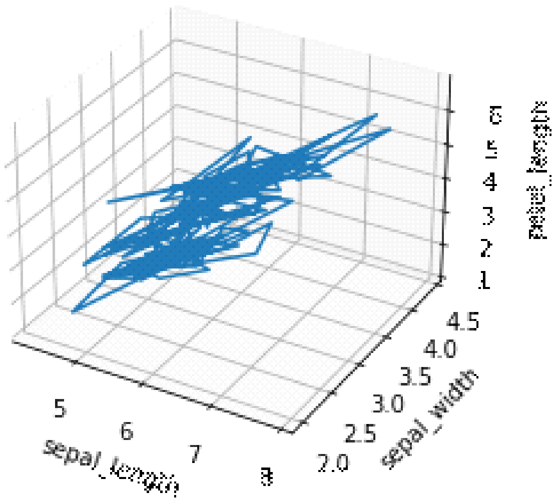




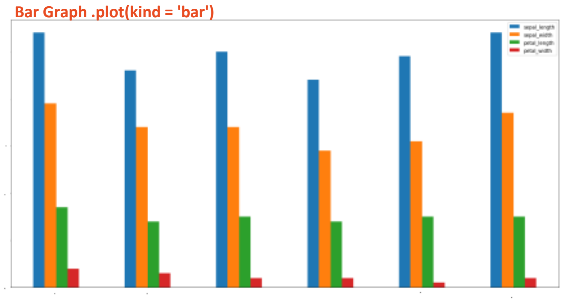
Plot.Hex-Bin



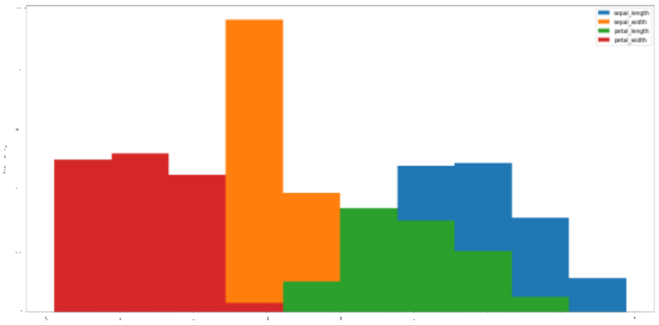
3-D Graph(plt.axes(projection='3d'))



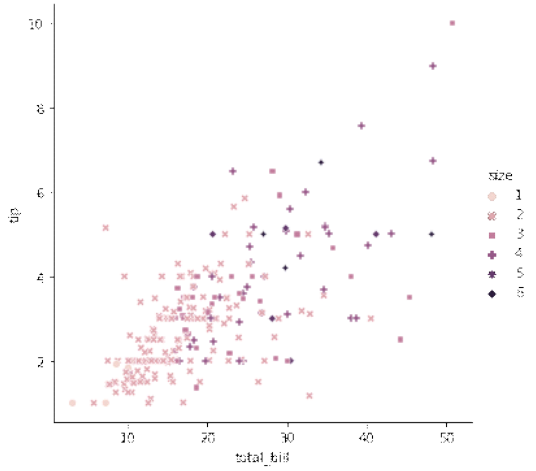
Bar Graph .plot(kind = 'bar')



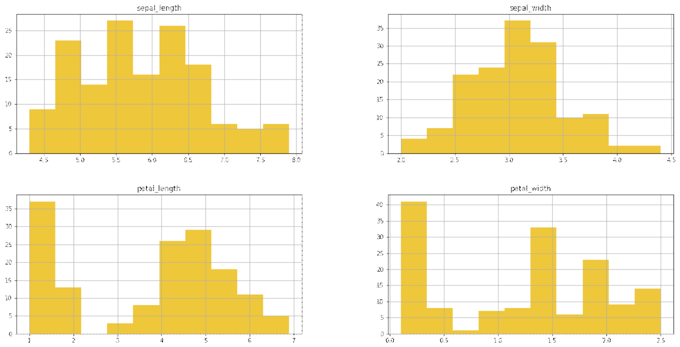
Histogram(.plot(kind='hist))



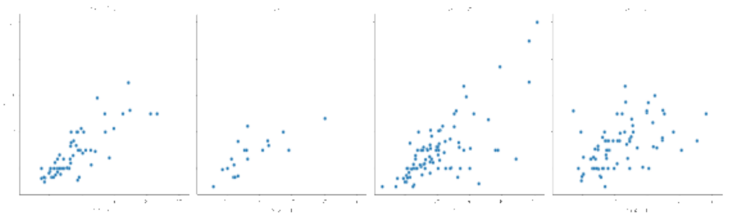
Sns.relplot()



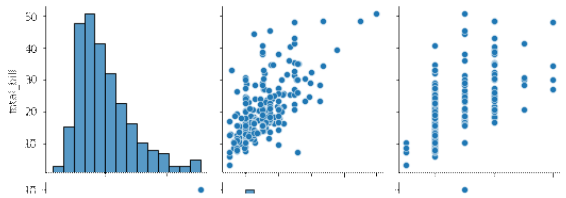
Histogram of Data (df.hist())



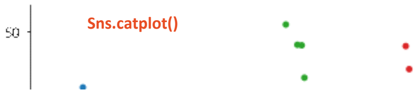
Sns.relplot()

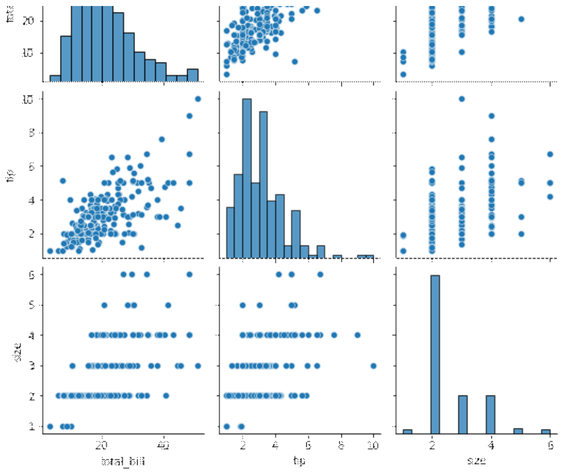


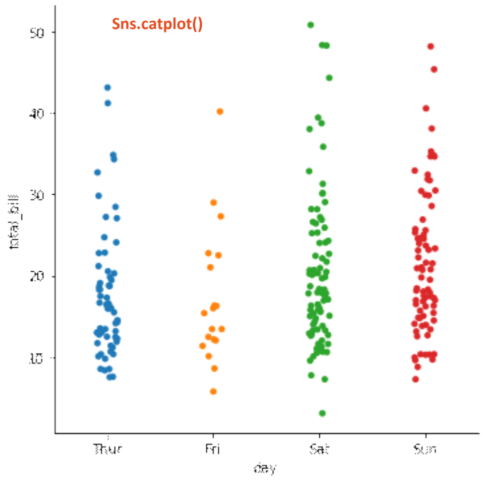
Sns.pairplot()

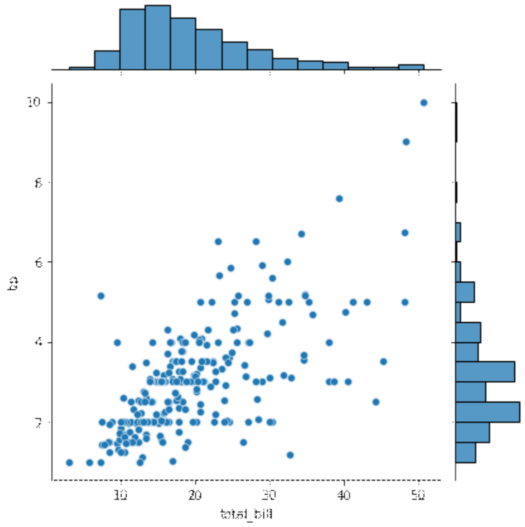


Sns.catplot()

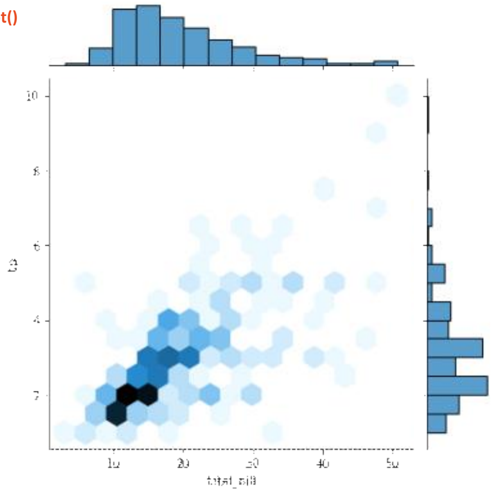





Sns.catplot()



Sns.jointplot()


tip
total_bill