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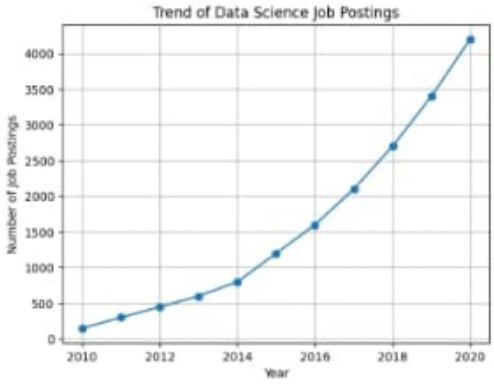
Code JupyterLab Python 3 (ipykernel)

[1]:
```
import pandas as pd
import matplotlib.pyplot as plt

# Data
data = {
    'Year': list(range(2010, 2021)),
    'Job Postings': [150, 300, 450, 600, 800, 1200, 1600, 2100, 2700, 3400, 4200]
}

df = pd.DataFrame(data)

# Plot
plt.plot(df['Year'], df['Job Postings'], marker='o')
plt.title('Trend of Data Science Job Postings')
plt.xlabel('Year')
plt.ylabel('Number of Job Postings')
plt.grid(True)
plt.show()
```



[2]:
```
import matplotlib.pyplot as plt

# Data
roles = ['Data Analyst', 'Data Engineer', 'Data Scientist', 'ML Engineer', 'Business Analyst']
counts = [300, 500, 450, 200, 150]

plt.bar(roles, counts, color='skyblue')
plt.title('Distribution of Data Science Roles')
plt.xlabel('Role')
plt.ylabel('Count')
plt.xticks(rotation=15)
plt.show()
```

[3]:
```
import pandas as pd

# Structured data example
structured_data = pd.DataFrame({
    'ID': [1, 2, 3],
    'Name': ['Alice', 'Bob', 'Charlie'],
    'Age': [25, 30, 35]
})
print("Structured Data:\n", structured_data)

# Unstructured data example
unstructured_data = "This is an example of unstructured data. It can be a piece of text, an image, or a video file."
print("\nUnstructured Data:\n", unstructured_data)

# Semi-structured data example (JSON-like format)
semi_structured_data = {'ID': 1, 'Name': 'Alice', 'Attributes': {'Height': 165, 'Weight': 68}}
print("\nSemi-structured Data:\n", semi_structured_data)
```

```
Structured Data:
    ID     Name  Age
0   1    Alice   25
1   2      Bob   30
2   3  Charlie   35

Unstructured Data:
 This is an example of unstructured data. It can be a piece of text, an image, or a video file.

Semi-structured Data:
 {'ID': 1, 'Name': 'Alice', 'Attributes': {'Height': 165, 'Weight': 68}}
```

[4]:
```
from cryptography.fernet import Fernet

# Generate a key
key = Fernet.generate_key()
cipher_suite = Fernet(key)

# Original data
plain_text = b"Rajalakshmi Engineering College"

# Encrypt data
cipher_text = cipher_suite.encrypt(plain_text)

# Decrypt data
decrypted_text = cipher_suite.decrypt(cipher_text)
```

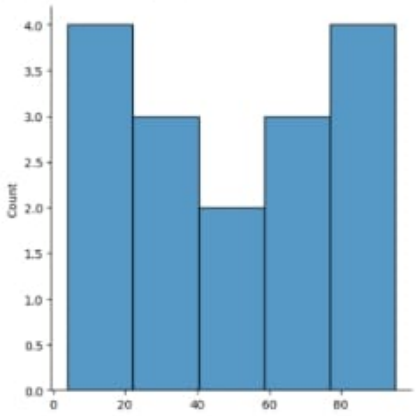
```
[nltk_data]     C:\Users\VITHESH\AppData\Roaming\nltk_data...
[nltk_data]   Package punkt is already up-to-date!
```

```
Pairs
[('[', 1), ('Emma', 2), ('by', 1), ('Jane', 1), ('Austen', 1), ('1816', 1), (']', 1), ('VOLUME', 1), ('I', 2), ('CHAPTER', 1), ('I', 2), ('Emma', 2), ('Woo
dhouse', 1), (',', 5), ('handsome', 1), (',', 5), ('clever', 1), (',', 5), ('and', 3), ('rich', 1), (',', 5), ('with', 2), ('a', 1), ('comfortable', 1),
('home', 1), ('and', 3), ('happy', 1), ('disposition', 1), (',', 5), ('seemed', 1), ('to', 1), ('unite', 1), ('some', 1), ('of', 2), ('the', 2), ('best',
1), ('blessings', 1), ('of', 2), ('existence', 1), (';', 1), ('and', 3), ('had', 1), ('lived', 1), ('nearly', 1), ('twenty-one', 1), ('years', 1), ('in',
1), ('the', 2), ('world', 1), ('with', 2)]
```

[28]:
```
import numpy as np
array=np.random.randint(1,100,16)
def outDetection(array):
    sorted(array)
    Q1,Q3=np.percentile(array,[25,75])
    IQR=Q3-Q1
    lr=Q1-(1.5*IQR)
    ur=Q3+(1.5*IQR)
    return lr,ur
lr,ur=outDetection(array)
print(lr,ur)
import seaborn as sns
%matplotlib inline
sns.displot(array)
```

```
-59.375 155.625
```

[28]:
```
<seaborn.axisgrid.FacetGrid at 0x16b23e6c350>
```

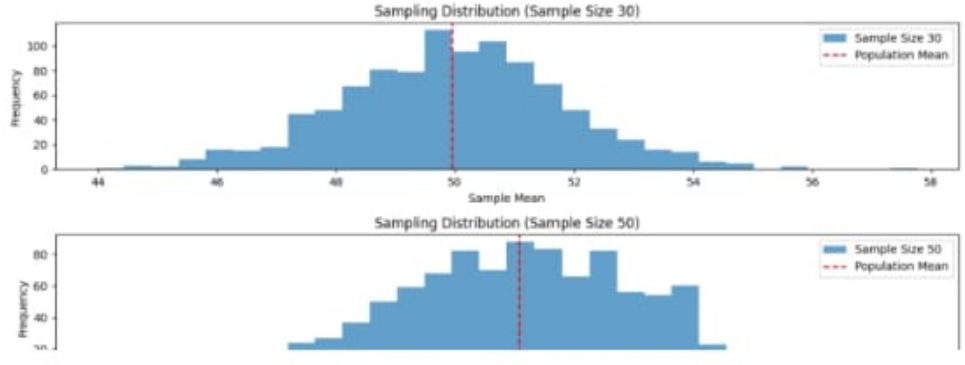


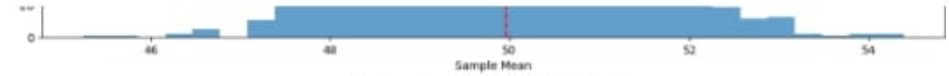
[24]:
```
import numpy as np
import pandas as pd
df=pd.read_csv("Hotel_Dataset.csv")
df.drop_duplicates(inplace=True)
index=np.array(list(range(0,len(df))))
df.set_index(index,inplace=True)
df.drop(['Age_Group.1'],axis=1,inplace=True)
df.Age_Group.unique()
df.Hotel.unique()
df.Hotel.replace(['Ibys'],'Ibis',inplace=True)
df.FoodPreference.unique
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)
df
```

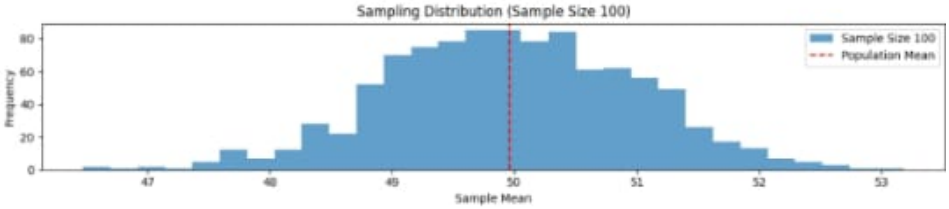
[24]:

	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	Veg	989	2	45000
5	6	35+	3	Ibis	Non-Veg	1909	2	122220
6	7	35+	4	RedFox	Veg	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

[26]:
```
import numpy as np
import matplotlib.pyplot as plt

# Generate a population
population = np.random.normal(50, 10, 100000)

# Sampling and plotting
sample_sizes = [30, 50, 100]
num_samples = 1000

plt.figure(figsize=(12, 8))
for i, size in enumerate(sample_sizes):
    sample_means = [np.mean(np.random.choice(population, size=size, replace=False)) for _ in range(num_samples)]
    plt.subplot(len(sample_sizes), 1, i+1)
    plt.hist(sample_means, bins=30, alpha=0.7, label=f'Sample Size {size}')
    plt.axvline(np.mean(population), color='red', linestyle='dashed', linewidth=1.5, label='Population Mean')
    plt.title(f'Sampling Distribution (Sample Size {size})')
    plt.xlabel('Sample Mean')
    plt.ylabel('Frequency')
    plt.legend()

plt.tight_layout()
plt.show()
```







[27]:
```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
df = pd.read_csv('E:\\PythonFORDBMS\\Fds\\Salary_data.csv')
df.dropna(inplace=True)
features = df.iloc[:, [0]].values
label = df.iloc[:, [1]].values
x_train, x_test, y_train, y_test = train_test_split(features, label, test_size=0.2, random_state=42)
model = LinearRegression()
model.fit(x_train, y_train)
train_score = model.score(x_train, y_train)
test_score = model.score(x_test, y_test)
coef = model.coef_
intercept = model.intercept_
print(f"Training Score: {train_score:.2f}")
print(f"Testing Score: {test_score:.2f}")
print(f"Coefficient: {coef[0][0]:.2f}")
print(f"Intercept: {intercept[0]:.2f}")
```

```
Training Score: 0.96
Testing Score: 0.90
Coefficient: 9423.82
Intercept: 25521.58
```

[28]:
```
import numpy as np
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import classification_report
df = pd.read_csv('E:\\PythonFORDBMS\\Fds\\Social_Network_Ads.csv')
features = df.iloc[:, [2, 3]].values
label = df.iloc[:, 4].values
best_state = None
best_test_score = -np.inf
for i in range(1, 401):
    x_train, x_test, y_train, y_test = train_test_split(features, label, test_size=0.2, random_state=i)
    model = LogisticRegression()
    model.fit(x_train, y_train)
    train_score = model.score(x_train, y_train)
    test_score = model.score(x_test, y_test)
    if test_score > train_score and test_score > best_test_score:
        best_state = i
        best_test_score = test_score
        print(f"Test: {test_score:.2f}, Train: {train_score:.2f}, Random State: {i}")
x_train, x_test, y_train, y_test = train_test_split(features, label, test_size=0.2, random_state=best_state)
final_model = LogisticRegression()
final_model.fit(x_train, y_train)

print("Final Model Training Score:", final_model.score(x_train, y_train))
print("Final Model Testing Score:", final_model.score(x_test, y_test))

print("\nClassification Report:")
print(classification_report(label, final_model.predict(features)))
```

```
Test: 0.90, Train: 0.84, Random State: 4
Test: 0.91, Train: 0.83, Random State: 47
Test: 0.93, Train: 0.84, Random State: 61
Test: 0.96, Train: 0.82, Random State: 220
Final Model Training Score: 0.81875
Final Model Testing Score: 0.9025

Classification Report:
              precision    recall  f1-score   support

           0       0.85      0.92      0.89       257
           1       0.84      0.71      0.77       143

    accuracy                           0.85       400
   macro avg       0.84      0.82      0.83       400
weighted avg       0.85      0.85      0.84       400
```

[29]:
```
import numpy as np
from scipy.stats import f_oneway
from statsmodels.stats.multicomp import pairwise_tukeyhsd

# Generate data
np.random.seed(42)
n = 25
growth_A = np.random.normal(loc=10, scale=2, size=n)
growth_B = np.random.normal(loc=12, scale=3, size=n)
growth_C = np.random.normal(loc=15, scale=2.5, size=n)

# ANOVA test
f_stat, p_val = f_oneway(growth_A, growth_B, growth_C)

# Output
print(f"Means: A={np.mean(growth_A):.2f}, B={np.mean(growth_B):.2f}, C={np.mean(growth_C):.2f}")
print(f"F: {f_stat:.4f}, P: {p_val:.4f}")
if p_val < 0.05:
    print("Reject null: Significant differences between treatments.")
    # Tukey's HSD
    labels = ['A'] * n + ['B'] * n + ['C'] * n
    tukey = pairwise_tukeyhsd(np.concatenate([growth_A, growth_B, growth_C]), labels, alpha=0.05)
    print("\nTukey's HSD Results:")
    print(tukey)
else:
    print("Fail to reject null: No significant differences.")
```

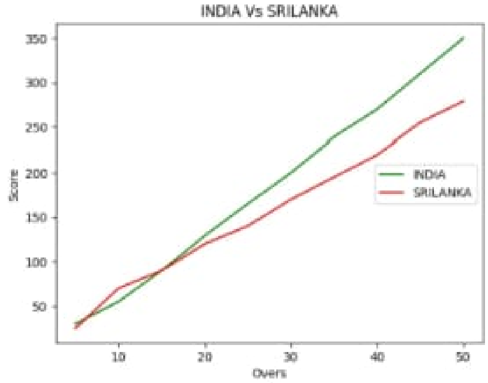
```
Means: A=9.67, B=11.14, C=15.27
F: 36.1214, P: 0.0000
Reject null: Significant differences between treatments.

Tukey's HSD Results:
Multiple Comparison of Means - Tukey HSD, FWER=0.05
====================================================
group1 group2 meandiff p-adj   lower  upper  reject
----------------------------------------------------
     A      B   1.4647 0.0877 -0.1683 3.0977  False
     A      C   5.5913    0.0  3.9583 7.2242   True
     B      C   4.1266    0.0  2.4946 5.7605   True
----------------------------------------------------
```

[30]:
```
import numpy as np
import pandas as pd
from sklearn.preprocessing import StandardScaler

# Generate a small dataset
```

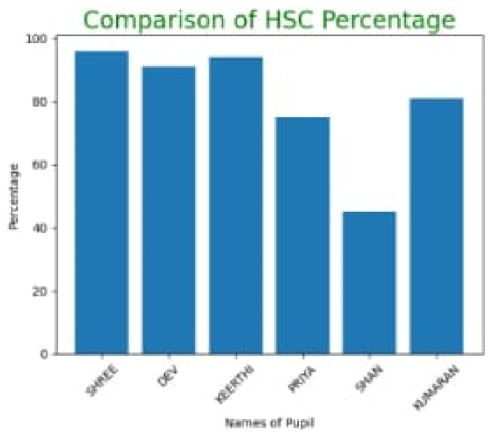
```python
# Output
print("Original Data:", plain_text.decode())
print("Encrypted Data:", cipher_text.decode())
print("Decrypted Data:", decrypted_text.decode())
```

```
Original Data: Rajalakshmi Engineering College
Encrypted Data: gAAAAABnPa2yKlPfpLIVqH[illegible]
Decrypted Data: Rajalakshmi Engineering College
```

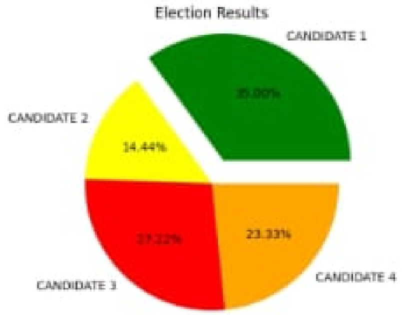
[15]:
```python
import matplotlib.pyplot as cricket
Overs = list(range(5, 51, 5))
Indian_Score = [30, 55, 90, 129, 165, 200, 235, 270, 310, 350]
Srilankan_Score = [25, 70, 90, 120, 140, 170, 195, 220, 255, 279]
cricket.plot(Overs, Indian_Score, color="green", label="INDIA")
cricket.plot(Overs, Srilankan_Score, color="red", label="SRILANKA")
cricket.title("INDIA Vs SRILANKA")
cricket.xlabel("Overs")
cricket.ylabel("Score")
cricket.legend(loc="center right")
cricket.show()
```



[16]:
```python
import matplotlib.pyplot as hscmark
import numpy as np
Names = ['SHREE', 'DEV', 'KEERTHI', 'PRIYA', 'SHAN', 'KUMARAN']
xaxis = np.arange(len(Names))
Percentage_hsc = [96, 91, 94, 75, 45, 81]
hscmark.bar(Names, Percentage_hsc)
hscmark.xticks(xaxis, Names, rotation=45)
hscmark.xlabel("Names of Pupil")
hscmark.ylabel("Percentage")
hscmark.title("Comparison of HSC Percentage", fontsize=20, color="green")
hscmark.show()
```



[17]:
```python
import matplotlib.pyplot as election
labels = ['CANDIDATE 1', 'CANDIDATE 2', 'CANDIDATE 3', 'CANDIDATE 4']
Votes = [315, 130, 245, 210]
colors = ['green', 'yellow', 'red', 'orange']
explode = (0.2, 0, 0, 0)
election.pie(Votes, labels=labels, colors=colors, explode=explode, autopct='%0.2f%%')
election.title('Election Results')
election.show()
```



[18]:
```python
import nltk
from nltk.tokenize import word_tokenize
from nltk.corpus import gutenberg
nltk.download('gutenberg')
nltk.download('punkt')
sample = gutenberg.raw("austen-emma.txt")
token = word_tokenize(sample)
wlist = [token[i] for i in range(50)]
wordfreq = [wlist.count(w) for w in wlist]
print("Pairs\n" + str(list(zip(wlist, wordfreq))))
```

```
[nltk_data] Downloading package gutenberg to
```