DSC630-T301 Predictive Analytics (2243-1)_week1_Samanta_Rajib

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0.1 Class : DSC630-T301 Predictive Analytics (2243-1)

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0.2.1 Assignment 1.2 : Week 1

This assignment is a refresher of data analysis and visualization using Python and/or R. Find a data set that interests you and has appropriate data to create some interesting visualizations. A few good sources for finding datasets include Kaggle, UCI ML Repository, and the US Bureau of Labor Statistics.

With the dataset that you choose, perform the following steps using Python and/or R:

1. Write a summary of your data and identify at least two questions to explore visually with your data.
2. Create a histogram or bar graph from your data.
3. Create a boxplot from your data.
4. Create a bivariate plot from your data.
5. Create any additional visualizations that will help to answer the question(s) you want to answer.
6. Summarize your results and make a conclusion. Explain how you arrived at this conclusion and how your visualizations support your conclusion.

0.2.2 Data Set :

```
Salary of Data Scientists
https://www.kaggle.com/datasets/piyushborhade/salary-of-data-scientists/
```

0.2.3 About Dataset:

This dataset aims to shed light on the salary trends in the field of Data Science for the years 2021 to 2023. With a focus on various aspects of employment, including work experience, job titles, and company locations, this dataset provides valuable insights into salary distributions within the industry.

0.2.4 Data Set Fields:

1. **Work_year:** Representing the specific year of salary data collection.
2. **Experience_level:** The level of work experience of the employees, categorized as EN (Entry-Level), EX (Experienced), MI (Mid-Level), SE (Senior).

3. **Employment_type:** The type of employment, labelled as FT (Full-Time), CT (Contractor), FL (Freelancer), PT (Part-Time).
4. **Job_title:** The job titles of the employees, such as “Applied Scientist”, “Data Quality Analyst”
5. **Salary:** The salary figures in their respective currency formats.
6. **Salary_currency:** The currency code representing the salary.
7. **Salary_in_usd:** The converted salary figures in USD for uniform comparison.
8. **Company_location:** The location of the companies, specified as country codes (e.g., “US” for the United States)
9. **Company_size:** The size of the companies, classified as “L” (Large), “M” (Medium), and “S” (Small).

0.2.5 Data exploration:

1. **Salary Trends over Time:** Utilize the dataset to visualize and interpret data science salary trends from 2021 to 2023.
2. **Job Title Recommendation:** Recommend suitable job titles for candidates based on their experience level and desired salary range.

[14]:

```
# Load the Libraries
import os
import pandas as pd
import matplotlib.pyplot as plt
#%matplotlib inline
import seaborn as sns
import warnings
warnings.filterwarnings('ignore')
```

[15]:

```
# 1. Load the dataset as a Pandas data frame.
# 2. Display the first ten rows of data.
# Read in the Video Game Sales with Ratings data file ('VData Science Salary␣
 ↪2021 to 2023.csv') from local:
directory = '/Users/rajibsamanta/Documents/Rajib/College/Sem 7 Winter 2023/
 ↪Week1'
# Set the working directory
os.chdir(directory)
print(os.getcwd())
dataset1_csv = pd.read_csv("ds_salaries.csv")
dataset1_csv.head(10)
# Display the DataFrame 10 rows
```

```
/Users/rajibsamanta/Documents/Rajib/College/Sem 7 Winter 2023/Week1
```

[15]:

```
   work_year experience_level employment_type                 job_title  \
0       2023               SE              FT  Principal Data Scientist
1       2023               MI              CT               ML Engineer
2       2023               MI              CT               ML Engineer
3       2023               SE              FT            Data Scientist
```

```
4       2023               SE              FT             Data Scientist
5       2023               SE              FT          Applied Scientist
6       2023               SE              FT          Applied Scientist
7       2023               SE              FT             Data Scientist
8       2023               SE              FT             Data Scientist
9       2023               SE              FT             Data Scientist

   salary salary_currency  salary_in_usd employee_residence  remote_ratio  \
0   80000             EUR          85847                 ES           100
1   30000             USD          30000                 US           100
2   25500             USD          25500                 US           100
3  175000             USD         175000                 CA           100
4  120000             USD         120000                 CA           100
5  222200             USD         222200                 US             0
6  136000             USD         136000                 US             0
7  219000             USD         219000                 CA             0
8  141000             USD         141000                 CA             0
9  147100             USD         147100                 US             0

  company_location company_size
0               ES            L
1               US            S
2               US            S
3               CA            M
4               CA            M
5               US            L
6               US            L
7               CA            M
8               CA            M
9               US            M
```

[16]:

```
# describe the dataframe'
dataset1_csv.shape
## It has 3755 records with 11 columns
```

[16]:

```
(3755, 11)
```

[17]:

```
# describe the dataframe'
dataset1_csv.describe()
```

[17]:

```
         work_year        salary  salary_in_usd  remote_ratio
count  3755.000000  3.755000e+03    3755.000000   3755.000000
mean   2022.373635  1.906956e+05  137570.389880     46.271638
std       0.691448  6.716765e+05   63055.625278     48.589050
min    2020.000000  6.000000e+03    5132.000000      0.000000
25%    2022.000000  1.000000e+05   95000.000000      0.000000
50%    2022.000000  1.380000e+05  135000.000000      0.000000
```

```
75%     2023.000000  1.800000e+05  175000.000000    100.000000
max     2023.000000  3.040000e+07  450000.000000    100.000000
```

[18]:
```
# missing values
dataset1_csv.isnull().sum()
#-- No  null column
```

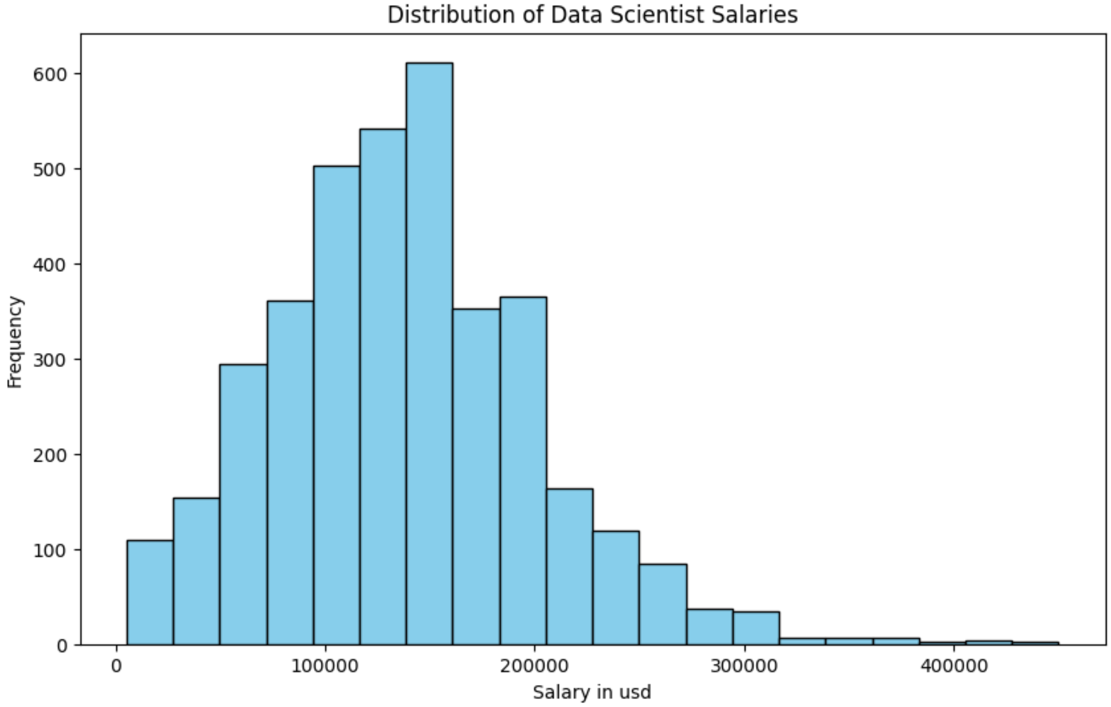
[18]:
```
work_year             0
experience_level      0
employment_type       0
job_title             0
salary                0
salary_currency       0
salary_in_usd         0
employee_residence    0
remote_ratio          0
company_location      0
company_size          0
dtype: int64
```

[19]:
```
# Calculate frequency of each job title
job_title_counts = dataset1_csv['job_title'].value_counts()
job_title_counts
```

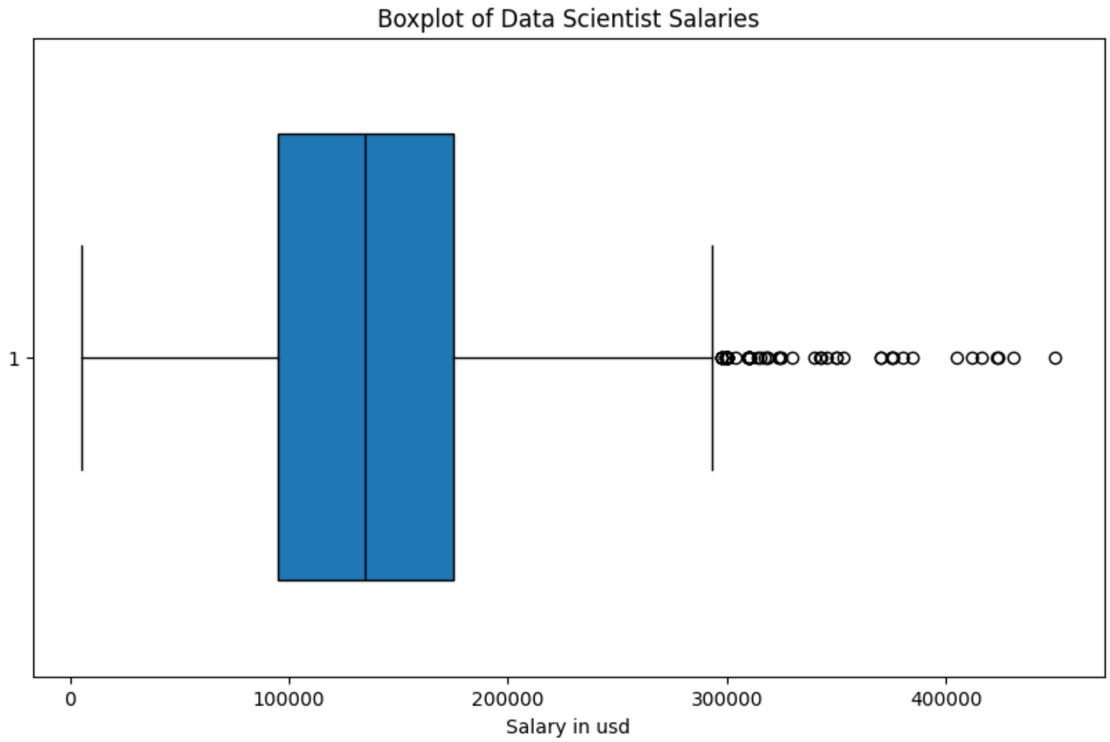
[19]:
```
job_title
Data Engineer                             1040
Data Scientist                             840
Data Analyst                               612
Machine Learning Engineer                  289
Analytics Engineer                         103
                                          …
Principal Machine Learning Engineer          1
Azure Data Engineer                          1
Manager Data Management                      1
Marketing Data Engineer                      1
Finance Data Analyst                         1
Name: count, Length: 93, dtype: int64
```

[20]:
```
# Create a histogram for Salary in usd
plt.figure(figsize=(10, 6))
plt.hist(dataset1_csv['salary_in_usd'], bins=20, color='skyblue',␣
 ↪edgecolor='black')

# Customize the plot
plt.title('Distribution of Data Scientist Salaries')
plt.xlabel('Salary in usd')
plt.ylabel('Frequency')
```

```
# Show the plot
plt.show()
```

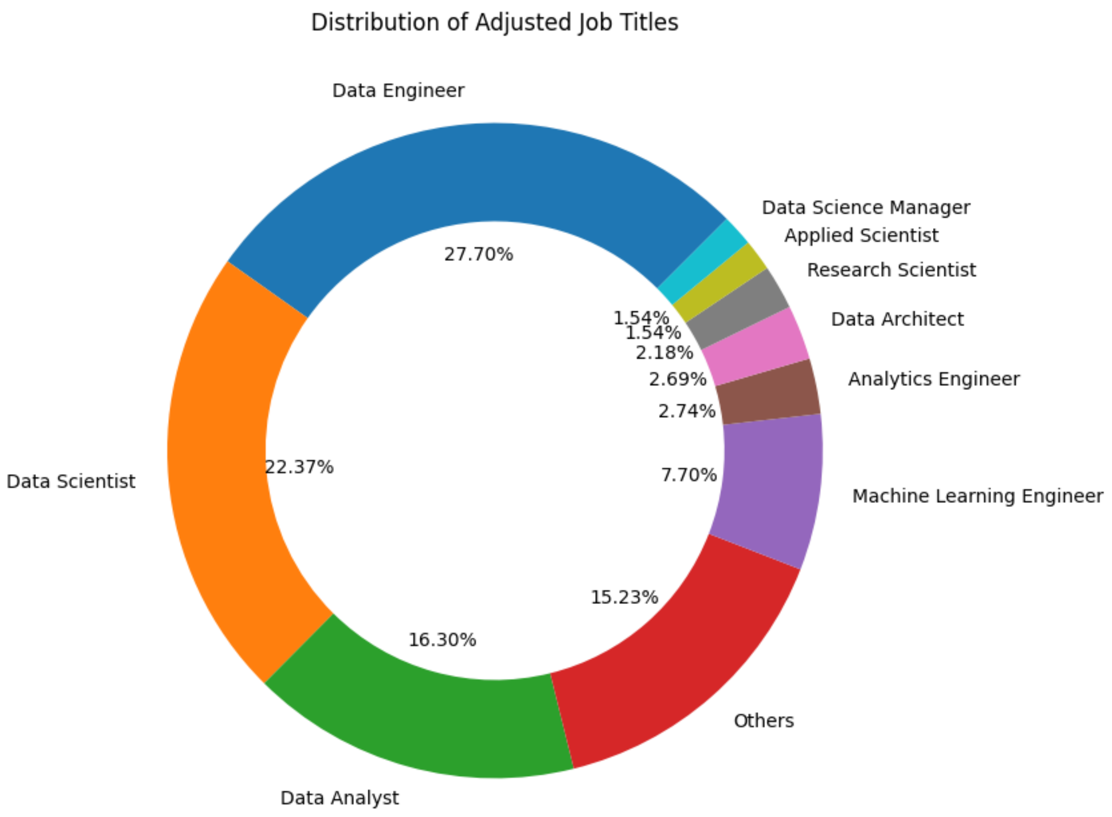


```
[21]: # Create a boxplot
plt.figure(figsize=(10, 6))
plt.boxplot(dataset1_csv['salary_in_usd'], vert=False, widths=0.7,␣
 ↪patch_artist=True, medianprops={'color':'black'})

# Customize the plot
plt.title('Boxplot of Data Scientist Salaries')
plt.xlabel('Salary in usd')

# Show the plot
plt.show()
```



1. From the above histogram & boxplot the average data science job Salary is around 140K USD. Which is very good are per IT market.

[22]:
```
# Determine titles below the threshold, e.g., less than N occurrences
N=50
low_frequency_titles = job_title_counts[job_title_counts < N].index

# Replace these titles in the dataframe with "Others"
dataset1_csv['adjusted_job_title'] = dataset1_csv['job_title'].apply(lambda x:␣
↪"Others" if x in low_frequency_titles else x)

# Recalculate the frequency
adjusted_counts = dataset1_csv['adjusted_job_title'].value_counts()

# Plot
plt.figure(figsize=(10,8))
adjusted_counts.plot.pie(autopct='%.2f%%', startangle=45,␣
↪wedgeprops=dict(width=0.3))
plt.title('Distribution of Adjusted Job Titles')
plt.ylabel('')  # Hide the 'adjusted_job_title' y-label
plt.show()
```



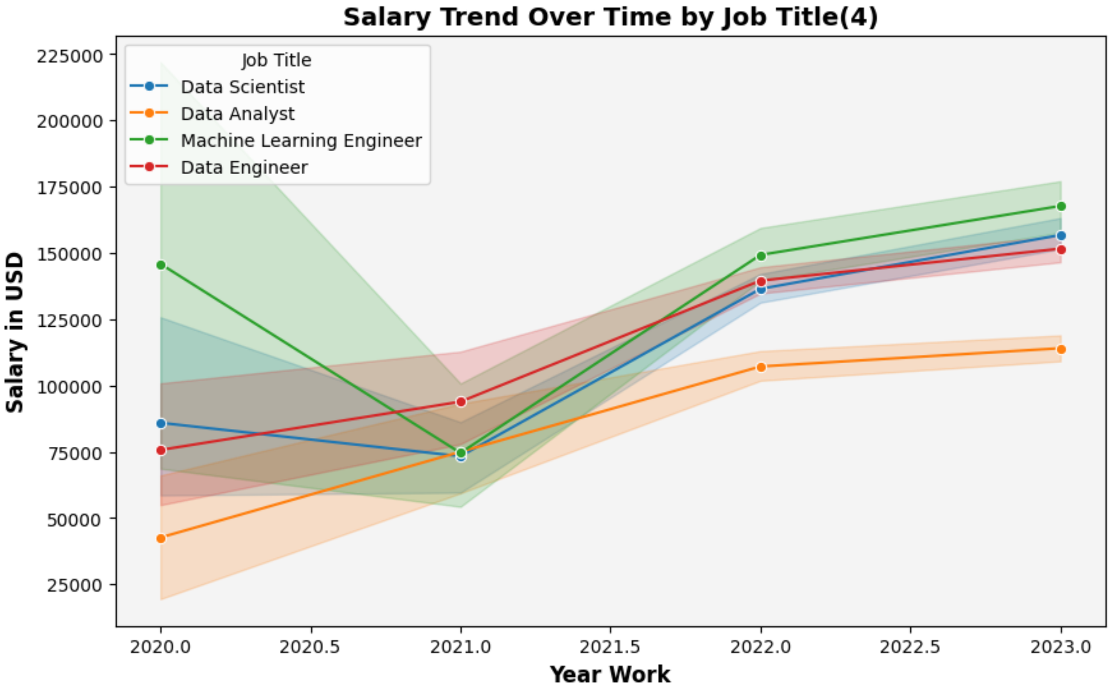
0.2.6 Most frequent positions are:

1. Data Engineer
2. Data Scientist
3. Data Analyst
4. Machine Learning Engineer

[23]:

```
# Salary Trend Over Time by Job Title for
#a. Data Engineer                  1040
#b. Data Scientist                  840
#c. Data Analyst                    614
#d. Machine Learning Engineer       291
# list of active subscription statuses
job_titles_sal= ['Data Engineer', 'Data Scientist','Data Analyst','Machine␣
 ↪Learning Engineer']
# filter rows based on list values
dataset_mask = dataset1_csv['job_title'].isin(job_titles_sal)
dataset=dataset1_csv[dataset_mask]

plt.figure(figsize=(10, 6))
```

```
p = sns.lineplot(data=dataset, x='work_year', y='salary_in_usd',␣
 ↪hue='job_title', marker='o')

plt.xlabel('Year Work', fontsize=12, fontweight='bold')
plt.ylabel('Salary in USD', fontsize=12, fontweight='bold')

# Add a legend
plt.legend(title='Job Title', title_fontsize=10, fontsize=10, loc='upper left')

# Add a title
plt.title('Salary Trend Over Time by Job Title(4)', fontsize=14,␣
 ↪fontweight='bold')


# Customize the background color
p.set_facecolor("#f4f4f4")

# Remove the grid lines
p.grid(False)
plt.show()
```



1. The salary trend in Machine learning engineer currently increasing better than data enginer/analyst/secientist
2. All the four job titles 'Data Engineer', 'Data Scientist','Data Analyst','Machine Learning Engineer' salary is in up trend.

0.2.7 Conclusion:

1. Average data science job Salary is around 140 K USD.
2. Most demanding data science job titles are a. Data Engineer b. Data Scientist c. Data Analyst d.Machine Learning Engineer
3. All the four job titles 'Data Engineer', 'Data Scientist','Data Analyst','Machine Learning Engineer' salary is in up trend.

[ ]:

```

```