In [1]:
```python
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import plotly.express as px
import seaborn as sns
```

In [5]:
```python
1.#load in data
df = pd.read_excel(r"C:\Users\User\Downloads\salaries 2023.xlsx")
df
```

Out[5]:

	work_year	experience_level	employment_type	job_title	salary	salary_currency	salary_in_usd	employee_residence	remote_ratio	com
0	2023	SE	FT	Principal Data Scientist	80000	EUR	85847	ES	100	
1	2023	MI	CT	ML Engineer	30000	USD	30000	US	100	
2	2023	MI	CT	ML Engineer	25500	USD	25500	US	100	
3	2023	SE	FT	Data Scientist	175000	USD	175000	CA	100	
4	2023	SE	FT	Data Scientist	120000	USD	120000	CA	100	
...	...	...	...	...	...	...	...	...	...	
3750	2020	SE	FT	Data Scientist	412000	USD	412000	US	100	
3751	2021	MI	FT	Principal Data Scientist	151000	USD	151000	US	100	
3752	2020	EN	FT	Data Scientist	105000	USD	105000	US	100	
3753	2020	EN	CT	Business Data Analyst	100000	USD	100000	US	100	
3754	2021	SE	FT	Data Science Manager	7000000	INR	94665	IN	50	

3755 rows × 11 columns

In [ ]:

In [6]:
```python
#understand the data
df.shape
```

Out[6]:
```
(3755, 11)
```

In [7]:
```python
df['work_year'].value_counts() # count of employess by work year
```

Out[7]:
```
2023    1785
2022    1664
2021     230
2020      76
Name: work_year, dtype: int64
```

In [38]:
```python
df['experience_level'].value_counts()#count of employess by experience level
#EN, which refers to Entry-level / Junior.

#MI, which refers to Mid-level / Intermediate.

#SE, which refers to Senior-level / Expert.

#EX, which refers to Executive-level / Director.
```

Out[38]:
```
SE    1554
MI     664
EN     270
EX      96
Name: experience_level, dtype: int64
```

In [11]:
```python
df['employment_type'].value_counts() # count of employess by employment type
# employment_type :

#FT: Full-Time PT: Part-Time CT: Contractual FL: Freelancer
```

Out[11]:
```
FT    3718
PT      17
CT      10
FL      10
Name: employment_type, dtype: int64
```

In [13]:
```python
df['job_title'].value_counts()# count employess by job title
```

Out[13]:
```
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: job_title, Length: 93, dtype: int64
```

In [14]:
```python
df['salary'].value_counts() # count employess by their salary
```

Out[14]:
```
100000    112
150000    100
120000     99
160000     85
130000     85
         ...
241871      1
93919       1
385000      1
225900      1
412000      1
Name: salary, Length: 815, dtype: int64
```

In [15]:
```python
df['employee_residence'].value_counts() # count employess by their residence
```

Out[15]:
```
US    3004
GB     167
CA      85
ES      80
IN      71
      ...
BA       1
AM       1
CY       1
KW       1
MT       1
Name: employee_residence, Length: 78, dtype: int64
```

In [16]:
```python
df['company_location'].value_counts() # count employess by company location
```

Out[16]:
```
US    3040
GB     172
CA      87
ES      77
IN      58
      ...
MK       1
BS       1
IR       1
CR       1
MT       1
Name: company_location, Length: 72, dtype: int64
```

In [17]:
```python
df['company_size'].value_counts() #count employess by company size
```

Out[17]:
```
M    3153
L     454
S     148
Name: company_size, dtype: int64
```

In [ ]:
```python
#Data Preprocessing
```

In [20]:
```python
df.isnull().sum() # check null values
```

Out[20]:
```
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
```

In [22]:
```python
df.duplicated().sum() # check duplcate values
```

Out[22]:
```
0
```

In [23]:
```python
df['salary_in_usd'].groupby(df['job_title']) .mean()# salary mean based on job title
```

Out[23]:
```
job_title
3D Computer Vision Researcher     21352.250000
AI Developer                     136666.090909
AI Programmer                     55000.000000
AI Scientist                     110120.875000
Analytics Engineer               150151.747253
                                     ...
Research Engineer                165909.393939
Research Scientist               153486.369231
Software Data Engineer            62510.000000
Staff Data Analyst                15000.000000
Staff Data Scientist             105000.000000
Name: salary_in_usd, Length: 93, dtype: float64
```

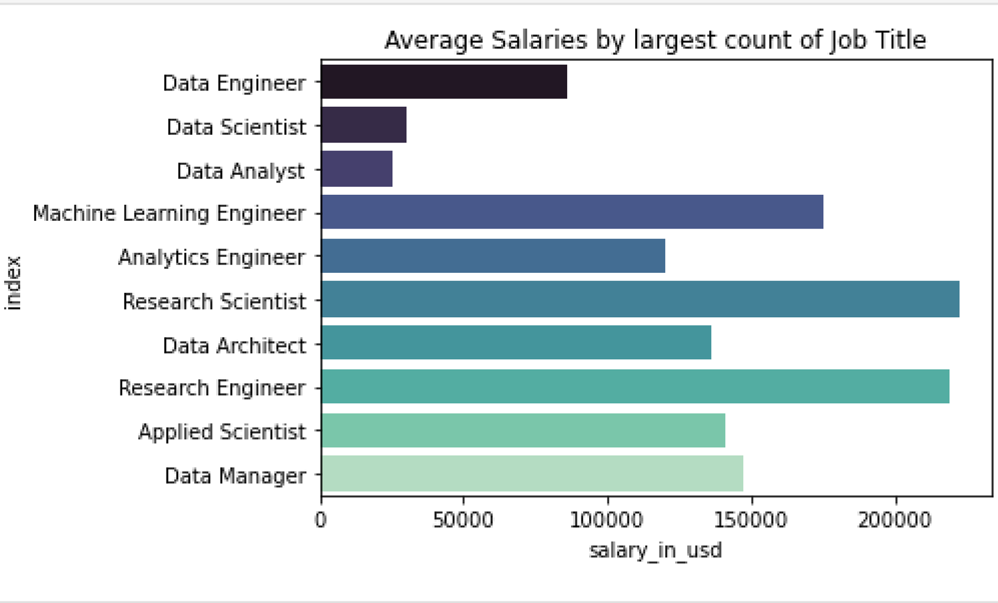
In [26]:
```python
jobs = df[df['work_year']==2023]['job_title'].value_counts().nlargest(10).reset_index() #  10 largest job title
jobs
```

Out[26]:

	index	job_title
0	Data Engineer	269
1	Data Scientist	223
2	Data Analyst	195
3	Machine Learning Engineer	103
4	Analytics Engineer	41
5	Research Scientist	38
6	Data Architect	31
7	Research Engineer	28
8	Applied Scientist	20
9	Data Manager	18

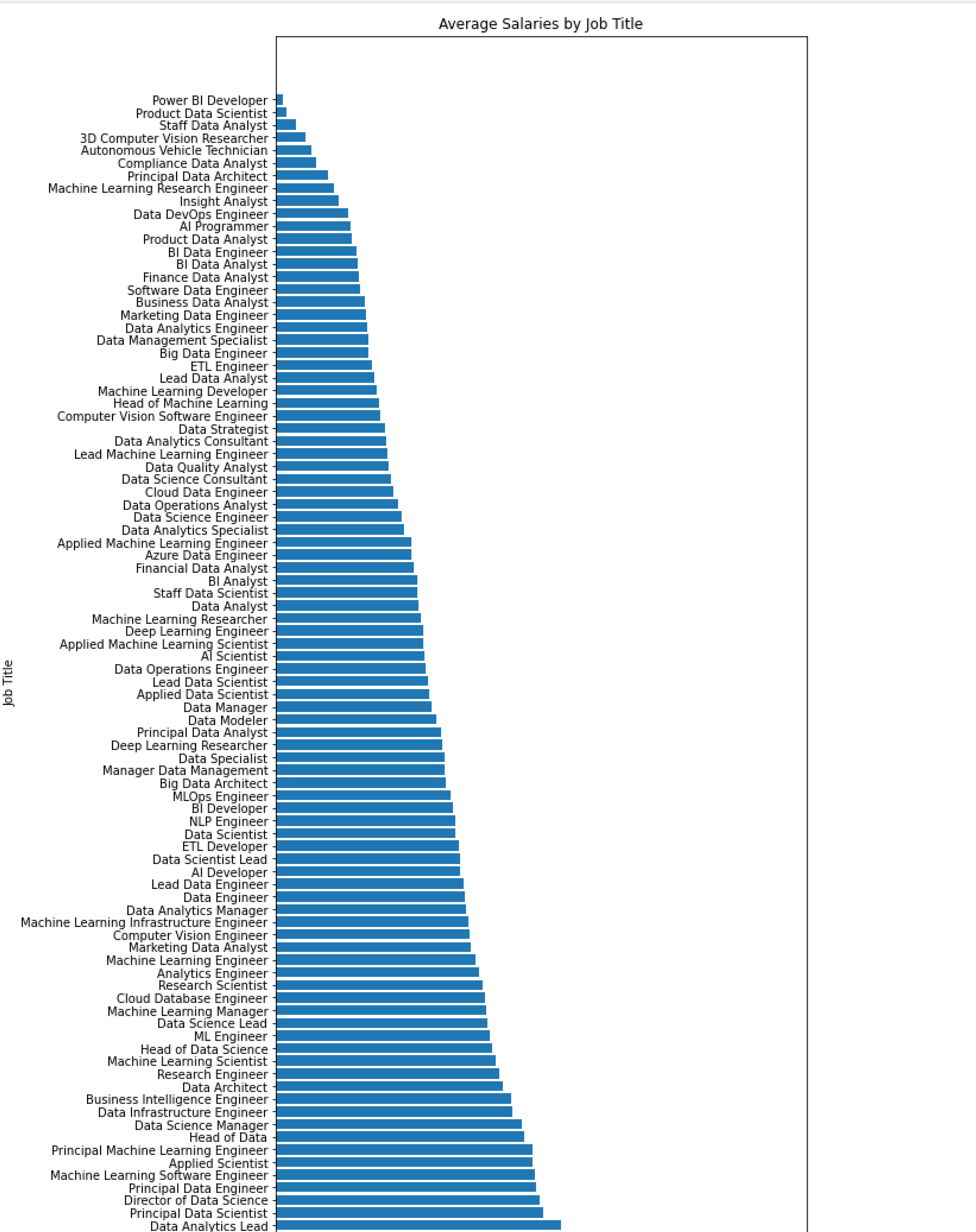
In [ ]:
```python
# Data engineer,Data Scientist and Data Analyst are top 3 job  in industry
```

In [30]:
```python
import matplotlib.pyplot as plt
import seaborn as sns
fig, ax = plt.subplots()
ax.set_title('Average Salaries by largest count of Job Title')
ax = sns.barplot(ax = ax, data = jobs , y = jobs['index'], x = df['salary_in_usd'],palette='mako')
```



In [32]:
```python
# Calculate mean salaries for each job title
job_title_salaries = df.groupby('job_title')['salary_in_usd'].mean().sort_values(ascending=False)
```

In [33]:
```python
# Create horizontal bar chart
import matplotlib.pyplot as plt
fig, ax = plt.subplots(figsize=(8, 20))
ax.barh(job_title_salaries.index, job_title_salaries.values)
ax.set_title('Average Salaries by Job Title')
ax.set_xlabel('Salary in USD')
ax.set_ylabel('Job Title')
plt.show()
```



In [ ]:
```python
# Data science tech lead is having the highest salary followed by cloud Data Architect, whereas Power bi develo

#If compared the count of job title to its salary the top 3 most popular jobs (Data engineer,Data Scientist and
```

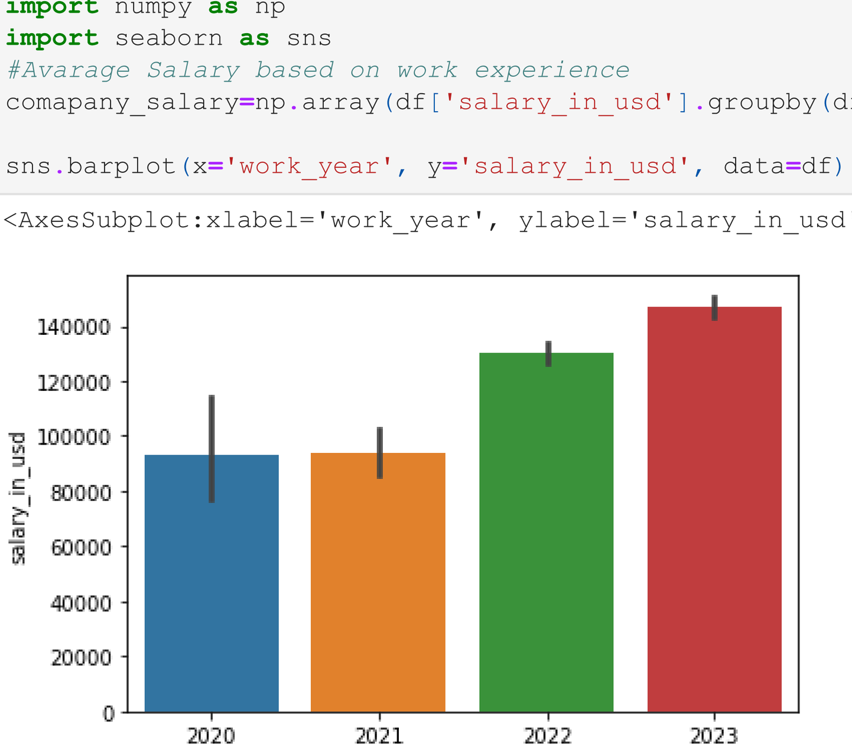
In [37]:
```python
df['salary_in_usd'].groupby(df['experience_level']) .mean() #Avarage Salary based on work experience
```

Out[37]:
```
experience_level
EN     72648.685185
EX    191078.208333
MI    101828.783133
SE    153897.435650
Name: salary_in_usd, dtype: float64
```

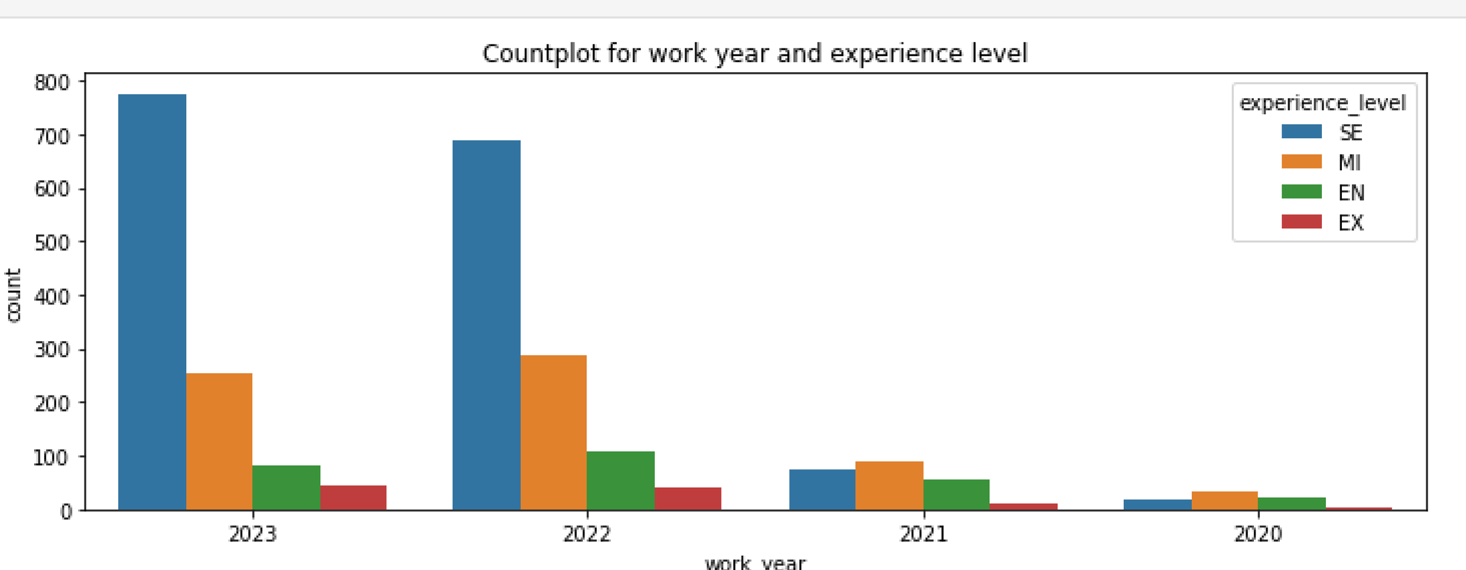
In [55]:
```python
import numpy as np
import seaborn as sns
#Avarage Salary based on work experience
comapany_salary=np.array(df['salary_in_usd'].groupby(df['work_year']) .mean())

sns.barplot(x='work_year', y='salary_in_usd', data=df)
```

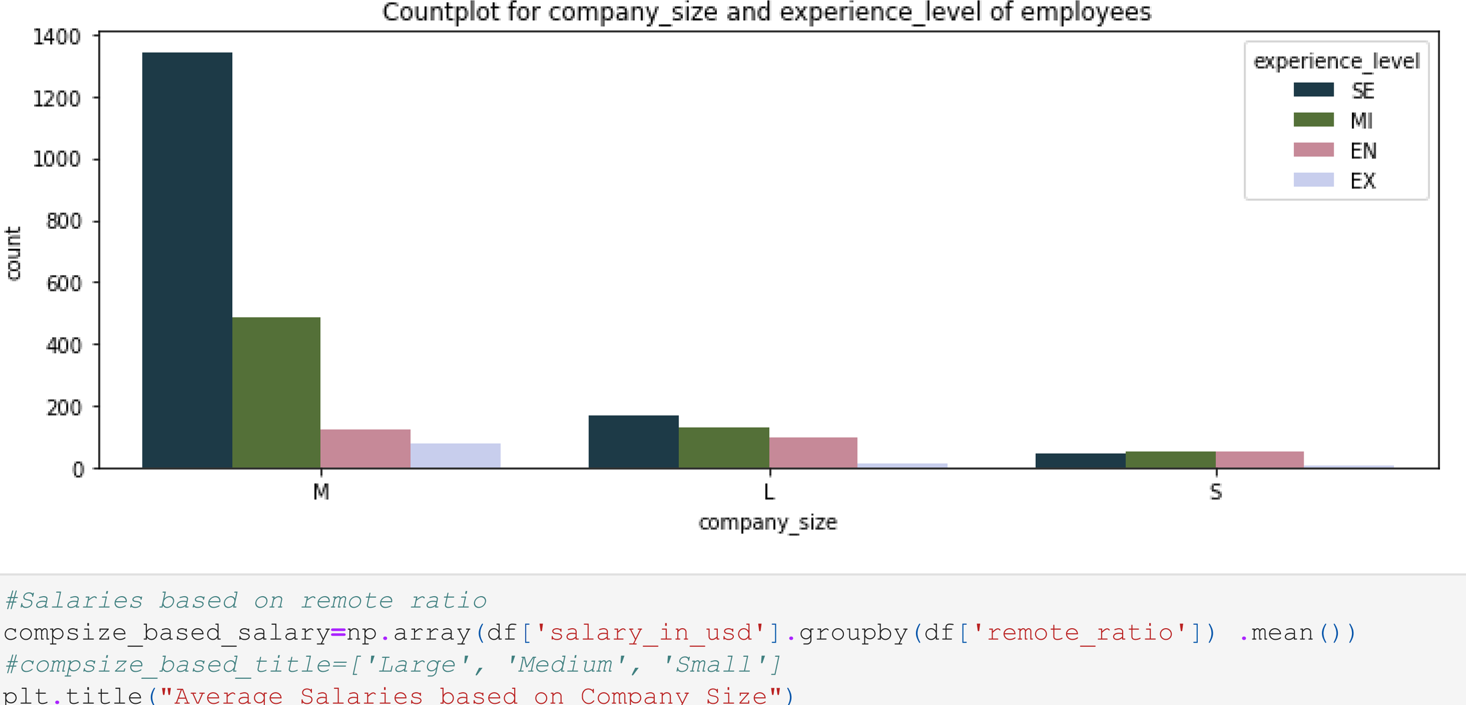
Out[55]:
```
<AxesSubplot:xlabel='work_year', ylabel='salary_in_usd'>
```



In [50]:
```python
plt.figure(figsize=[12,4])
sns.countplot(x = df['work_year'],hue=df['experience_level'],order=df['work_year'].value_counts().index)
plt.title('Countplot for work year and experience level')
plt.show()
```



In [53]:
```python
plt.figure(figsize=[12,4])
sns.countplot(x = df['company_size'],hue=df['experience_level'],order=df['company_size'].value_counts().index,p
plt.title('Countplot for company_size and experience_level of employees')
plt.show()
```



In [56]:
```python
#Salaries based on remote ratio
compsize_based_salary=np.array(df['salary_in_usd'].groupby(df['remote_ratio']) .mean())
#compsize_based_title=['Large', 'Medium', 'Small']
plt.title("Average Salaries based on Company Size")
plt.xlabel('Company size')
plt.ylabel('Salary')
sns.barplot(x='remote_ratio',y='salary_in_usd',data=df)
plt.show()
```