In [1]:
```
import pandas as pd
```

In [2]:
```
pd.__version__
```

Out[2]:
```
'2.3.1'
```

In [3]:
```
pip install openpyxl
```

```
Requirement already satisfied: openpyxl in c:\users\dell\appdata\local\programs\pyth
on\python313\lib\site-packages (3.1.5)
Requirement already satisfied: et-xmlfile in c:\users\dell\appdata\local\programs\py
thon\python313\lib\site-packages (from openpyxl) (2.0.0)
Note: you may need to restart the kernel to use updated packages.
```

In [4]:
```
emp = pd.read_excel(r"C:\Users\DELL\Downloads\Rawdata.xlsx")
```

In [5]:
```
emp
```

Out[5]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience#$	34 years	Mumbai	5^00#0	2+
1	Teddy^	Testing	45' yr	Bangalore	10%%000	<3
2	Uma#r	Dataanalyst^^#	NaN	NaN	1$5%000	4> yrs
3	Jane	Ana^^lytics	NaN	Hyderbad	2000^0	NaN
4	Uttam*	Statistics	67-yr	NaN	30000-	5+ year
5	Kim	NLP	55yr	Delhi	6000^$0	10+

In [6]:
```
import numpy as np
```

In [7]:
```
np.__version__
```

Out[7]:
```
'2.3.1'
```

In [8]:
```
emp.shape
```

Out[8]:
```
(6, 6)
```

In [9]:
```
len(emp)
```

Out[9]:
```
6
```

In [10]:
```
emp.columns
```

Out[10]:
```
Index(['Name', 'Domain', 'Age', 'Location', 'Salary', 'Exp'], dtype='object')
```

In [11]:
```
len(emp.columns)
```

Out[11]: 6

In [12]:
```
emp.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6 entries, 0 to 5
Data columns (total 6 columns):
 #   Column    Non-Null Count  Dtype 
---  ------    --------------  ----- 
 0   Name      6 non-null      object
 1   Domain    6 non-null      object
 2   Age       4 non-null      object
 3   Location  4 non-null      object
 4   Salary    6 non-null      object
 5   Exp       5 non-null      object
dtypes: object(6)
memory usage: 420.0+ bytes
```

In [13]:
```
emp
```

Out[13]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience#$	34 years	Mumbai	5^00#0	2+
1	Teddy^	Testing	45' yr	Bangalore	10%%000	<3
2	Uma#r	Dataanalyst^^#	NaN	NaN	1$5%000	4> yrs
3	Jane	Ana^^lytics	NaN	Hyderbad	2000^0	NaN
4	Uttam*	Statistics	67-yr	NaN	30000-	5+ year
5	Kim	NLP	55yr	Delhi	6000^$0	10+

In [14]:
```
emp['Name']
```

Out[14]:
```
0      Mike
1    Teddy^
2     Uma#r
3      Jane
4    Uttam*
5       Kim
Name: Name, dtype: object
```

In [15]:
```
emp['Domain']
```

Out[15]:
```
0     Datascience#$
1           Testing
2    Dataanalyst^^#
3       Ana^^lytics
4        Statistics
5               NLP
Name: Domain, dtype: object
```

In [16]:
```
emp['Age']
```

Out[16]:
```
0    34 years
1      45' yr
2         NaN
3         NaN
4       67-yr
5        55yr
Name: Age, dtype: object
```

In [17]:
```
emp['Location']
```

Out[17]:
```
0       Mumbai
1    Bangalore
2          NaN
3     Hyderbad
4          NaN
5        Delhi
Name: Location, dtype: object
```

In [18]:
```
emp['Salary']
```

Out[18]:
```
0     5^00#0
1    10%%000
2    1$5%000
3     2000^0
4     30000-
5    6000^$0
Name: Salary, dtype: object
```

In [19]:
```
emp['Exp']
```

Out[19]:
```
0         2+
1         <3
2     4> yrs
3        NaN
4    5+ year
5        10+
Name: Exp, dtype: object
```

In [20]:
```
emp[['Domain','Domain']]
```

Out[20]:

	Domain	Domain
0	Datascience#$	Datascience#$
1	Testing	Testing
2	Dataanalyst^^#	Dataanalyst^^#
3	Ana^^lytics	Ana^^lytics
4	Statistics	Statistics
5	NLP	NLP

In [21]:
```
emp[['Domain','Domain','Age','Location','Salary','Exp']]
```

Out[21]:

	Domain	Domain	Age	Location	Salary	Exp
0	Datascience#$	Datascience#$	34 years	Mumbai	5^00#0	2+
1	Testing	Testing	45' yr	Bangalore	10%%000	<3
2	Dataanalyst^^#	Dataanalyst^^#	NaN	NaN	1$5%000	4> yrs
3	Ana^^lytics	Ana^^lytics	NaN	Hyderbad	2000^0	NaN
4	Statistics	Statistics	67-yr	NaN	30000-	5+ year
5	NLP	NLP	55yr	Delhi	6000^$0	10+

DATA CLEANSING

In [22]:
```
emp['Name']
```

Out[22]:
```
0      Mike
1    Teddy^
2     Uma#r
3      Jane
4    Uttam*
5       Kim
Name: Name, dtype: object
```

✅ Correct (for newer pandas versions):

(regex=True): IS ADD AND USED

In [23]:
```
emp['Name'] = emp['Name'].str.replace(r'\W','', regex=True)
```

In [24]:
```
emp['Name']
```

Out[24]:
```
0     Mike
1    Teddy
2     Umar
3     Jane
4    Uttam
5      Kim
Name: Name, dtype: object
```

In [25]:
```
emp['Age'] = emp['Age'].str.replace(r'\W','', regex=True)
```

In [26]:
```
emp['Age']
```

Out[26]:
```
0    34years
1       45yr
2        NaN
3        NaN
4       67yr
5       55yr
Name: Age, dtype: object
```

In [27]:
```
# ✅ Correct (for newer pandas versions):
# .str.extract(r'(\d+)') :- IS USED
emp['Age'] = emp['Age'].str.extract(r'(\d+)')
```

In [28]:
```
emp['Age']
```

Out[28]:
```
0     34
1     45
2    NaN
3    NaN
4     67
5     55
Name: Age, dtype: object
```

In [29]:
```
emp
```

Out[29]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience#$	34	Mumbai	5^00#0	2+
1	Teddy	Testing	45	Bangalore	10%%000	<3
2	Umar	Dataanalyst^^#	NaN	NaN	1$5%000	4> yrs
3	Jane	Ana^^lytics	NaN	Hyderbad	2000^0	NaN
4	Uttam	Statistics	67	NaN	30000-	5+ year
5	Kim	NLP	55	Delhi	6000^$0	10+

In [30]:
```
emp['Domain'] = emp['Domain'].str.replace(r'\W','', regex=True)
```

In [31]:
```
emp['Domain']
```

Out[31]:
```
0    Datascience
1        Testing
2    Dataanalyst
3      Analytics
4     Statistics
5            NLP
Name: Domain, dtype: object
```

In [32]:
```
emp['Location'] = emp['Location'].str.replace(r'\W','', regex=True)
```

In [33]:
```
emp['Location']
```

Out[33]:
```
0       Mumbai
1    Bangalore
2          NaN
3     Hyderbad
4          NaN
5        Delhi
Name: Location, dtype: object
```

In [34]:
```
emp['Salary'] = emp['Salary'].str.replace(r'\W','', regex=True)
```

In [35]:
```
emp['Salary']
```

Out[35]:
```
0     5000
1    10000
2    15000
3    20000
4    30000
5    60000
Name: Salary, dtype: object
```

In [36]:
```
emp['Exp'] = emp['Exp'].str.replace(r'\W','', regex=True)
```

In [37]:
```
emp['Exp']
```

Out[37]:
```
0        2
1        3
2     4yrs
3      NaN
4    5year
5       10
Name: Exp, dtype: object
```

✅ Correct (for newer pandas versions):

.str.extract(r'(\d+)') :- IS USED

In [38]:
```
emp['Exp'] = emp['Exp'].str.extract(r'(\d+)')
```

In [39]:
```
emp['Exp']
```

Out[39]:
```
0      2
1      3
2      4
3    NaN
4      5
5     10
Name: Exp, dtype: object
```

In [40]:
```
emp
```

Out[40]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3
2	Umar	Dataanalyst	NaN	NaN	15000	4
3	Jane	Analytics	NaN	Hyderbad	20000	NaN
4	Uttam	Statistics	67	NaN	30000	5
5	Kim	NLP	55	Delhi	60000	10

In [41]:
```
clean_data = emp.copy()
```

In [42]:
```
clean_data
```

Out[42]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3
2	Umar	Dataanalyst	NaN	NaN	15000	4
3	Jane	Analytics	NaN	Hyderbad	20000	NaN
4	Uttam	Statistics	67	NaN	30000	5
5	Kim	NLP	55	Delhi	60000	10

Clean Missing Value Treatement

In [43]:
```
clean_data
```

Out[43]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3
2	Umar	Dataanalyst	NaN	NaN	15000	4
3	Jane	Analytics	NaN	Hyderbad	20000	NaN
4	Uttam	Statistics	67	NaN	30000	5
5	Kim	NLP	55	Delhi	60000	10

In [44]:
```
clean_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6 entries, 0 to 5
Data columns (total 6 columns):
 #   Column    Non-Null Count  Dtype 
---  ------    --------------  ----- 
 0   Name      6 non-null      object
 1   Domain    6 non-null      object
 2   Age       4 non-null      object
 3   Location  4 non-null      object
 4   Salary    6 non-null      object
 5   Exp       5 non-null      object
dtypes: object(6)
memory usage: 420.0+ bytes
```

In [45]:
```
import numpy as np
```

In [46]:
```
clean_data
```

Out[46]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3
2	Umar	Dataanalyst	NaN	NaN	15000	4
3	Jane	Analytics	NaN	Hyderbad	20000	NaN
4	Uttam	Statistics	67	NaN	30000	5
5	Kim	NLP	55	Delhi	60000	10

In [47]:
```
clean_data.head()
```

Out[47]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3
2	Umar	Dataanalyst	NaN	NaN	15000	4
3	Jane	Analytics	NaN	Hyderbad	20000	NaN
4	Uttam	Statistics	67	NaN	30000	5

In [48]:
```
clean_data.head(1)
```

Out[48]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2

In [49]:
```
clean_data['Age']
```

Out[49]:
```
0     34
1     45
2    NaN
3    NaN
4     67
5     55
Name: Age, dtype: object
```

In [50]:
```
clean_data['Age'] = clean_data['Age'].fillna(np.mean(pd.to_numeric(clean_data['Age'
```

In [51]:
```
clean_data['Age']
```

Out[51]:
```
0       34
1       45
2    50.25
3    50.25
4       67
5       55
Name: Age, dtype: object
```

In [52]:
```
emp
```

Out[52]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3
2	Umar	Dataanalyst	NaN	NaN	15000	4
3	Jane	Analytics	NaN	Hyderbad	20000	NaN
4	Uttam	Statistics	67	NaN	30000	5
5	Kim	NLP	55	Delhi	60000	10

In [53]:
```
clean_data
```

Out[53]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3
2	Umar	Dataanalyst	50.25	NaN	15000	4
3	Jane	Analytics	50.25	Hyderbad	20000	NaN
4	Uttam	Statistics	67	NaN	30000	5
5	Kim	NLP	55	Delhi	60000	10

In [54]:
```
clean_data['Exp'] = clean_data['Exp'].fillna(np.mean(pd.to_numeric(clean_data['Exp'
```

In [55]:
```
clean_data['Exp']
```

Out[55]:
```
0      2
1      3
2      4
3    4.8
4      5
5     10
Name: Exp, dtype: object
```

In [56]:
```
clean_data
```

Out[56]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3
2	Umar	Dataanalyst	50.25	NaN	15000	4
3	Jane	Analytics	50.25	Hyderbad	20000	4.8
4	Uttam	Statistics	67	NaN	30000	5
5	Kim	NLP	55	Delhi	60000	10

In [61]:
```
clean_data['Location'] = clean_data['Location'].fillna(clean_data['Location'].mode(
```

In [62]:
```
clean_data['Location']
```

Out[62]:
```
0       Mumbai
1    Bangalore
2    Bangalore
3     Hyderbad
4    Bangalore
5        Delhi
Name: Location, dtype: object
```

In [63]:
```
clean_data
```

Out[63]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3
2	Umar	Dataanalyst	50.25	Bangalore	15000	4
3	Jane	Analytics	50.25	Hyderbad	20000	4.8
4	Uttam	Statistics	67	Bangalore	30000	5
5	Kim	NLP	55	Delhi	60000	10

In [64]:
```
clean_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6 entries, 0 to 5
Data columns (total 6 columns):
 #   Column    Non-Null Count  Dtype 
---  ------    --------------  ----- 
 0   Name      6 non-null      object
 1   Domain    6 non-null      object
 2   Age       6 non-null      object
 3   Location  6 non-null      object
 4   Salary    6 non-null      object
 5   Exp       6 non-null      object
dtypes: object(6)
memory usage: 420.0+ bytes
```

Try TO Convert Object To Cat And Int

In [65]:
```
clean_data['Age'] = clean_data['Age'].astype(int)
```

In [66]:
```
clean_data['Salary'] = clean_data['Salary'].astype(int)
```

In [67]:
```
clean_data['Exp'] = clean_data['Exp'].astype(int)
```

In [68]:
```
clean_data
```

Out[68]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3
2	Umar	Dataanalyst	50	Bangalore	15000	4
3	Jane	Analytics	50	Hyderbad	20000	4
4	Uttam	Statistics	67	Bangalore	30000	5
5	Kim	NLP	55	Delhi	60000	10

In [69]:
```
clean_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6 entries, 0 to 5
Data columns (total 6 columns):
 #   Column    Non-Null Count  Dtype 
---  ------    --------------  ----- 
 0   Name      6 non-null      object
 1   Domain    6 non-null      object
 2   Age       6 non-null      int64 
 3   Location  6 non-null      object
 4   Salary    6 non-null      int64 
 5   Exp       6 non-null      int64 
dtypes: int64(3), object(3)
memory usage: 420.0+ bytes
```

In [75]:
```
clean_data['Name'] = clean_data['Name'].astype('category')
```

In [76]:
```
clean_data['Domain'] = clean_data['Domain'].astype('category')
```

In [77]:
```
clean_data['Location'] = clean_data['Location'].astype('category')
```

In [78]:
```
clean_data
```

Out[78]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3
2	Umar	Dataanalyst	50	Bangalore	15000	4
3	Jane	Analytics	50	Hyderbad	20000	4
4	Uttam	Statistics	67	Bangalore	30000	5
5	Kim	NLP	55	Delhi	60000	10

In [80]:
```
clean_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6 entries, 0 to 5
Data columns (total 6 columns):
 #   Column    Non-Null Count  Dtype   
---  ------    --------------  -----   
 0   Name      6 non-null      category
 1   Domain    6 non-null      category
 2   Age       6 non-null      int64   
 3   Location  6 non-null      category
 4   Salary    6 non-null      int64   
 5   Exp       6 non-null      int64   
dtypes: category(3), int64(3)
memory usage: 938.0 bytes
```

In [81]:
```
clean_data.to_csv('clean_data.csv')
```

In [82]:
```
import os
os.getcwd()
```

Out[82]:
```
'C:\\Users\\DELL'
```

In [84]:
```
clean_data.columns
```

Out[84]:
```
Index(['Name', 'Domain', 'Age', 'Location', 'Salary', 'Exp'], dtype='object')
```

In [85]:
```
import matplotlib.pyplot as plt
import seaborn as sns
```

In [86]:
```
import warnings
warnings.filterwarnings('ignore')
```

In [87]:
```
clean_data
```

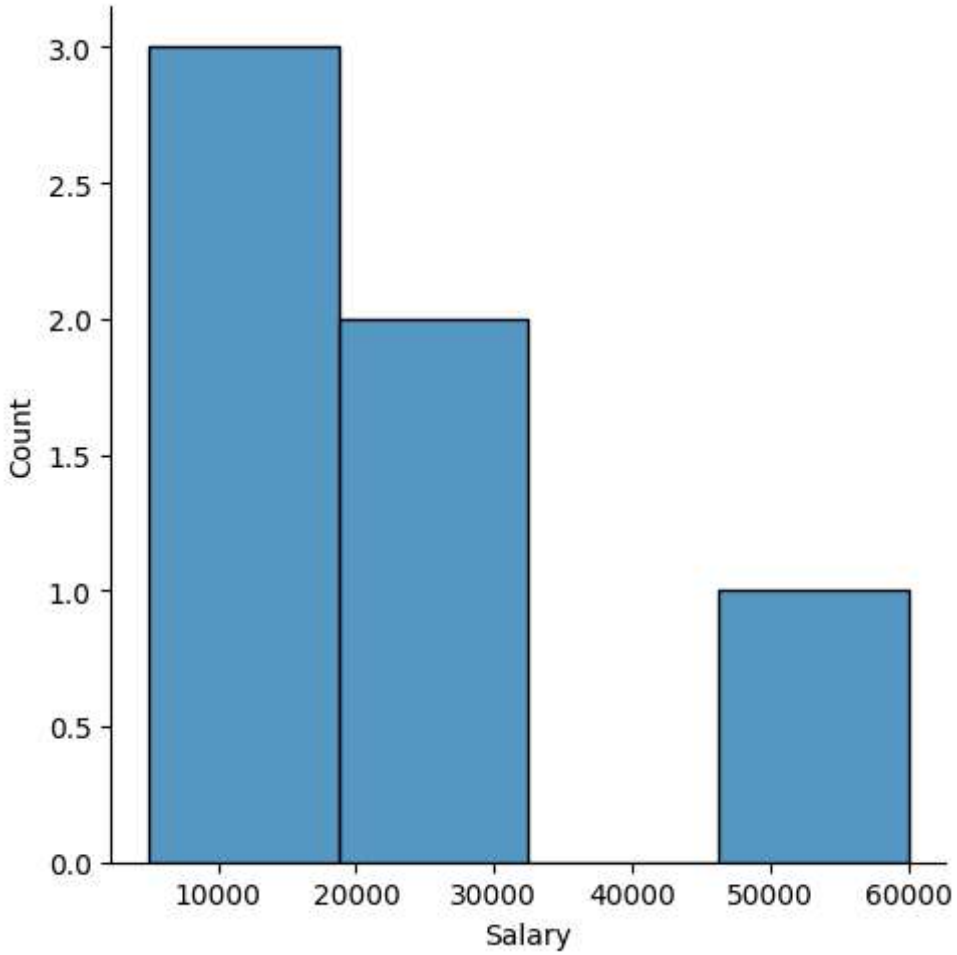
Out[87]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3
2	Umar	Dataanalyst	50	Bangalore	15000	4
3	Jane	Analytics	50	Hyderbad	20000	4
4	Uttam	Statistics	67	Bangalore	30000	5
5	Kim	NLP	55	Delhi	60000	10

In [88]:
```
clean_data['Salary']
```

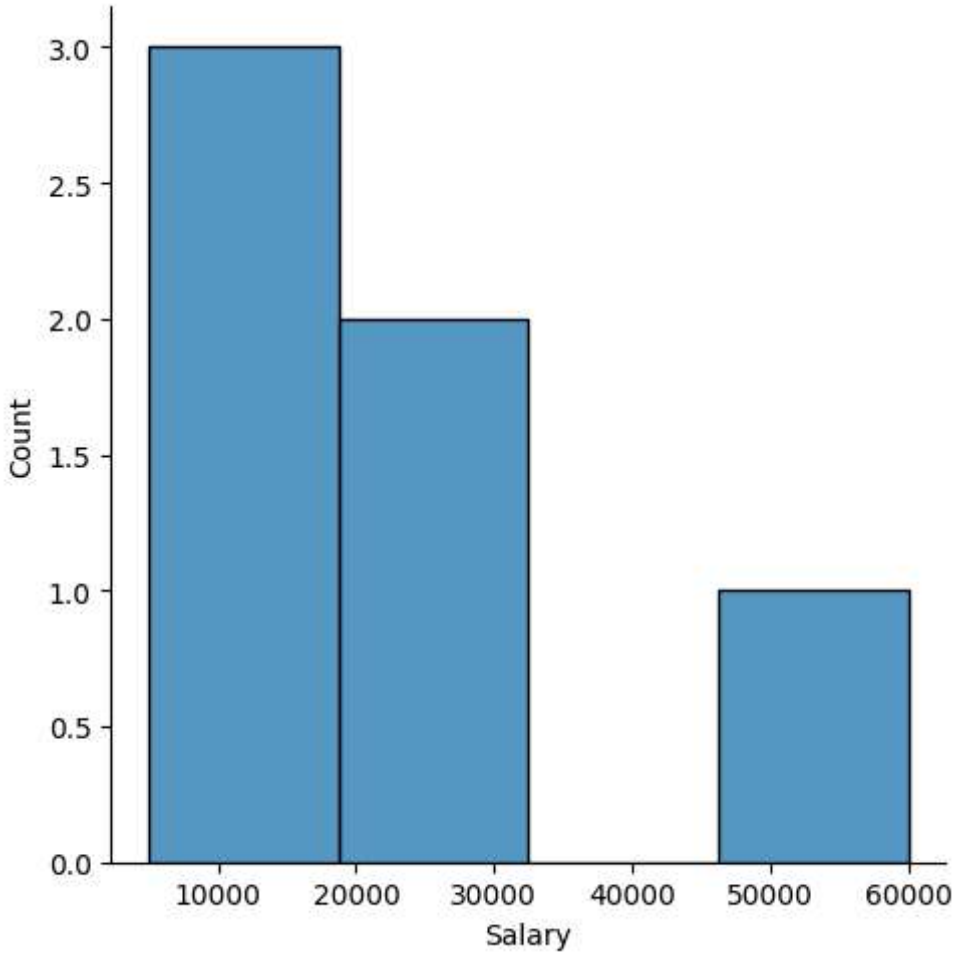
Out[88]:
```
0     5000
1    10000
2    15000
3    20000
4    30000
5    60000
Name: Salary, dtype: int64
```

In [89]:
```
vis1 = sns.displot(clean_data['Salary'])
```

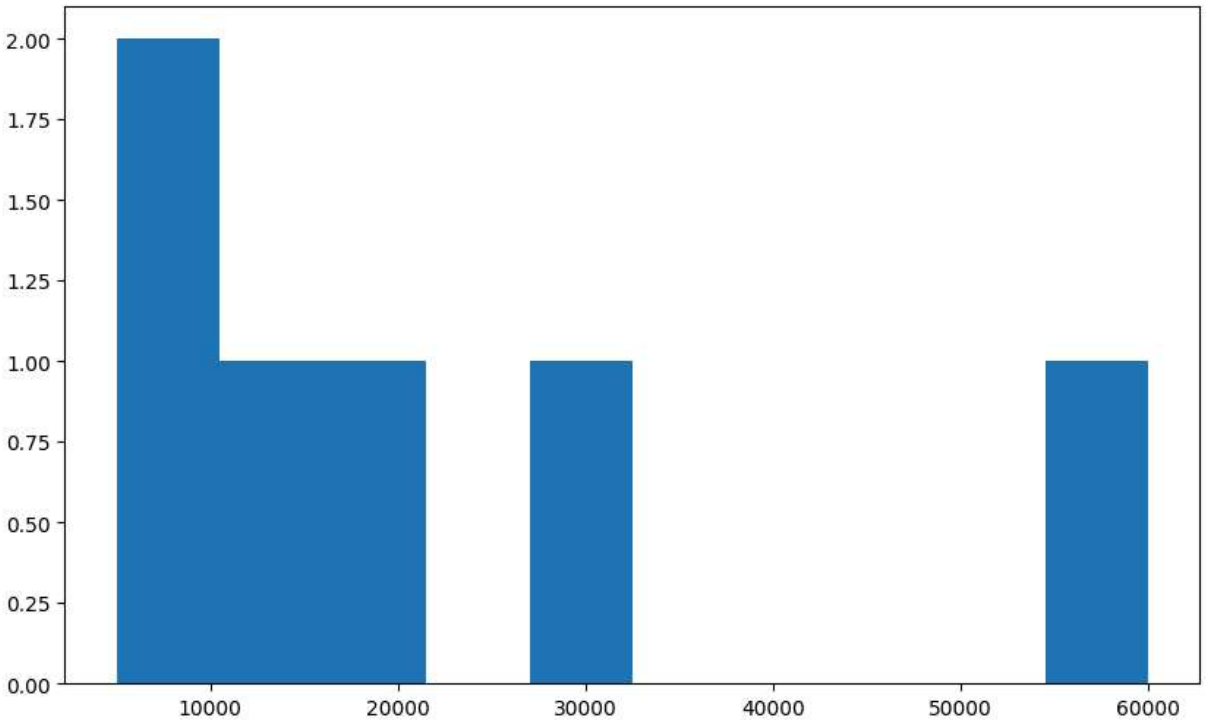


In [95]:
```
plt.rcParams['figure.figsize'] = 10,6
```

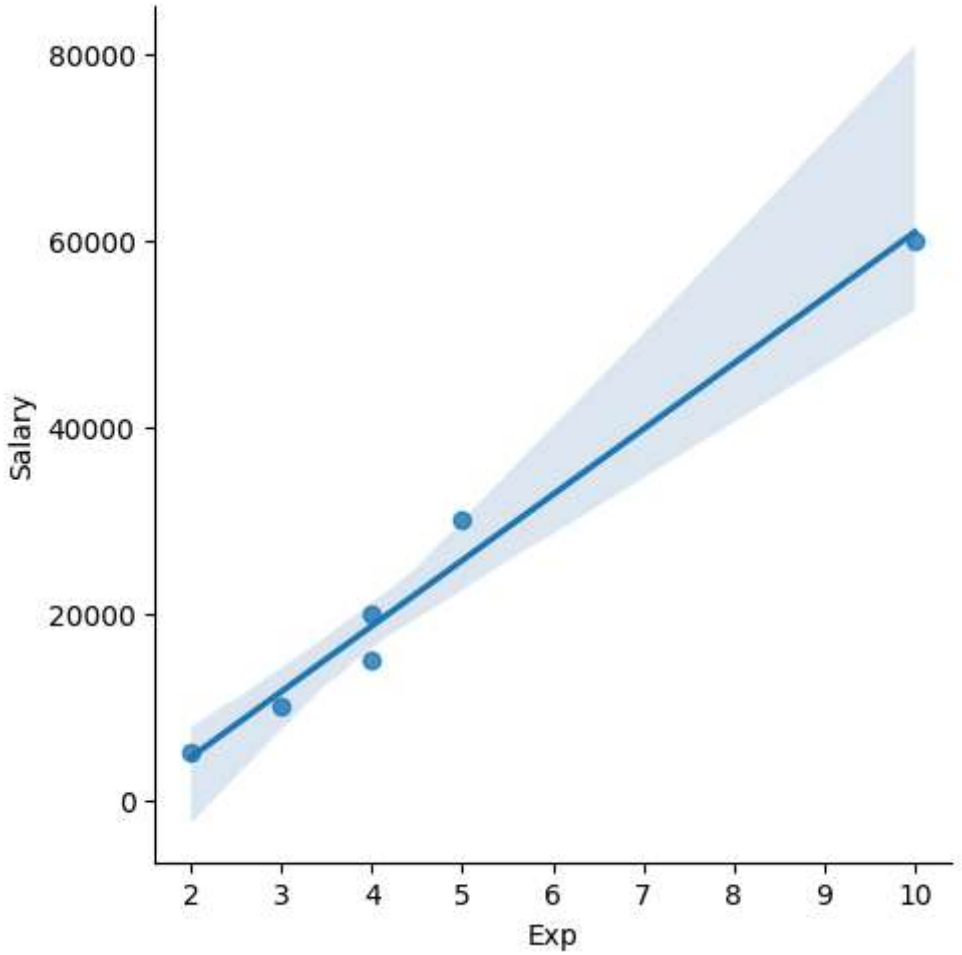
In [96]:
```
vis1 = sns.displot(clean_data['Salary'])
```



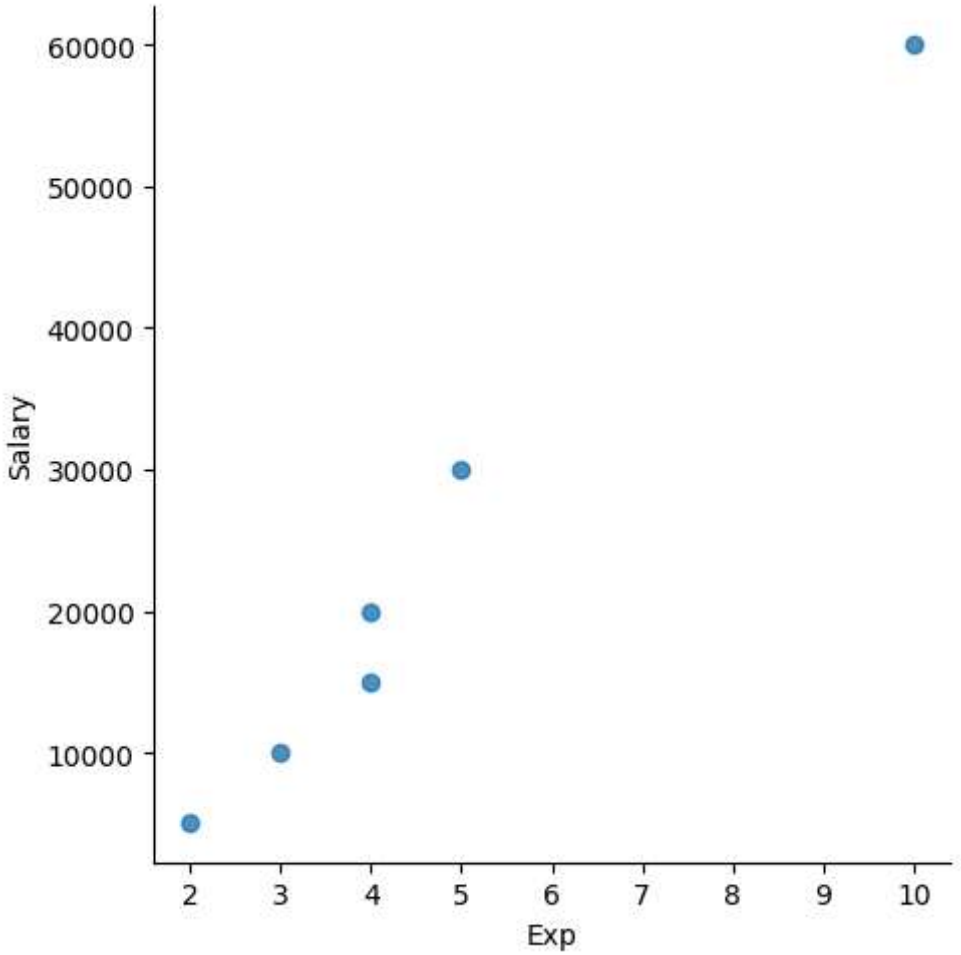
In [97]:
```
vis2 = plt.hist(clean_data['Salary'])
```



In [99]:
```
vis4 = sns.lmplot(data=clean_data,x = 'Exp', y = 'Salary')
```



In [105…
```
vis6 = sns.lmplot(data=clean_data,x = 'Exp' , y = 'Salary' , fit_reg = False)
```



In [106…
```
clean_data
```

Out[106…

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3
2	Umar	Dataanalyst	50	Bangalore	15000	4
3	Jane	Analytics	50	Hyderbad	20000	4
4	Uttam	Statistics	67	Bangalore	30000	5
5	Kim	NLP	55	Delhi	60000	10

In [107…
```
clean_data[:]
```

Out[107…

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3
2	Umar	Dataanalyst	50	Bangalore	15000	4
3	Jane	Analytics	50	Hyderbad	20000	4
4	Uttam	Statistics	67	Bangalore	30000	5
5	Kim	NLP	55	Delhi	60000	10

In [108…
```
clean_data[:2]
```

Out[108…

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3

In [109…
```
clean_data[2:]
```

Out[109…

	Name	Domain	Age	Location	Salary	Exp
2	Umar	Dataanalyst	50	Bangalore	15000	4
3	Jane	Analytics	50	Hyderbad	20000	4
4	Uttam	Statistics	67	Bangalore	30000	5
5	Kim	NLP	55	Delhi	60000	10

In [110…
```
clean_data[:]
```

Out[110…

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3
2	Umar	Dataanalyst	50	Bangalore	15000	4
3	Jane	Analytics	50	Hyderbad	20000	4
4	Uttam	Statistics	67	Bangalore	30000	5
5	Kim	NLP	55	Delhi	60000	10

In [111…
```
clean_data[0:1]
```

Out[111…

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2

In [114…
```
x_iv = clean_data.drop(['Salary'],axis=1)
```

In [115…
```
x_iv
```

Out[115…

	Name	Domain	Age	Location	Exp
0	Mike	Datascience	34	Mumbai	2
1	Teddy	Testing	45	Bangalore	3
2	Umar	Dataanalyst	50	Bangalore	4
3	Jane	Analytics	50	Hyderbad	4
4	Uttam	Statistics	67	Bangalore	5
5	Kim	NLP	55	Delhi	10

In [116…
```
x_iv.columns
```

Out[116…
```
Index(['Name', 'Domain', 'Age', 'Location', 'Exp'], dtype='object')
```

In [118…
```
clean_data.columns
```

Out[118…
```
Index(['Name', 'Domain', 'Age', 'Location', 'Salary', 'Exp'], dtype='object')
```

In [120…
```
y_dv = clean_data.drop(['Name', 'Domain', 'Age', 'Location', 'Exp'], axis= 1)
```

In [121…
```
y_dv
```

Out[121…

	Salary
0	5000
1	10000
2	15000
3	20000
4	30000
5	60000

In [122…
```
clean_data
```

Out[122…

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
1	Teddy	Testing	45	Bangalore	10000	3
2	Umar	Dataanalyst	50	Bangalore	15000	4
3	Jane	Analytics	50	Hyderbad	20000	4
4	Uttam	Statistics	67	Bangalore	30000	5
5	Kim	NLP	55	Delhi	60000	10

In [123…
```
x_iv
```

Out[123…

	Name	Domain	Age	Location	Exp
0	Mike	Datascience	34	Mumbai	2
1	Teddy	Testing	45	Bangalore	3
2	Umar	Dataanalyst	50	Bangalore	4
3	Jane	Analytics	50	Hyderbad	4
4	Uttam	Statistics	67	Bangalore	5
5	Kim	NLP	55	Delhi	10

In [124…
```
y_dv
```

Out[124…

	Salary
0	5000
1	10000
2	15000
3	20000
4	30000
5	60000

In [125…
```
imputation = pd.get_dummies(clean_data)
```

In [126…
```
imputation
```

Out[126...

	Age	Salary	Exp	Name_Jane	Name_Kim	Name_Mike	Name_Teddy	Name_Umar	Nan
0	34	5000	2	False	False	True	False	False	
1	45	10000	3	False	False	False	True	False	
2	50	15000	4	False	False	False	False	True	
3	50	20000	4	True	False	False	False	False	
4	67	30000	5	False	False	False	False	False	
5	55	60000	10	False	True	False	False	False	

In [ ]: