Day 24 - Exploratory Data Analysis: Practical

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings('ignore')
```

In [2]:
```
emp = pd.read_excel(r'C:\Users\Arman\Downloads\dataset\rawdata.xlsx')
```

In [3]:
```
emp
```

Out[3]:

	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 [4]:
```
emp.head()
```

Out[4]:

	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

In [5]:
```
emp.tail()
```

Out[5]:

	Name	Domain	Age	Location	Salary	Exp
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]:
```
emp.shape
```

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

In [7]:
```
emp.columns
```

Out[7]:
```
Index(['Name', 'Domain', 'Age', 'Location', 'Salary', 'Exp'], dtype='object')
```

In [8]:
```
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 [9]:
```
emp['Name']
```

Out[9]:
```
0      Mike
1    Teddy^
2     Uma#r
3      Jane
4    Uttam*
5       Kim
Name: Name, dtype: object
```

In [10]:
```
emp['Domain']
```

Out[10]:
```
0     Datascience#$
1           Testing
2    Dataanalyst^^#
3       Ana^^lytics
4        Statistics
5               NLP
Name: Domain, dtype: object
```

In [11]:
```
emp['Age']
```

Out[11]:
```
0    34 years
1      45' yr
2         NaN
3         NaN
4       67-yr
5        55yr
Name: Age, dtype: object
```

In [12]:
```
emp['Location']
```

Out[12]:
```
0       Mumbai
1    Bangalore
2          NaN
3     Hyderbad
4          NaN
5        Delhi
Name: Location, dtype: object
```

In [13]:
```
emp['Salary']
```

Out[13]:
```
0     5^00#0
1    10%%000
2    1$5%000
3     2000^0
4     30000-
5    6000^$0
Name: Salary, dtype: object
```

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

Out[14]:
```
0         2+
1         <3
2     4> yrs
3        NaN
4    5+ year
5        10+
Name: Exp, dtype: object
```

In [15]:
```
emp
```

Out[15]:

	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+

Data Cleaning

In [16]:
```
emp['Name'] = emp['Name'].str.replace(r'\W', '', regex=True)
emp['Name']
```

Out[16]:
```
0     Mike
1    Teddy
2     Umar
3     Jane
4    Uttam
5      Kim
Name: Name, dtype: object
```

In [17]:
```
emp['Domain'] = emp['Domain'].str.replace(r'\W', '', regex=True)
emp['Age'] = emp['Age'].str.replace(r'\W', '', regex=True)
emp['Salary'] = emp['Salary'].str.replace(r'\W', '', regex=True)
emp['Location'] = emp['Location'].str.replace(r'\W', '', regex=True)
```

In [18]:
```
emp
```

Out[18]:

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

In [19]:
```
emp['Age'] = emp['Age'].str.extract(r'(\d+)')
emp['Exp'] = emp['Exp'].str.extract(r'(\d+)')
```

In [20]:
```
emp
```

Out[20]:

	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 [21]:
```
clean_data = emp.copy()
```

In [22]:
```
clean_data
```

Out[22]:

	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

Missing Value Treatment

In [23]:
```
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 [24]:
```
clean_data
```

Out[24]:

	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 [25]:
```
clean_data['Age']
```

Out[25]:
```
0     34
1     45
2    NaN
3    NaN
4     67
5     55
Name: Age, dtype: object
```

In [26]:
```
clean_data['Age'] = clean_data['Age'].fillna(np.mean(pd.to_numeric(clean_data['Age'])))
clean_data['Exp'] = clean_data['Exp'].fillna(np.mean(pd.to_numeric(clean_data['Exp'])))
```

In [27]:
```
clean_data['Age']
```

Out[27]:
```
0       34
1       45
2    50.25
3    50.25
4       67
5       55
Name: Age, dtype: object
```

In [28]:
```
clean_data['Exp']
```

Out[28]:
```
0      2
1      3
2      4
3    4.8
4      5
5     10
Name: Exp, dtype: object
```

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

Out[29]:

	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 [30]:
```
clean_data
```

Out[30]:

	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 [31]:
```
clean_data['Location'] = clean_data['Location'].fillna(clean_data['Location'].mode()[0])
clean_data['Location']
```

Out[31]:
```
0       Mumbai
1    Bangalore
2    Bangalore
3     Hyderbad
4    Bangalore
5        Delhi
Name: Location, dtype: object
```

In [32]:
```
clean_data['Age'] = clean_data['Age'].astype(int)
clean_data['Salary'] = clean_data['Salary'].astype(int)
clean_data['Exp'] = clean_data['Exp'].astype(int)
```

In [33]:
```
clean_data
```

Out[33]:

	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 [34]:
```
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 [35]:
```
clean_data['Name'] = clean_data['Name'].astype('category')
clean_data['Domain'] = clean_data['Domain'].astype('category')
clean_data['Location'] = clean_data['Location'].astype('category')
```

In [36]:
```
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 [37]:
```
clean_data
```

Out[37]:

	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

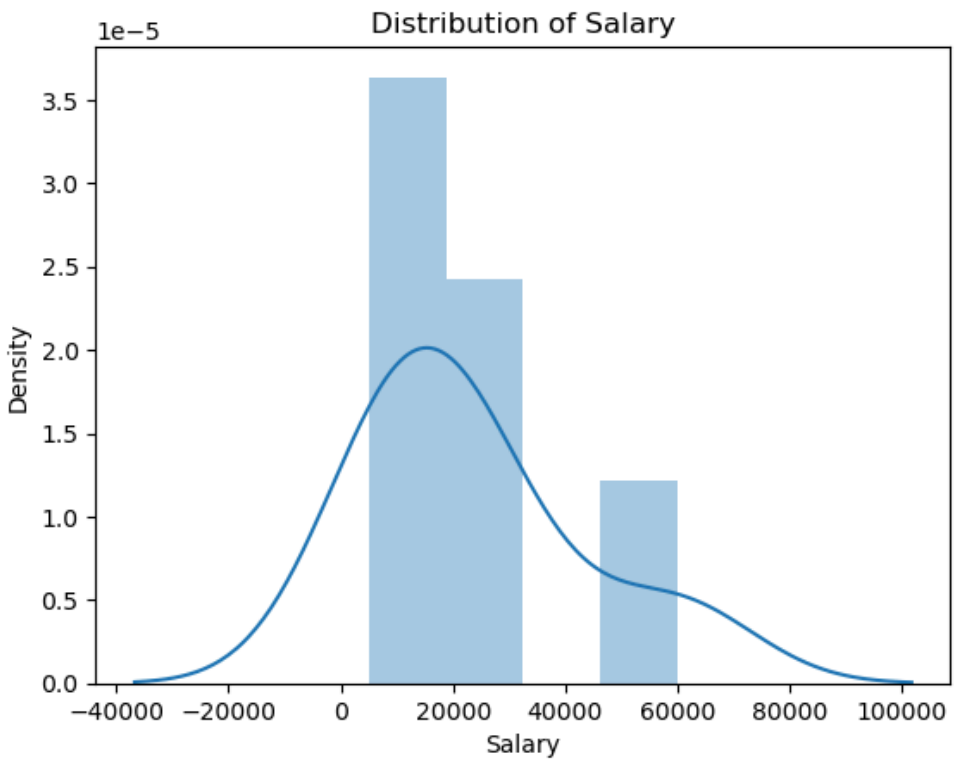
In [38]:
```
clean_data.to_csv('clean_data.csv')
```

In [39]:
```
clean_data['Salary']
```

Out[39]:
```
0     5000
1    10000
2    15000
3    20000
4    30000
5    60000
Name: Salary, dtype: int64
```

In [40]:
```
vis1 = sns.distplot(clean_data['Salary'])
plt.title("Distribution of Salary")
```

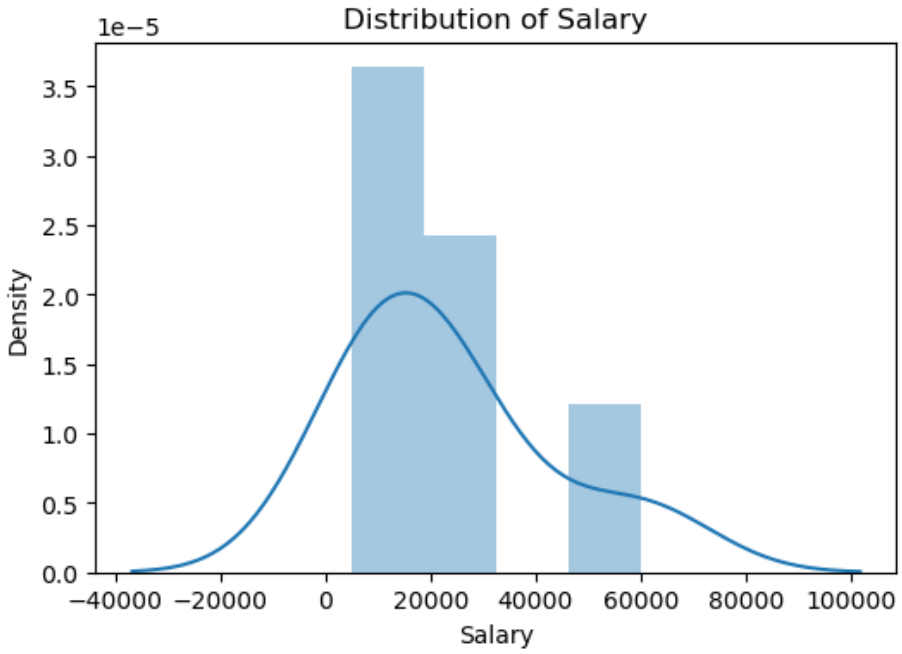
Out[40]:
```
Text(0.5, 1.0, 'Distribution of Salary')
```



In [41]:
```
plt.rcParams['figure.figsize'] = 6,4
```

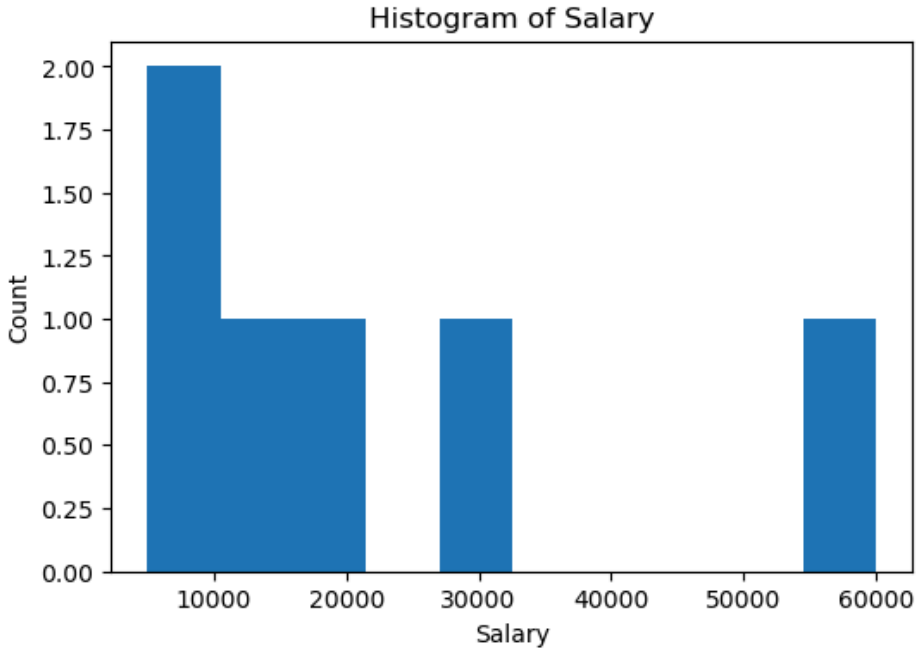
In [42]:
```
vis1 = sns.distplot(clean_data['Salary'])
plt.title("Distribution of Salary")
```

Out[42]:
```
Text(0.5, 1.0, 'Distribution of Salary')
```



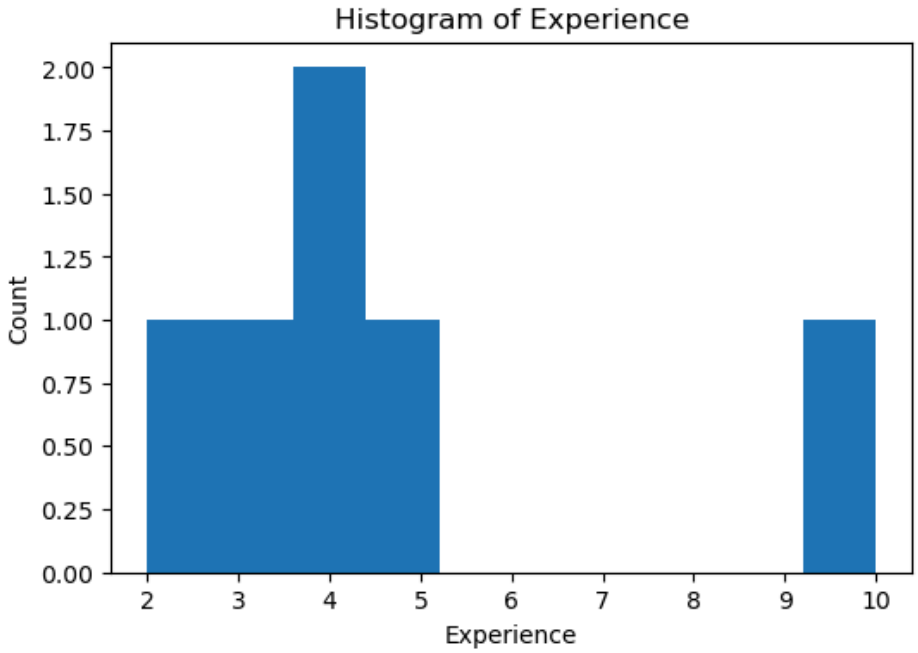
In [43]:
```
vis2 = plt.hist(clean_data['Salary'])
plt.title("Histogram of Salary")
plt.xlabel("Salary")
plt.ylabel("Count")
```

Out[43]: Text(0, 0.5, 'Count')

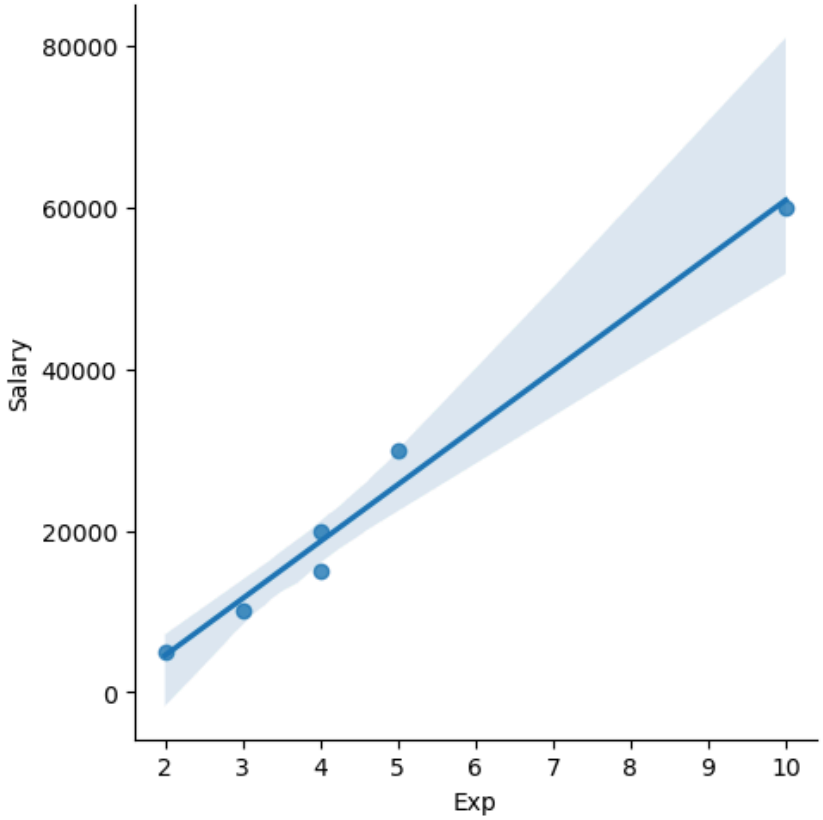


In [44]:
```
vis3 = plt.hist(clean_data['Exp'])
plt.title("Histogram of Experience")
plt.xlabel("Experience")
plt.ylabel("Count")
```

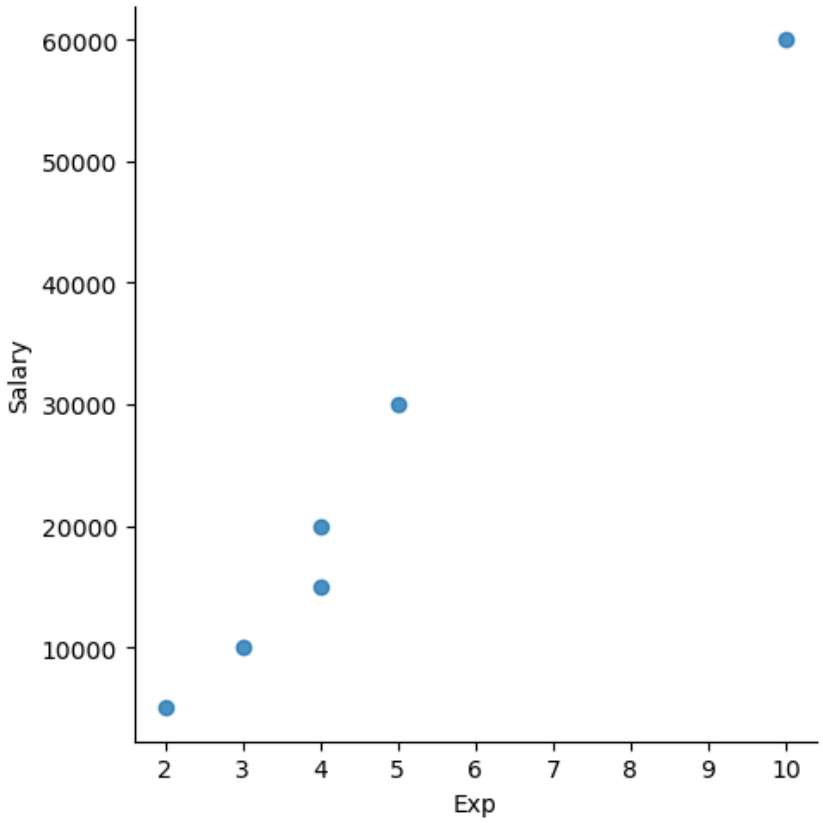
Out[44]: Text(0, 0.5, 'Count')



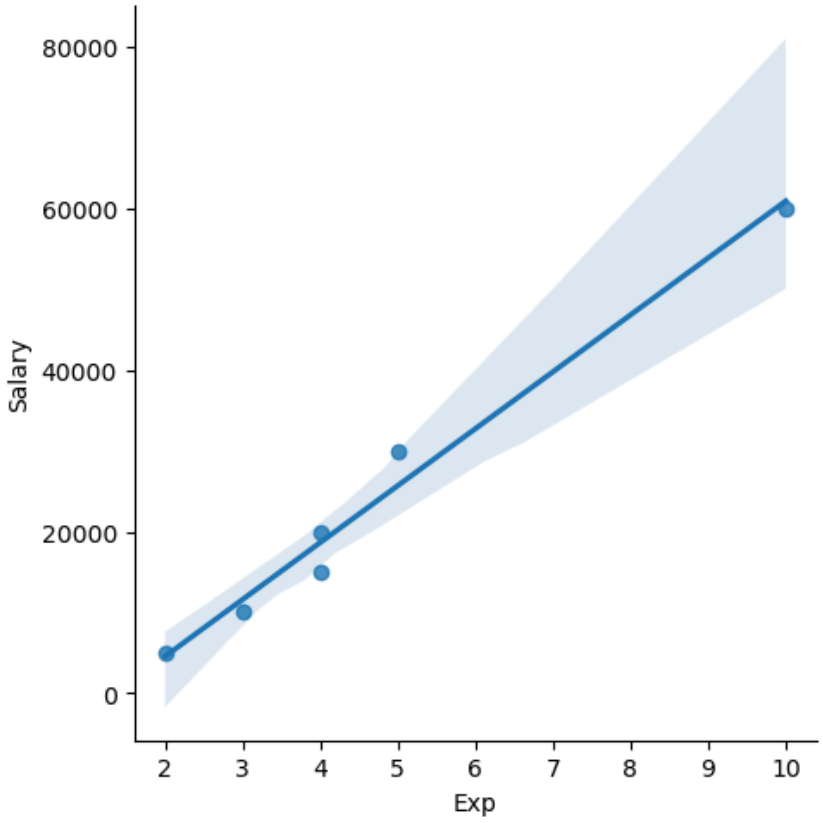
In [45]:
```
vis4 = sns.lmplot(data=clean_data,x = 'Exp', y='Salary')
```



In [46]:
```
vis5 = sns.lmplot(data=clean_data,x = 'Exp', y='Salary', fit_reg = False)
```



In [47]:
```
vis6 = sns.lmplot(data=clean_data,x = 'Exp', y='Salary', fit_reg = True)
```



In [48]:
```
clean_data
```

Out[48]:

	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 [49]:
```
clean_data[:2]
```

Out[49]:

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

In [50]:
```
clean_data[2:]
```

Out[50]:

	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 [51]:
```
clean_data[0:6:2]
```

Out[51]:

	Name	Domain	Age	Location	Salary	Exp
0	Mike	Datascience	34	Mumbai	5000	2
2	Umar	Dataanalyst	50	Bangalore	15000	4
4	Uttam	Statistics	67	Bangalore	30000	5

In [52]:
```
clean_data
```

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	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 [53]:
```
x_iv = emp[['Name', 'Domain', 'Age', 'Location', 'Exp']] # Independent variables
y_dv = emp[['Salary']]  # Dependent variable
```

In [54]:
```
x_iv
```

Out[54]:

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

In [55]:
```
y_dv
```

Out[55]:

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

In [56]:
```
imputation = pd.get_dummies(clean_data)
```

In [57]:
```
imputation
```

Out[57]:

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