Preprocessing of Employee Dataset

Loading the dataset and displaying the important details

In [142]:
```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
```

In [143]:
```
df = pd.read_csv("Employee.csv")
df.head(), df.shape
```

Out[143]:
```
(   Company   Age  Salary     Place Country  Gender
 0      TCS  20.0     NaN   Chennai   India       0
 1  Infosys  30.0     NaN    Mumbai   India       0
 2      TCS  35.0  2300.0  Calcutta   India       0
 3  Infosys  40.0  3000.0     Delhi   India       0
 4      TCS  23.0  4000.0    Mumbai   India       0,
 (148, 6))
```

There are 148 records with 6 features

Data Exploration

Statisticl Analysis

In [144]:
```
df.describe()
```

Out[144]:

	Age	Salary	Gender
count	130.000000	124.000000	148.000000
mean	30.484615	5312.467742	0.222973
std	11.096640	2573.764683	0.417654
min	0.000000	1089.000000	0.000000
25%	22.000000	3030.000000	0.000000
50%	32.500000	5000.000000	0.000000
75%	37.750000	8000.000000	0.000000
max	54.000000	9876.000000	1.000000

Analysing the unique values and their count for each feature

In [145]:
```
df.Company.unique(), len(df.Company.unique())
```

Out[145]:
```
(array(['TCS', 'Infosys', 'CTS', nan, 'Tata Consultancy Services',
        'Congnizant', 'Infosys Pvt Lmt'], dtype=object),
 7)
```

In [146]:
```
df.Age.unique(), len(df.Age.unique())
```

Out[146]:
```
(array([20., 30., 35., 40., 23., nan, 34., 45., 18., 22., 32., 37., 50.,
        21., 46., 36., 26., 41., 24., 25., 43., 19., 38., 51., 31., 44.,
        33., 17.,  0., 54.]),
 30)
```

In [147]:
```
df.Salary.unique(), len(df.Salary.unique())
```

Out[147]:
```
(array([  nan, 2300., 3000., 4000., 5000., 6000., 7000., 8000., 9000.,
        1089., 1234., 3030., 3045., 3184., 4824., 5835., 7084., 8943.,
        8345., 9284., 9876., 2034., 7654., 2934., 4034., 5034., 8202.,
        9024., 4345., 6544., 6543., 3234., 4324., 5435., 5555., 8787.,
        3454., 5654., 5009., 5098., 3033.]),
 41)
```

In [148]:
```
df.Place.unique(), len(df.Place.unique())
```

Out[148]:
```
(array(['Chennai', 'Mumbai', 'Calcutta', 'Delhi', 'Podicherry', 'Cochin',
        nan, 'Noida', 'Hyderabad', 'Bhopal', 'Nagpur', 'Pune'],
       dtype=object),
 12)
```

In [17]:
```
df.Country.unique(), len(df.Country.unique())
```

Out[17]:
```
(array(['India'], dtype=object), 1)
```

In [18]:
```
df.Gender.unique(), len(df.Gender.unique())
```

Out[18]:
```
(array([0, 1], dtype=int64), 2)
```

Data Cleaning

Handling duplicate rows

In [149]:
```
df[df.duplicated()]
```

Out[149]:

	Company	Age	Salary	Place	Country	Gender
84	CTS	43.0	NaN	Mumbai	India	0
130	TCS	21.0	4824.0	Mumbai	India	0
131	Infosys	NaN	5835.0	Mumbai	India	0
144	Infosys	22.0	8787.0	Calcutta	India	1

In [150]:
```
df = df.drop_duplicates()
df.shape
```

Out[150]:
```
(144, 6)
```

4 duplicate rows are removed

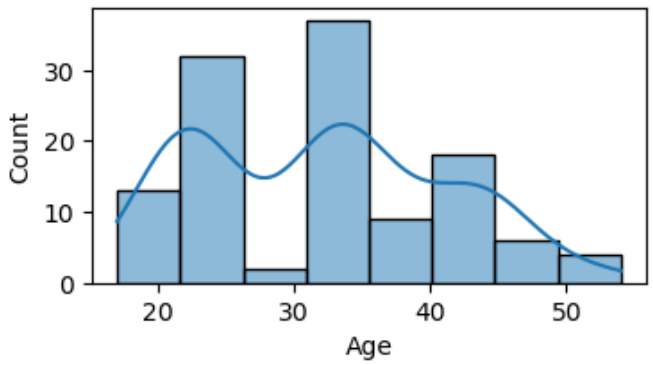
Handling missing/inappropriate data

In [151]:
```
#replacing 0 values of Age with Nan
df["Age"].replace(0,np.nan,inplace=True)
#df.head(10)
```

Out[151]: (144, 6)

In [152]:
```
plt.figure(figsize=(4,2))
sns.histplot(data=df,x='Age',kde=True)
```

Out[152]: <AxesSubplot:xlabel='Age', ylabel='Count'>



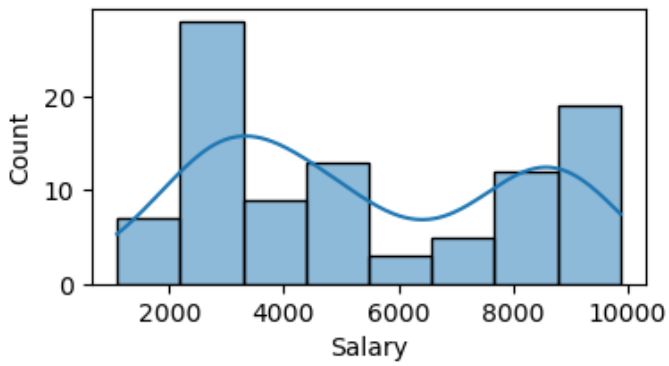
There are age values less than 20. Let us consider this as outliers and remove them

In [153]:
```
df = df[df['Age']>=20]
df.shape
```

Out[153]: (118, 6)

In [154]:
```
plt.figure(figsize=(4,2))
sns.histplot(data=df,x='Salary',kde=True)
```

Out[154]: <AxesSubplot:xlabel='Salary', ylabel='Count'>



In [157]:
```
#Replacing company values
df['Company'] = df['Company'].replace('Tata Consultancy Services','TCS')
df['Company'] = df['Company'].replace('Congnizant','CTS')
df['Company'] = df['Company'].replace('Infosys Pvt Lmt','Infosys')
df.Company.unique()
```

Out[157]: array(['TCS', 'Infosys', 'CTS', nan], dtype=object)

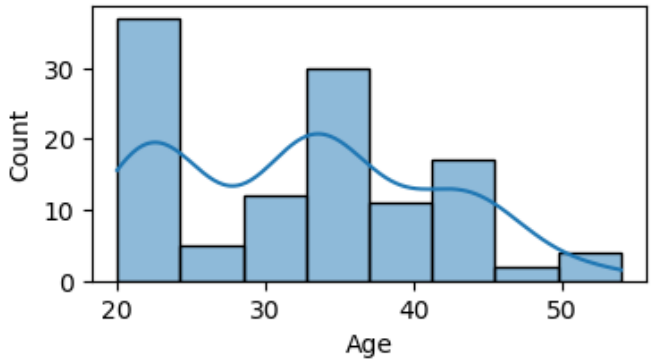
Handling Nan Values

In [41]:
```
df['Age'].mean()
```

Out[41]: 26.92361111111111

In [158]:
```
#Replacing Nan values with mean age
df["Age"]=df["Age"].fillna(27)
plt.figure(figsize=(4,2))
sns.histplot(data=df,x='Age',kde=True)
```

Out[158]: <AxesSubplot:xlabel='Age', ylabel='Count'>

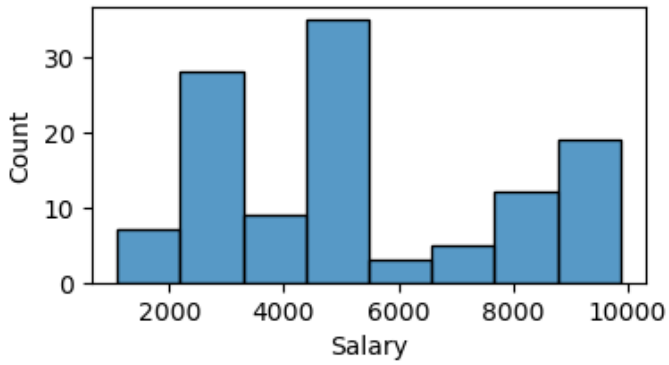


In [159]:
```
df["Salary"].mean()
```

Out[159]: 5424.083333333333

In [160]:
```
#Replacing Nan values with mean salary
df["Salary"]=df["Salary"].fillna(5312)
plt.figure(figsize=(4,2))
sns.histplot(data=df,x='Salary')
```

Out[160]: <AxesSubplot:xlabel='Salary', ylabel='Count'>



In [161]:
```
#Replacing Nan values for Places with Others
df["Place"]=df["Place"].fillna("Others")
```

In [163]:
```
#Replacing Nan values for Company with Others
df["Company"]=df["Company"].fillna("Others")
```

Data Analysis

Filtering data with age>40 and salary<5000

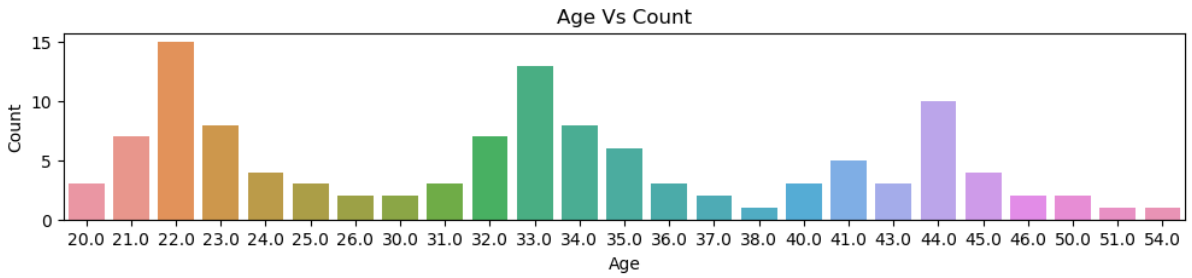
In [164]:
```
df_filtered = df[(df['Age']>40) & (df['Salary']<5000)]
df_filtered
```

Out[164]:

	Company	Age	Salary	Place	Country	Gender
21	Infosys	50.0	3184.0	Delhi	India	0
32	Infosys	45.0	4034.0	Calcutta	India	0
39	Infosys	41.0	3000.0	Mumbai	India	0
50	Infosys	41.0	3000.0	Chennai	India	0
57	Infosys	51.0	3184.0	Hyderabad	India	0
68	Infosys	43.0	4034.0	Mumbai	India	0
75	Infosys	44.0	3000.0	Cochin	India	0
86	Infosys	41.0	3000.0	Delhi	India	0
93	Infosys	54.0	3184.0	Mumbai	India	0
104	Infosys	44.0	4034.0	Delhi	India	0
122	Infosys	44.0	3234.0	Mumbai	India	0
129	Infosys	50.0	3184.0	Calcutta	India	0
138	CTS	44.0	3033.0	Cochin	India	0
140	Infosys	44.0	4034.0	Hyderabad	India	0
145	Infosys	44.0	4034.0	Delhi	India	1

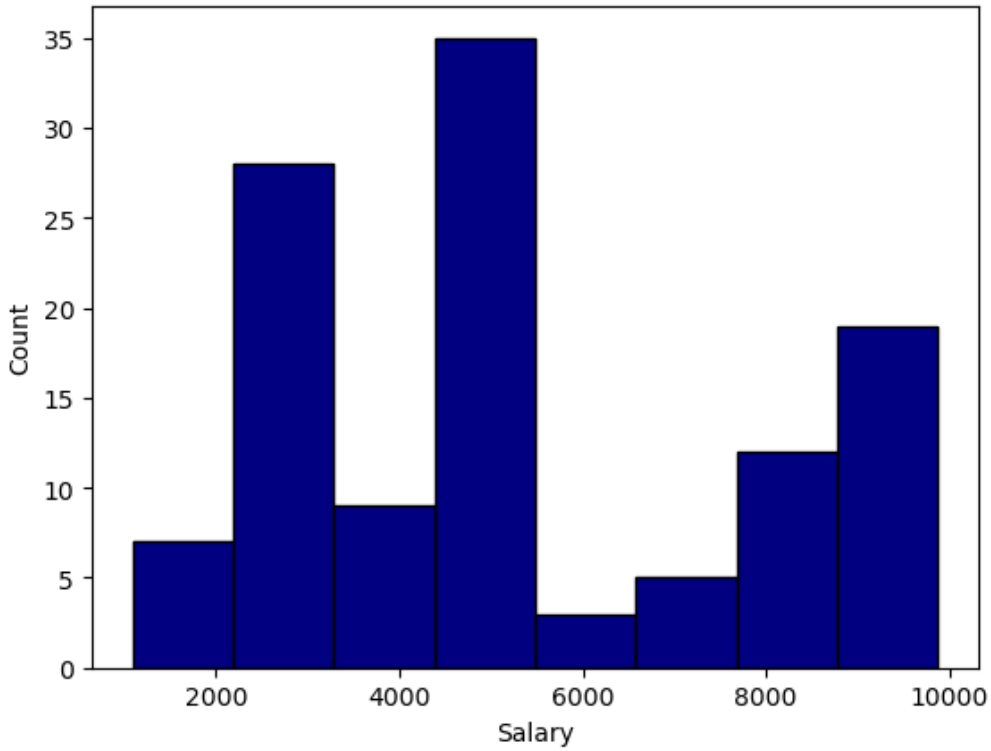
Plotting the chart with age and salary

In [165]:
```
age_count = df['Age'].value_counts()
plt.figure(figsize=(12,2))
sns.barplot(x=age_count.index, y=age_count.values)
plt.xlabel("Age")
plt.ylabel("Count")
plt.title("Age Vs Count")
plt.show()
```

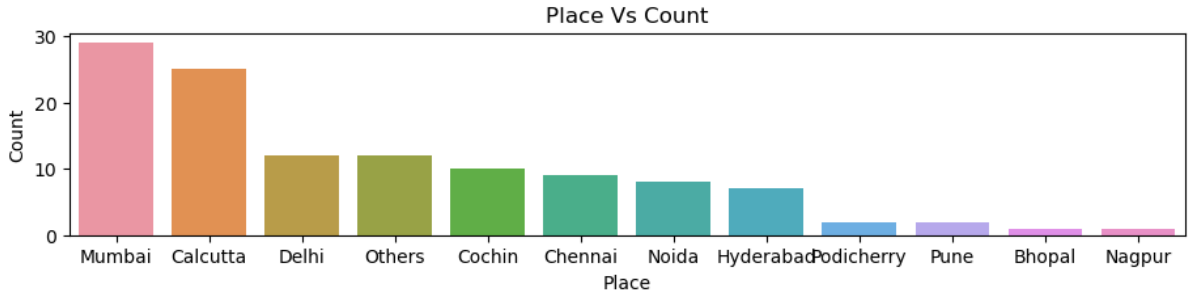


In [166]:
```
sns.histplot(data=df,x='Salary',color='navy',alpha=1)
```

Out[166]: <AxesSubplot:xlabel='Salary', ylabel='Count'>



In [167]:
```
place_count = df['Place'].value_counts()
plt.figure(figsize=(11,2))
sns.barplot(x=place_count.index, y=place_count.values)
plt.xlabel("Place")
plt.ylabel("Count")
plt.title("Place Vs Count")
plt.show()
```



Data Encoding

Company category encoding using Dummy Encoding

In [173]:
```
#creating dummy columns for company categories
dummies = pd.get_dummies(df.Company)
dummies

#merging with original df
encoded_company_merged = pd.concat([df,dummies],axis='columns')
encoded_company_merged.head()
```

Out[173]:

	Company	Age	Salary	Place	Country	Gender	CTS	Infosys	Others	TCS
0	TCS	20.0	5312.0	Chennai	India	0	0	0	0	1
1	Infosys	30.0	5312.0	Mumbai	India	0	0	1	0	0
2	TCS	35.0	2300.0	Calcutta	India	0	0	0	0	1
3	Infosys	40.0	3000.0	Delhi	India	0	0	1	0	0
4	TCS	23.0	4000.0	Mumbai	India	0	0	0	0	1

In [172]:
```
#Dropping the original Company column and one of the dummies so as to avoid dummy trap
final_company_encoded = encoded_company_merged.drop(['Company','Others'], axis='columns'
final_company_encoded
```

Out[172]:

	Age	Salary	Place	Country	Gender	CTS	Infosys	TCS
0	20.0	5312.0	Chennai	India	0	0	0	1
1	30.0	5312.0	Mumbai	India	0	0	1	0
2	35.0	2300.0	Calcutta	India	0	0	0	1
3	40.0	3000.0	Delhi	India	0	0	1	0
4	23.0	4000.0	Mumbai	India	0	0	0	1
...	...	...	...	...	...	...	...	...
142	22.0	8202.0	Mumbai	India	0	0	1	0
143	33.0	9024.0	Calcutta	India	1	0	0	1
145	44.0	4034.0	Delhi	India	1	0	1	0
146	33.0	5034.0	Mumbai	India	1	0	0	1
147	22.0	8202.0	Cochin	India	0	0	1	0

118 rows × 8 columns

Place category encoding

In [176]:
```
#creating dummy columns for company categories
place_dummies = pd.get_dummies(final_company_encoded.Place)
place_dummies

#merging with company_merged df
encoded_place_merged = pd.concat([final_company_encoded,place_dummies],axis='columns')
encoded_place_merged.head()
```

Out[176]:

	Age	Salary	Place	Country	Gender	CTS	Infosys	TCS	Bhopal	Calcutta	Chennai	Cochin	Delhi	Hy
0	20.0	5312.0	Chennai	India	0	0	0	1	0	0	1	0	0	
1	30.0	5312.0	Mumbai	India	0	0	1	0	0	0	0	0	0	
2	35.0	2300.0	Calcutta	India	0	0	0	1	0	1	0	0	0	
3	40.0	3000.0	Delhi	India	0	0	1	0	0	0	0	0	1	
4	23.0	4000.0	Mumbai	India	0	0	0	1	0	0	0	0	0	

In [178]:
```
#Dropping the original Place column and one of the dummies so as to avoid dummy trap
# Also dropping Country column as it has no impact
final_encoded_df = encoded_place_merged.drop(['Place','Others','Country'], axis='columns
final_encoded_df
```

Out[178]:

	Age	Salary	Gender	CTS	Infosys	TCS	Bhopal	Calcutta	Chennai	Cochin	Delhi	Hyderabad	Mumba
0	20.0	5312.0	0	0	0	1	0	0	1	0	0	0	
1	30.0	5312.0	0	0	1	0	0	0	0	0	0	0	
2	35.0	2300.0	0	0	0	1	0	1	0	0	0	0	
3	40.0	3000.0	0	0	1	0	0	0	0	0	1	0	
4	23.0	4000.0	0	0	0	1	0	0	0	0	0	0	
...	...	...	...	...	...	...	...	...	...	...	...	...	.
142	22.0	8202.0	0	0	1	0	0	0	0	0	0	0	
143	33.0	9024.0	1	0	0	1	0	1	0	0	0	0	
145	44.0	4034.0	1	0	1	0	0	0	0	0	1	0	
146	33.0	5034.0	1	0	0	1	0	0	0	0	0	0	
147	22.0	8202.0	0	0	1	0	0	0	0	1	0	0	

118 rows × 17 columns

The final dataframe is cleaned and completely converted into numeric values and is ready for algorithms

Feature Scaling

This is performed during the data pre-processing to handle highly varying magnitudes or values or units

In [ ]:
```
from sklearn.preprocessing import MinMaxScaler

#Copying the columns to scale to a new df
df_to_scale = df[['Age','Salary']]
df_to_scale
```

In [191]:
```
scaler = MinMaxScaler()
#scaling the values to be between 0 & 1 using MinMax Scaling
scaled_data = scaler.fit_transform(df_to_scale)
scaled_df = pd.DataFrame(scaled_data,columns=df_to_scale.columns)
scaled_df.head()
```

Out[191]:

	Age	Salary
0	0.000000	0.480596
1	0.294118	0.480596
2	0.441176	0.137817
3	0.588235	0.217480
4	0.088235	0.331285

In [195]:
```
#dropping the original Age & Salary columns
final_encoded=final_encoded_df.drop(['Age','Salary'],axis='columns')

#Merging the scaled columns to final encoded dataframe
final_df = pd.concat([scaled_df,final_encoded],axis='columns')
final_df.head()
```

Out[195]:

	Age	Salary	Gender	CTS	Infosys	TCS	Bhopal	Calcutta	Chennai	Cochin	Delhi	Hyderabad	M
0	0.000000	0.480596	0.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	0.0	
1	0.294118	0.480596	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.441176	0.137817	0.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	
3	0.588235	0.217480	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	
4	0.088235	0.331285	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	

The final dataframe, which is cleaned,encoded and scaled is displayed above