Module 4: Python Project

[44]:
```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
```

*[8]:
```
abc = pd.read_csv('abc_company.csv', encoding='latin-1')
print(abc.head())
```

```
             Name            Team  Number Position  Age  Height  Weight  \
0  Avery Bradley  Boston Celtics       0       PG   25  06-Feb     180
1    Jae Crowder  Boston Celtics      99       SF   25  06-Jun     235
2   John Holland  Boston Celtics      30       SG   27  06-May     205
3    R.J. Hunter  Boston Celtics      28       SG   22  06-May     185
4  Jonas Jerebko  Boston Celtics       8       PF   29  06-Oct     231

              College     Salary
0               Texas  7730337.0
1           Marquette  6796117.0
2  Boston University        NaN
3      Georgia State  1148640.0
4                 NaN  5000000.0
```

[26]:
```
for col in abc.columns:
    print(col)
```

```
Name
Team
Number
Position
Age
Height
Weight
College
Salary
```

Preprocessing:
Correct the data in the "height" column by replacing it with random numbers between 150 and 180. Ensure data consistency and integrity before proceeding with analysis. (1 mark)

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```
abc = pd.read_csv('abc_company.csv', encoding='latin-1') # Load the dataset

print("Original DataFrame:")
print(abc.head())

if 'Height' in abc.columns:              # REPLACE Height btwn 150 and 180
    abc['Height'] = np.random.randint(150, 181, size=len(abc)) # (size=len(abc)) used for generate specific number of random integers.
else:
    print("Column 'height' does not exist in the dataset.")

print("\nDataFrame after preprocessing:")
print(abc.head())

abc.to_csv('abc_company_cleaned.csv', index=False)  # saved to new csv file
print("\nCleaned dataset saved as 'abc_company_cleaned.csv'.")
```

```
Original DataFrame:
             Name            Team  Number Position  Age  Height  Weight  \
0  Avery Bradley  Boston Celtics       0       PG   25  06-Feb     180
1    Jae Crowder  Boston Celtics      99       SF   25  06-Jun     235
2   John Holland  Boston Celtics      30       SG   27  06-May     205
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              College     Salary
0               Texas  7730337.0
1           Marquette  6796117.0
2  Boston University        NaN
3       Georgia State  1148640.0
4                 NaN  5000000.0

DataFrame after preprocessing:
             Name            Team  Number Position  Age  Height  Weight  \
0  Avery Bradley  Boston Celtics       0       PG   25     174     180
1    Jae Crowder  Boston Celtics      99       SF   25     157     235
2   John Holland  Boston Celtics      30       SG   27     153     205
3    R.J. Hunter  Boston Celtics      28       SG   22     180     185
4  Jonas Jerebko  Boston Celtics       8       PF   29     179     231

              College     Salary
0               Texas  7730337.0
1           Marquette  6796117.0
2  Boston University        NaN
3       Georgia State  1148640.0
4                 NaN  5000000.0

Cleaned dataset saved as 'abc_company_cleaned.csv'.
```

Analysis Tasks:

1. Determine the distribution of employees across each team and calculate the percentage split relative to the total number of employees. (2 marks)

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1. Determine the distribution of employees across each team and calculate the
percentage split relative to the total number of employees. (2 marks)
```

```
abc = pd.read_csv('abc_company_cleaned.csv') #READ

team_count = abc['Team'].value_counts() # number of employees in each team

team_percentage = (team_count / len(abc)) * 100 # percentage split for each team

print("Number of employees in each team:")
print(team_count)
print("\nPercentage of employees in each team:")
print(team_percentage)
```

```
Number of employees in each team:
Team
New Orleans Pelicans      19
Memphis Grizzlies         18
Utah Jazz                 16
New York Knicks           16
Milwaukee Bucks           16
Brooklyn Nets             15
Portland Trail Blazers    15
Oklahoma City Thunder     15
Denver Nuggets            15
Washington Wizards        15
Miami Heat                15
Charlotte Hornets         15
Atlanta Hawks             15
San Antonio Spurs         15
Houston Rockets           15
Boston Celtics            15
Indiana Pacers            15
Detroit Pistons           15
Cleveland Cavaliers       15
Chicago Bulls             15
Sacramento Kings          15
Phoenix Suns              15
Los Angeles Lakers        15
Los Angeles Clippers      15
Golden State Warriors     15
Toronto Raptors           15
Philadelphia 76ers        15
Dallas Mavericks          15
Orlando Magic             14
Minnesota Timberwolves    14
Name: count, dtype: int64
```

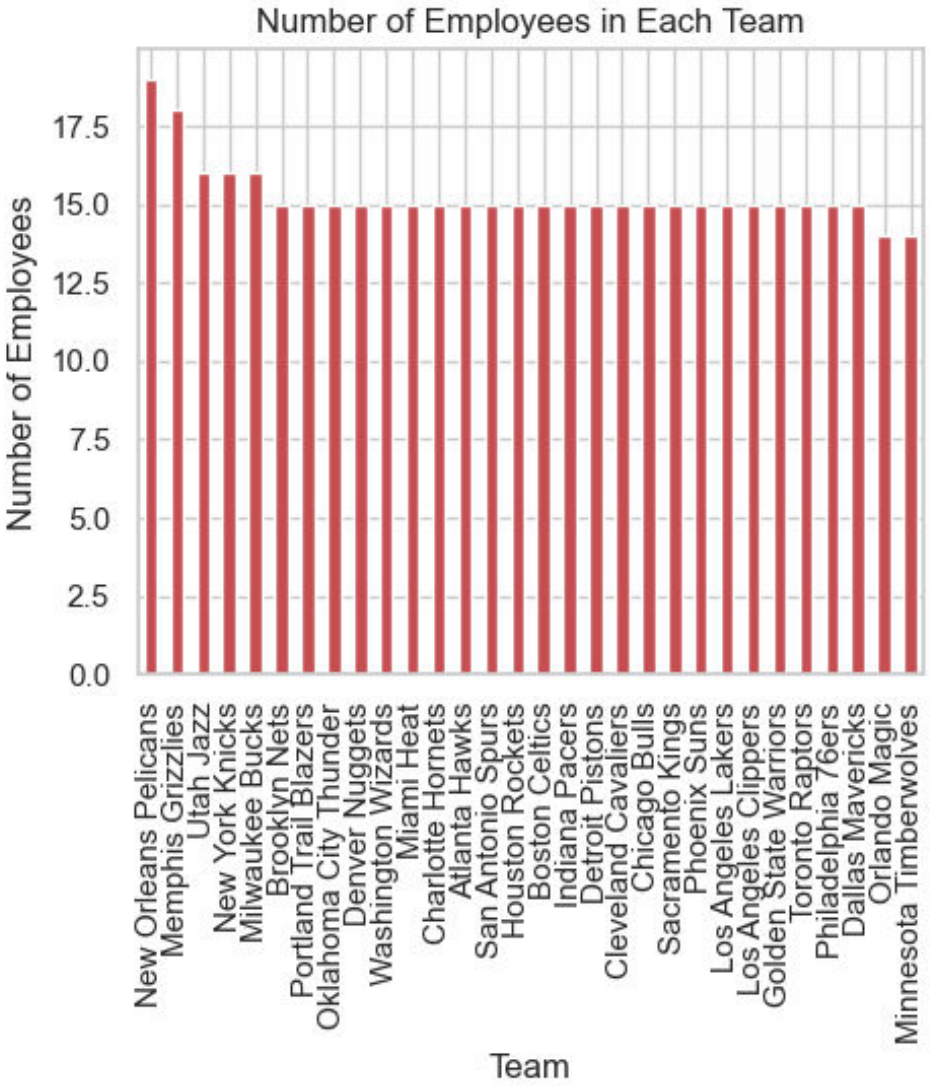
```
Percentage of employees in each team:
Team
New Orleans Pelicans      4.148472
Memphis Grizzlies         3.930131
Utah Jazz                 3.493450
New York Knicks           3.493450
Milwaukee Bucks           3.493450
Brooklyn Nets             3.275109
Portland Trail Blazers    3.275109
Oklahoma City Thunder     3.275109
Denver Nuggets            3.275109
Washington Wizards        3.275109
Miami Heat                3.275109
Charlotte Hornets         3.275109
Atlanta Hawks             3.275109
San Antonio Spurs         3.275109
Houston Rockets           3.275109
Boston Celtics            3.275109
Indiana Pacers            3.275109
Detroit Pistons           3.275109
Cleveland Cavaliers       3.275109
Chicago Bulls             3.275109
Sacramento Kings          3.275109
Phoenix Suns              3.275109

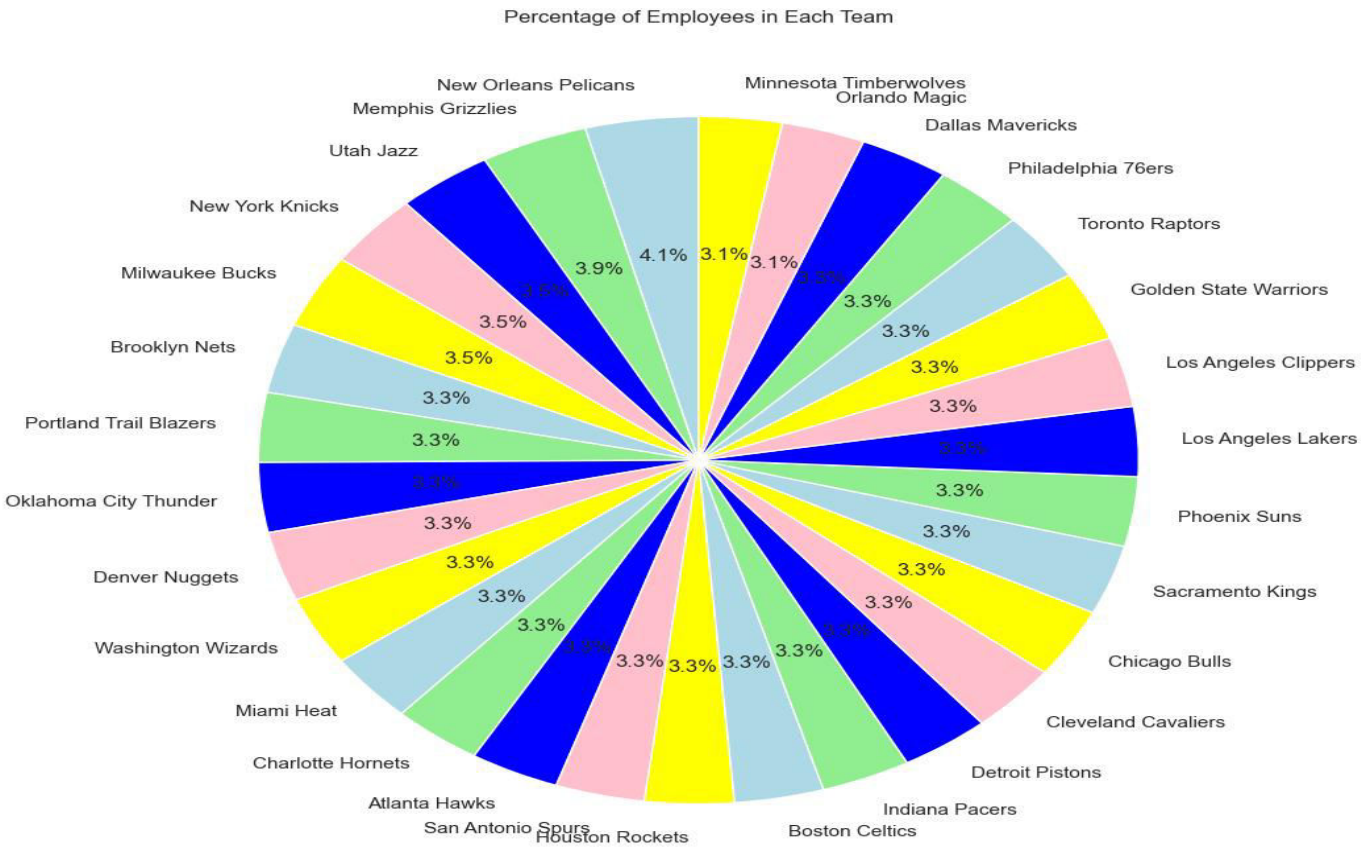
 Los Angeles Lakers       3.275109
 Los Angeles Clippers     3.275109
 Golden State Warriors    3.275109
 Toronto Raptors          3.275109
 Philadelphia 76ers       3.275109
 Dallas Mavericks         3.275109
 Orlando Magic            3.056769
 Minnesota Timberwolves   3.056769
 Name: count, dtype: float64
```

```
# Graphical Representation
```

]:
```
# 1ST CHART: Bar chart - number of employees in each team
plt.figure(figsize=(8, 6), dpi=100)
team_count.plot(kind='bar', color='r')
plt.title("Number of Employees in Each Team")
plt.xlabel("Team")
plt.ylabel("Number of Employees")
plt.grid(True, axis ='y')
plt.show()

# 2ND CHART : Pie chart - percentage split of employees in each team
plt.figure(figsize=(10, 8), dpi=100)
team_percentage.plot(kind='pie', autopct='%1.1f%%', startangle=90, colors=['lightblue', 'lightgreen', 'blue', 'pink', 'yellow'])
plt.title("Percentage of Employees in Each Team")
plt.ylabel('') # Removes default y label
plt.tight_layout() # to avoid overlapping
plt.show()
```


Number of Employees in Each Team
Number of Employees
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
New Orleans Pelicans
Memphis Grizzlies
Utah Jazz
New York Knicks
Milwaukee Bucks
Brooklyn Nets
Portland Trail Blazers
Oklahoma City Thunder
Denver Nuggets
Washington Wizards
Miami Heat
Charlotte Hornets
Atlanta Hawks
San Antonio Spurs
Houston Rockets
Boston Celtics
Indiana Pacers
Detroit Pistons
Cleveland Cavaliers
Chicago Bulls
Sacramento Kings
Phoenix Suns
Los Angeles Lakers
Los Angeles Clippers
Golden State Warriors
Toronto Raptors
Philadelphia 76ers
Dallas Mavericks
Orlando Magic
Minnesota Timberwolves
Team



2. Segregate employees based on their positions within the company. (2 marks)

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```

[95]:

```
abc = pd.read_csv('abc_company_cleaned.csv')

position_count = abc['Position'].value_counts()
print("Number of employees in each position:")
print(position_count)
```

```
Number of employees in each position:
Position
SG    102
PF    100
PG     92
SF     85
C      79
Name: count, dtype: int64
```

```
# Graphical Representation
```

103]:

```
plt.figure(figsize=(8, 4), dpi =100)  # Increase figure size for clarity
sns.barplot(x=position_count.index, y=position_count.values)

plt.title('Number of Employees by Position')
plt.xlabel('Position')
plt.ylabel('Number of Employees')
plt.grid(True,axis='y')

plt.xticks(rotation=45) # to avoid overlap rotate xaxis
plt.tight_layout()  # to avoid label overlapping
plt.show()
```

3. Identify the predominant age group among employees. (2 marks)

```
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```

```
abc = pd.read_csv('abc_company_cleaned.csv')

bins = [20, 30, 40, 50, 60, 70]  # Age ranges (20-30, 30-40, etc.)
labels = ['20-30', '30-40', '40-50', '50-60', '60-70']
abc['Age Group'] = pd.cut(abc['Age'], bins=bins, labels=labels)

age_group_count = abc['Age Group'].value_counts().sort_index()

print("Number of employees in each age group:")
print(age_group_count)
```

```
Number of employees in each age group:
Age Group
20-30    346
30-40     91
40-50      0
50-60      0
60-70      0
Name: count, dtype: int64
```

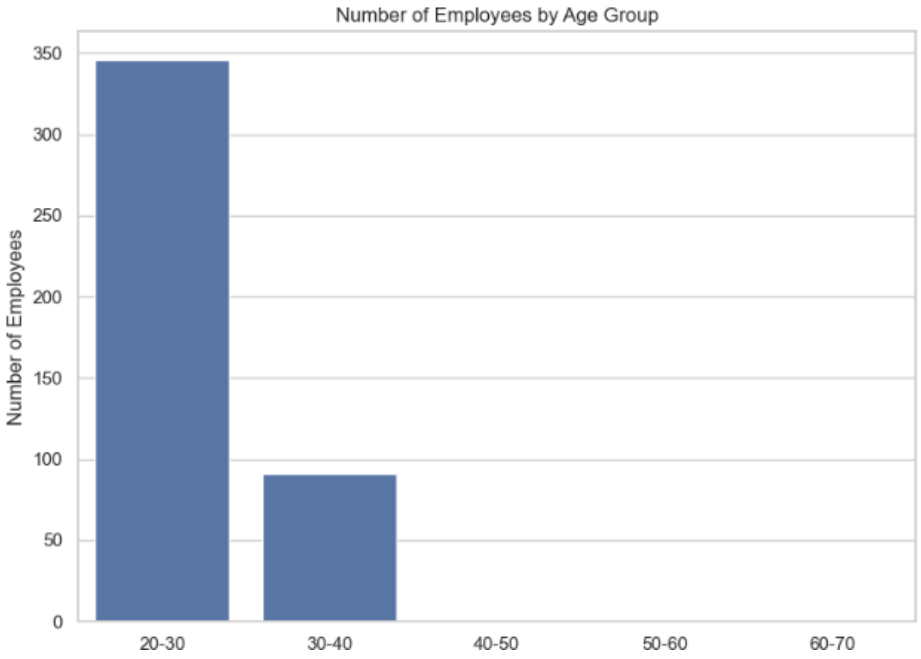
```
# Graphical Representation
```

27]:

```
plt.figure(figsize=(8, 6)) # no of emp in each age group
sns.barplot(x=age_group_count.index, y=age_group_count.values)

plt.title('Number of Employees by Age Group')
plt.xlabel('Age Group')
plt.ylabel('Number of Employees')
plt.grid(True,axis='y')

plt.tight_layout()  # Adjusted layout
plt.show()
```



4. Discover which team and position have the highest salary expenditure. (2 marks)

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[67]:

```
abc = pd.read_csv('abc_company_cleaned.csv')

salary_exp = abc.groupby(['Team', 'Position'])['Salary'].sum().unstack()
# (unstack() used to transform grouped data to table format, making it easier to plot with teams = rows and positions = columns.)

max_salary_exp = salary_exp.stack().idxmax()
highest_salary = salary_exp.stack().max()

print(f"The team and position with the highest salary expenditure is: {max_salary_exp}")
print(f"Total salary expenditure for this team and position: {highest_salary}")
```

```
The team and position with the highest salary expenditure is: ('Los Angeles Lakers', 'SF')
Total salary expenditure for this team and position: 31866445.0
```

Graphical Representation

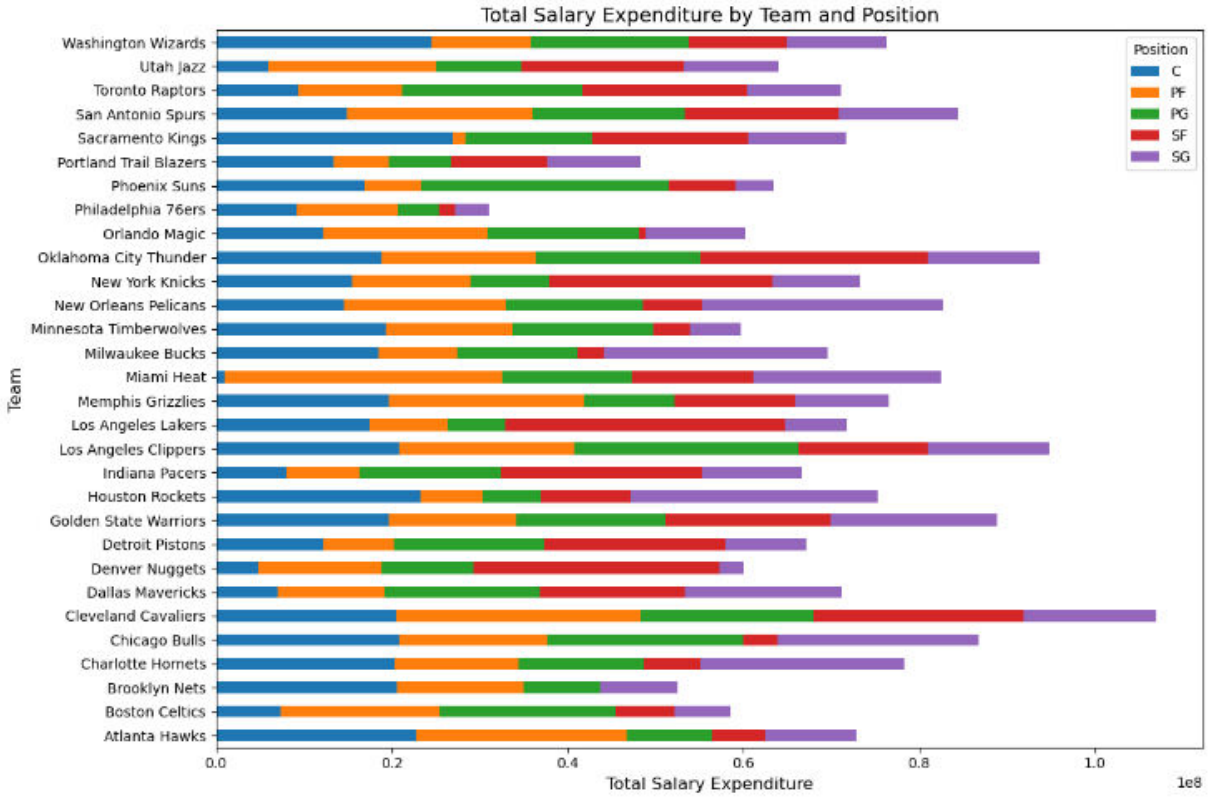
9]:

```
salary_exp.plot(kind='barh', stacked=True, figsize=(12, 8))
# (kind='barh', stacked=True automatically assign default color)

plt.title('Total Salary Expenditure by Team and Position', fontsize=14)
plt.xlabel('Total Salary Expenditure', fontsize=12)
plt.ylabel('Team', fontsize=12)

plt.tight_layout()

plt.show()
```




```
# 5. Investigate if there's any correlation between age and salary, and represent it visually. (2 marks)
```

[77]:

```
abc = pd.read_csv('abc_company_cleaned.csv')

correlation = abc[['Age', 'Salary']].corr()

print("Correlation between Age and Salary:")
print(correlation)
```

```
Correlation between Age and Salary:
             Age    Salary
Age     1.000000  0.214009
Salary  0.214009  1.000000
```

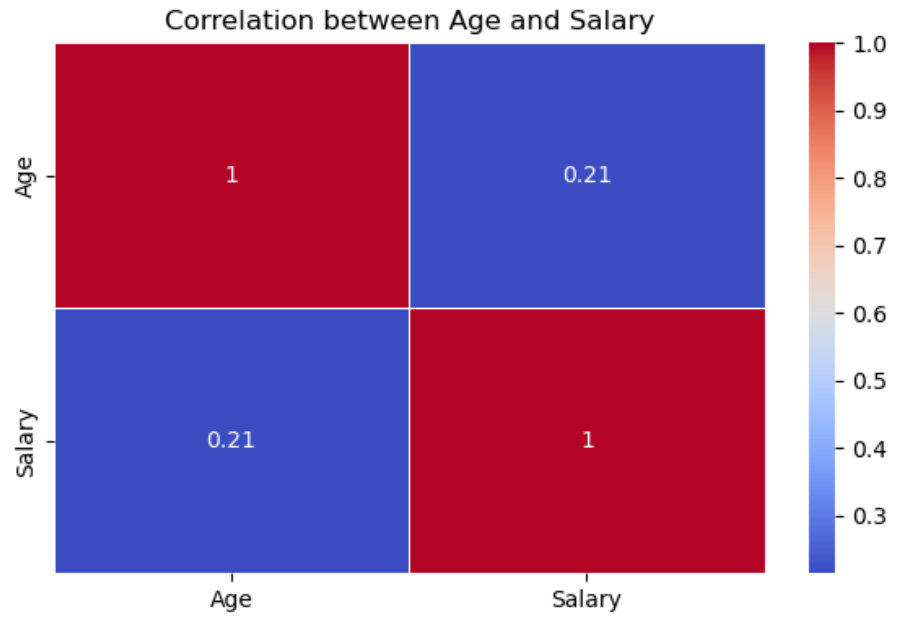
```
# Graphical Representation
```

[79]:

```
plt.figure(figsize=(6, 4))
sns.heatmap(correlation, annot=True, cmap='coolwarm', linewidths=0.5)

plt.title('Correlation between Age and Salary')

plt.tight_layout()
plt.show()
```



Sl.no	Key Trends	Key Patterns & Correlations	Key Insights
1	The **New Orleans Pelicans** have the most employees, while the **Minnesota Timberwolves** and **Orlando Magic** have the fewest.	A clear pattern shows that most employees are under 30, while older age groups are almost absent.	The company is focused on hiring younger talent, as seen in the large number of employees under 30.
2	The most common positions are **Shooting Guard (SG)** and **Power Forward (PF)**, while **Center (C)** has the fewest employees.	The **Los Angeles Lakers** and the **Small Forward (SF)** position have the highest salary expenditure.	High salaries are concentrated in key teams like the **Los Angeles Lakers** and in positions like **Small Forward (SF)**.
3	Most employees are in the **20-30 age group**, with very few over 30.	There is a **positive correlation (0.21)** between age and salary, meaning that older employees tend to earn more, but the link between age and salary is weak.	Although older employees tend to have higher salaries, age alone does not strongly influence salary.