Data Science Internship

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Objective: The objective of creating a bar chart or histogram is to visually represent and analyze the distribution of a specific variable, be it categorical or continuous, within a population, enabling insights into the data's characteristics and patterns.

In [44]:

```
#Importing packages

import pandas as pd
import matplotlib.pyplot as plt
```

In [33]:

```
# Excel Data stored as dataframe

data = pd.read_excel("D:/Prodigy/Task 1/worldbank data.xlsx")
```

In [42]:

```
# Displaying the first 5 records

data.head()
```

Out[42]:

	Country Name	Country Code	Region	IncomeGroup	Year	Birth rate, crude (per 1,000 people)	Death rate, crude (per 1,000 people)	Electric power consumption (kWh per capita)	GDP (USD)	GDP per capita (USD)	Individuals using the Internet (% of population)	mo rat b
0	Afghanistan	AFG	South Asia	Low income	2018	NaN	NaN	NaN	1.936300e+10	520.897	NaN	
1	Afghanistan	AFG	South Asia	Low income	2017	33.211	6.575	NaN	2.019180e+10	556.302	13.50	
2	Afghanistan	AFG	South Asia	Low income	2016	33.981	6.742	NaN	1.936260e+10	547.228	11.20	
3	Afghanistan	AFG	South Asia	Low income	2015	34.809	6.929	NaN	1.990710e+10	578.466	8.26	
4	Afghanistan	AFG	South Asia	Low income	2014	35.706	7.141	NaN	2.048490e+10	613.856	7.00	

In [43]:

In [43]:

```
# Displaying the last 5 records

data.tail()
```

Out[43]:

	Country Name	Country Code	Region	IncomeGroup	Year	Birth rate, crude (per 1,000 people)	Death rate, crude (per 1,000 people)	Electric power consumption (kWh per capita)	GDP (USD)	GDP per capita (USD)	Individuals using the Internet (% of population)
12444	Zimbabwe	ZWE	Sub-Saharan Africa	Low income	1964	47.770	13.083	NaN	1.217138e+09	281.558	NaN
12445	Zimbabwe	ZWE	Sub-Saharan Africa	Low income	1963	47.876	13.419	NaN	1.159512e+09	277.480	NaN
12446	Zimbabwe	ZWE	Sub-Saharan Africa	Low income	1962	47.950	13.762	NaN	1.117602e+09	276.689	NaN
12447	Zimbabwe	ZWE	Sub-Saharan Africa	Low income	1961	47.988	14.104	NaN	1.096647e+09	280.829	NaN
12448	Zimbabwe	ZWE	Sub-Saharan Africa	Low income	1960	47.996	14.441	NaN	1.052990e+09	278.814	NaN

In [16]:

```
# gives the total number of records (rows) and attributes/fields (columns)

data.shape
```

Out[16]:

```
(12449, 15)
```

In [17]:

```
#total number of records is displayed

data.size
```

Out[17]:

```
186735
```

In [45]:

```
# Displaying all the column/attribute names

data.columns
```

Out[45]:

```
Index(['Country Name', 'Country Code', 'Region', 'IncomeGroup', 'Year',
       'Birth rate, crude (per 1,000 people)',
       'Death rate, crude (per 1,000 people)',
       'Electric power consumption (kWh per capita)', 'GDP (USD)',
       'GDP per capita (USD)',
       'Individuals using the Internet (% of population)',
       'Infant mortality rate (per 1,000 live births)',
       'Life expectancy at birth (years)',
       'Population density (people per sq. km of land area)',
       'Unemployment (% of total labor force) (modeled ILO estimate)'],
      dtype='object')
```

In [46]:

```
#Data type of each type of attribute will be described

data.dtypes
```

Out[46]:

```
Country Name                                                    object
Country Code                                                    object
Region                                                          object
IncomeGroup                                                     object
Year                                                             int64
Birth rate, crude (per 1,000 people)                           float64
Death rate, crude (per 1,000 people)                           float64
Electric power consumption (kWh per capita)                    float64
GDP (USD)                                                      float64
GDP per capita (USD)                                           float64
Individuals using the Internet (% of population)               float64
Infant mortality rate (per 1,000 live births)                  float64
Life expectancy at birth (years)                               float64
Population density (people per sq. km of land area)            float64
Unemployment (% of total labor force) (modeled ILO estimate)   float64
dtype: object
```

In [18]:

```
data.index
```

Out[18]:

```
RangeIndex(start=0, stop=12449, step=1)
```

In [19]:

```
# Summary statistics of the dataset

data.describe()
```

Out[19]:

	Year	Birth rate, crude (per 1,000 people)	Death rate, crude (per 1,000 people)	Electric power consumption (kWh per capita)	GDP (USD)	GDP per capita (USD)	Individuals using the Internet (% of population)	Infant mortality rate (per 1,000 live births)	exp
count	12449.00000	11440.000000	11416.000000	5848.000000	9.578000e+03	9575.000000	5064.000000	9984.000000	11176
mean	1989.00000	28.643276	10.588539	3175.294686	1.700740e+11	8231.812259	23.334471	51.704437	64
std	17.03007	13.131893	5.489382	4467.139298	8.979866e+11	16173.539954	28.319388	46.131039	11
min	1960.00000	6.900000	1.127000	0.000000	8.824450e+06	34.790600	0.000000	1.400000	18
25%	1974.00000	16.600000	6.863750	390.385750	1.393010e+09	513.145500	0.594949	14.475000	55
50%	1989.00000	27.545500	9.200000	1541.895000	7.275305e+09	1852.810000	8.406225	37.000000	67
75%	2004.00000	40.881250	12.687000	4313.767500	4.857782e+10	7774.565000	41.295950	78.200000	72
max	2018.00000	58.227000	54.444000	54799.200000	2.050000e+13	189171.000000	100.000000	279.400000	85

In [39]:

```
# the output indicates that there is no duplicate values in the records
data.duplicated().sum()
```

Out[39]:

```
0
```

In [20]:

```
# Null and NaN values are dropped from the dataset
```

```
# Null and NaN values are dropped from the dataset

data1=data.dropna()
data1.head()
```

Out[20]:

	Country Name	Country Code	Region	IncomeGroup	Year	Birth rate, crude (per 1,000 people)	Death rate, crude (per 1,000 people)	Electric power consumption (kWh per capita)	GDP (USD)	GDP per capita (USD)	Individuals using the Internet (% of population)	Infa morta rate (p 1,(l birt
63	Albania	ALB	Europe & Central Asia	Upper middle income	2014	12.259	7.219	2309.37	1.322820e+10	4578.67	60.100	
64	Albania	ALB	Europe & Central Asia	Upper middle income	2013	12.257	7.096	2533.25	1.277630e+10	4413.08	57.200	
65	Albania	ALB	Europe & Central Asia	Upper middle income	2012	12.197	6.996	2118.33	1.231980e+10	4247.61	54.656	1
66	Albania	ALB	Europe & Central Asia	Upper middle income	2011	12.100	6.915	2205.70	1.289090e+10	4437.18	49.000	1
67	Albania	ALB	Europe & Central Asia	Upper middle income	2010	12.001	6.841	1943.34	1.192700e+10	4094.36	45.000	1

In [48]:

```
data1.shape
```

Out[48]:

```
(2775, 15)
```

In [49]:

```
#Verifying to check the presence of null values

data1.isna()
```

Out[49]:

	Country Name	Country Code	Region	IncomeGroup	Year	Birth rate, crude (per 1,000 people)	Death rate, crude (per 1,000 people)	Electric power consumption (kWh per capita)	GDP (USD)	GDP per capita (USD)	Individuals using the Internet (% of population)	Infant mortality rate (per 1,000 live births)	
63	False	False	False	False	False	False	False	False	False	False	False	False	
64	False	False	False	False	False	False	False	False	False	False	False	False	
65	False	False	False	False	False	False	False	False	False	False	False	False	
66	False	False	False	False	False	False	False	False	False	False	False	False	
67	False	False	False	False	False	False	False	False	False	False	False	False	
...	...	...	...	...	...	...	...	...	...	...	...	...	
12410	False	False	False	False	False	False	False	False	False	False	False	False	
12411	False	False	False	False	False	False	False	False	False	False	False	False	

	Country Name	Country Code	Region	IncomeGroup	Year	Birth rate, crude (per 1,000 people)	Death rate, crude (per 1,000 people)	Electric power consumption (kWh per capita)	GDP (USD)	GDP per capita (USD)	Individuals using the Internet (% of population)	Infant mortality rate (per 1,000 live births)
12412	False	False	False	False	False	False	False	False	False	False	False	False
12413	False	False	False	False	False	False	False	False	False	False	False	False
12414	False	False	False	False	False	False	False	False	False	False	False	False

2775 rows × 15 columns

In [23]:

```
#sum() sums up the boolean values [true=1,false=0].

data1.isna().sum()

#Here we can see all columns' NaN values are dropped. There is no missing value in our da
ta now.
```

Out[23]:

```
Country Name                                                    0
Country Code                                                    0
Region                                                          0
IncomeGroup                                                     0
Year                                                            0
Birth rate, crude (per 1,000 people)                            0
Death rate, crude (per 1,000 people)                            0
Electric power consumption (kWh per capita)                     0
GDP (USD)                                                       0
GDP per capita (USD)                                            0
Individuals using the Internet (% of population)                0
Infant mortality rate (per 1,000 live births)                   0
Life expectancy at birth (years)                                0
Population density (people per sq. km of land area)             0
Unemployment (% of total labor force) (modeled ILO estimate)    0
dtype: int64
```

In [24]:

```
data1.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2775 entries, 63 to 12414
Data columns (total 15 columns):
 #   Column                                                  Non-Null Count  Dtyp
e
---  ------                                                  --------------  ----
-
 0   Country Name                                            2775 non-null   objec
t
 1   Country Code                                            2775 non-null   objec
t
 2   Region                                                  2775 non-null   obje
ct
 3   IncomeGroup                                             2775 non-null   objec
t
 4   Year                                                    2775 non-null   int6
4
 5   Birth rate, crude (per 1,000 people)                    2775 non-null   float
64
 6   Death rate, crude (per 1,000 people)                    2775 non-null   float
64
 7   Electric power consumption (kWh per capita)             2775 non-null   float
64
 8   GDP (USD)                                               2775 non-null   float
64
 9   GDP per capita (USD)                                    2775 non-null   float
64
 10  Individuals using the Internet (% of population)        2775 non-null   float6
4
 11  Infant mortality rate (per 1,000 live births)           2775 non-null   float6
4
 12  Life expectancy at birth (years)                        2775 non-null   float
```

```
 12  Life expectancy at birth (years)                          2775 non-null   float
64
 13  Population density (people per sq. km of land area)       2775 non-null   float6
4
 14  Unemployment (% of total labor force) (modeled ILO estimate)  2775 non-null   float6
4
dtypes: float64(10), int64(1), object(4)
memory usage: 346.9+ KB
```

In [25]:

```
year = 2012
variable = 'Life expectancy at birth (years)'
```

In [26]:

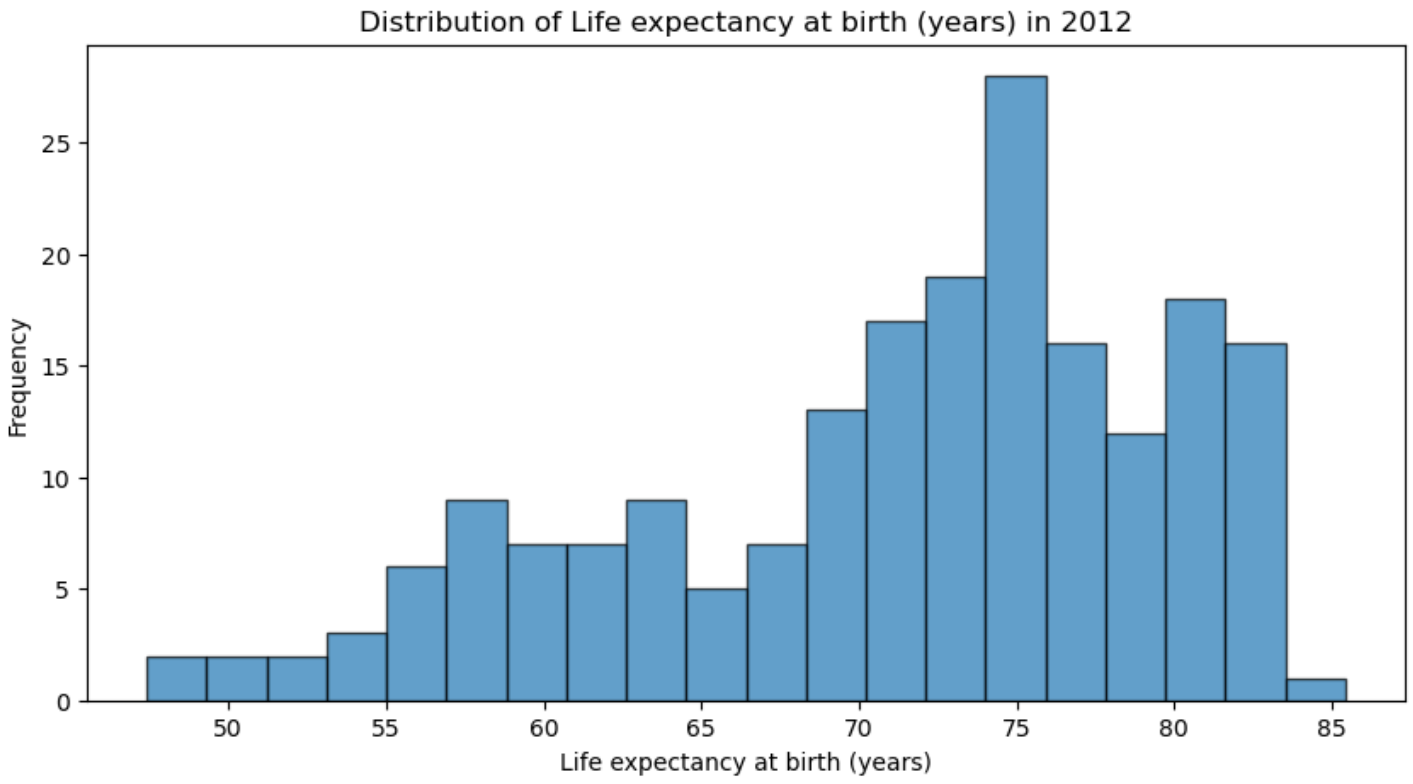
```
#Filter the data for a specific year
data_year = data[data['Year'] == year]
```

Creating a histogram

In [27]:

```
plt.figure(figsize=(10,5))
plt.hist(data_year[variable],bins=20, edgecolor='k', alpha=0.7)

plt.title(f'Distribution of {variable} in {year}')
plt.xlabel(variable)
plt.ylabel('Frequency')
plt.show()
```



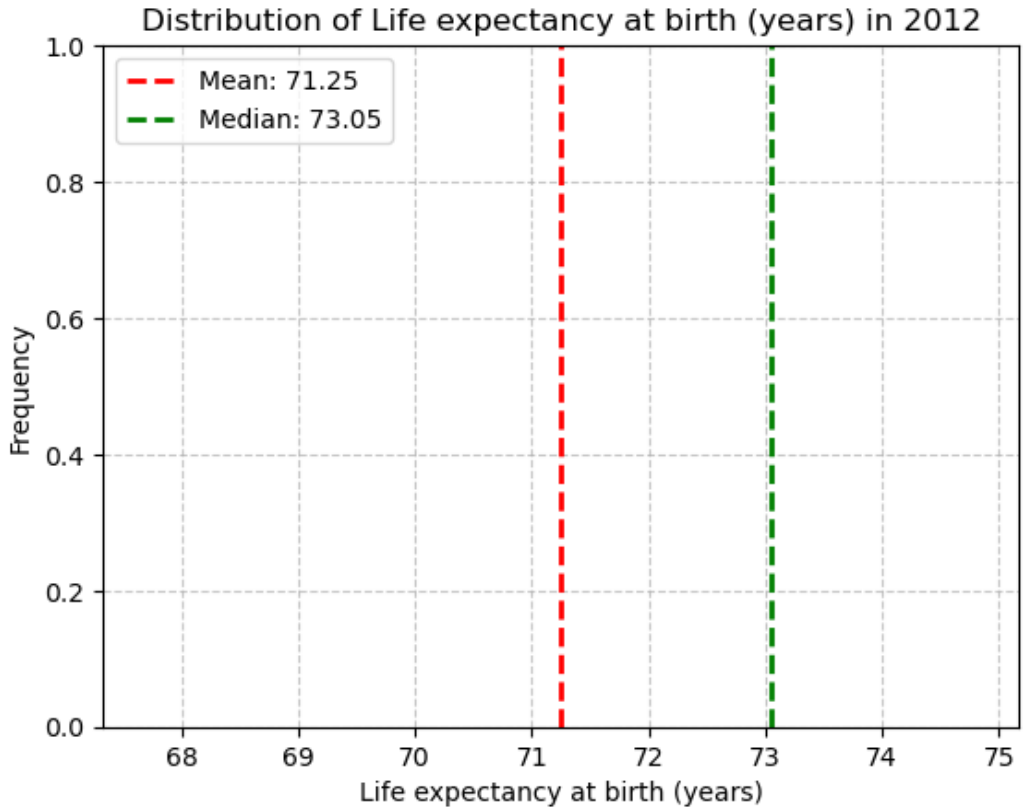
In [28]:

```
# Customize the plot further
plt.title(f'Distribution of {variable} in {year}')
plt.xlabel(variable)
plt.ylabel('Frequency')

plt.grid(True, linestyle='--', alpha=0.7)

# Add labels for mean and median
mean_value = data_year[variable].mean()
median_value = data_year[variable].median()
```

```
plt.axvline(mean_value, color='red', linestyle='dashed', linewidth=2, label=f'Mean: {mean_value:.2f}')
plt.axvline(median_value, color='green', linestyle='dashed', linewidth=2, label=f'Median: {median_value:.2f}')
plt.legend()
plt.show()
```

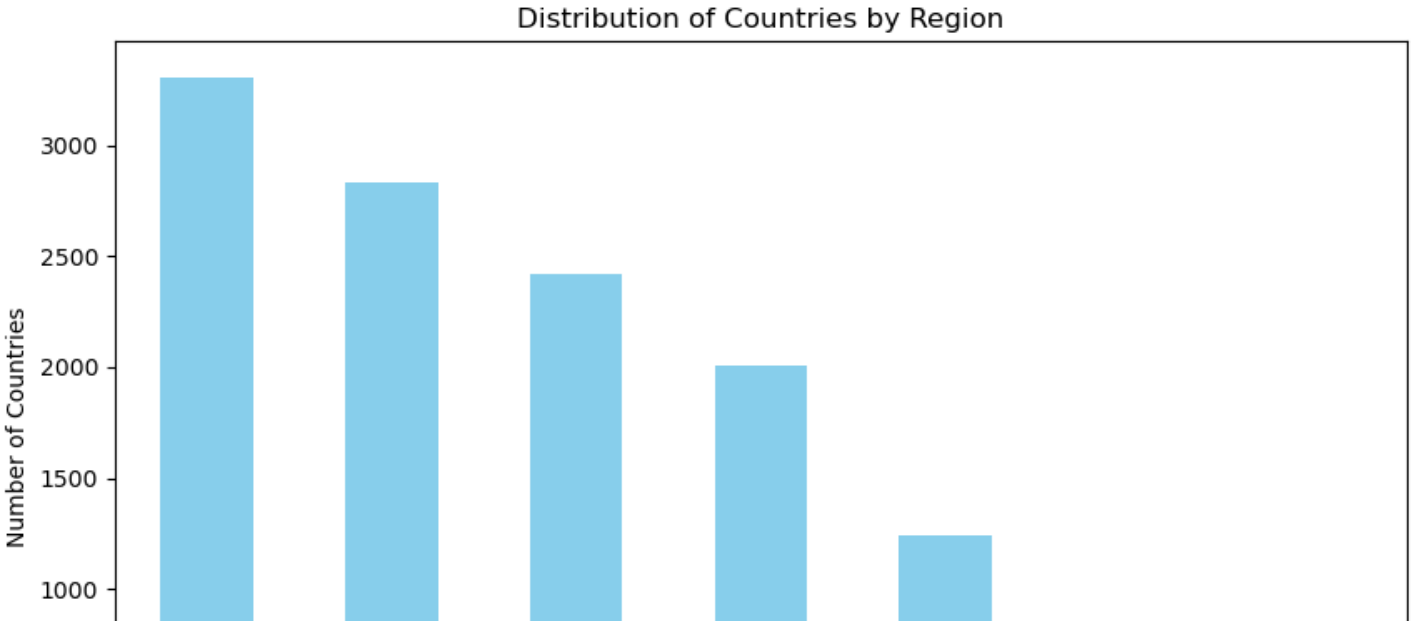


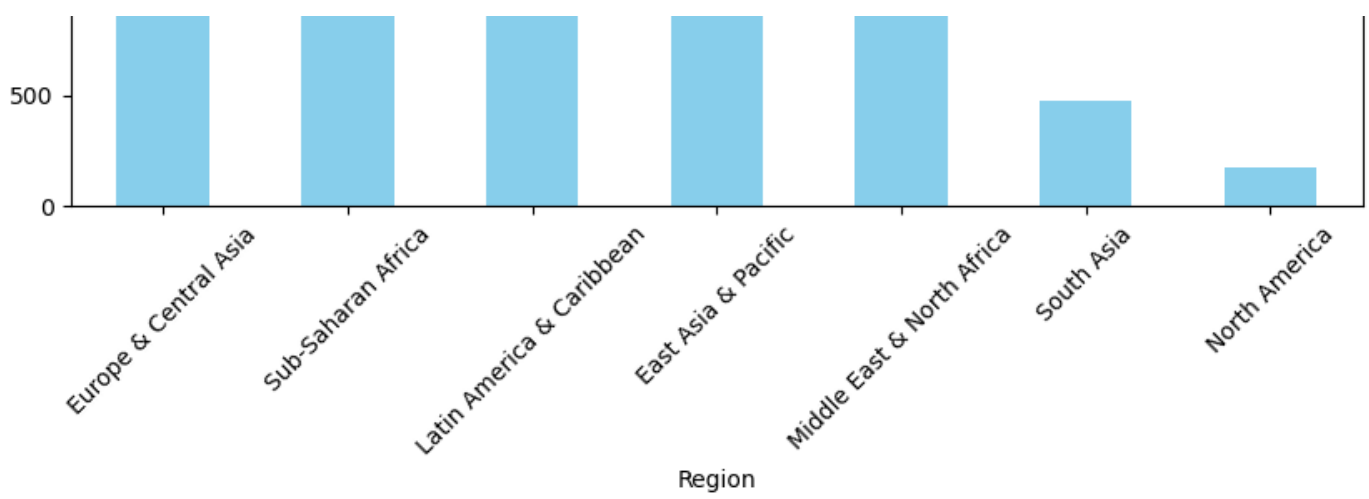
Bar Plot

In [29]:

```
region_counts = data['Region'].value_counts()

# Create a bar chart
plt.figure(figsize=(10, 6))
region_counts.plot(kind='bar', color='skyblue')
plt.xlabel('Region')
plt.ylabel('Number of Countries')
plt.title('Distribution of Countries by Region')
plt.xticks(rotation=45)
plt.show()
```





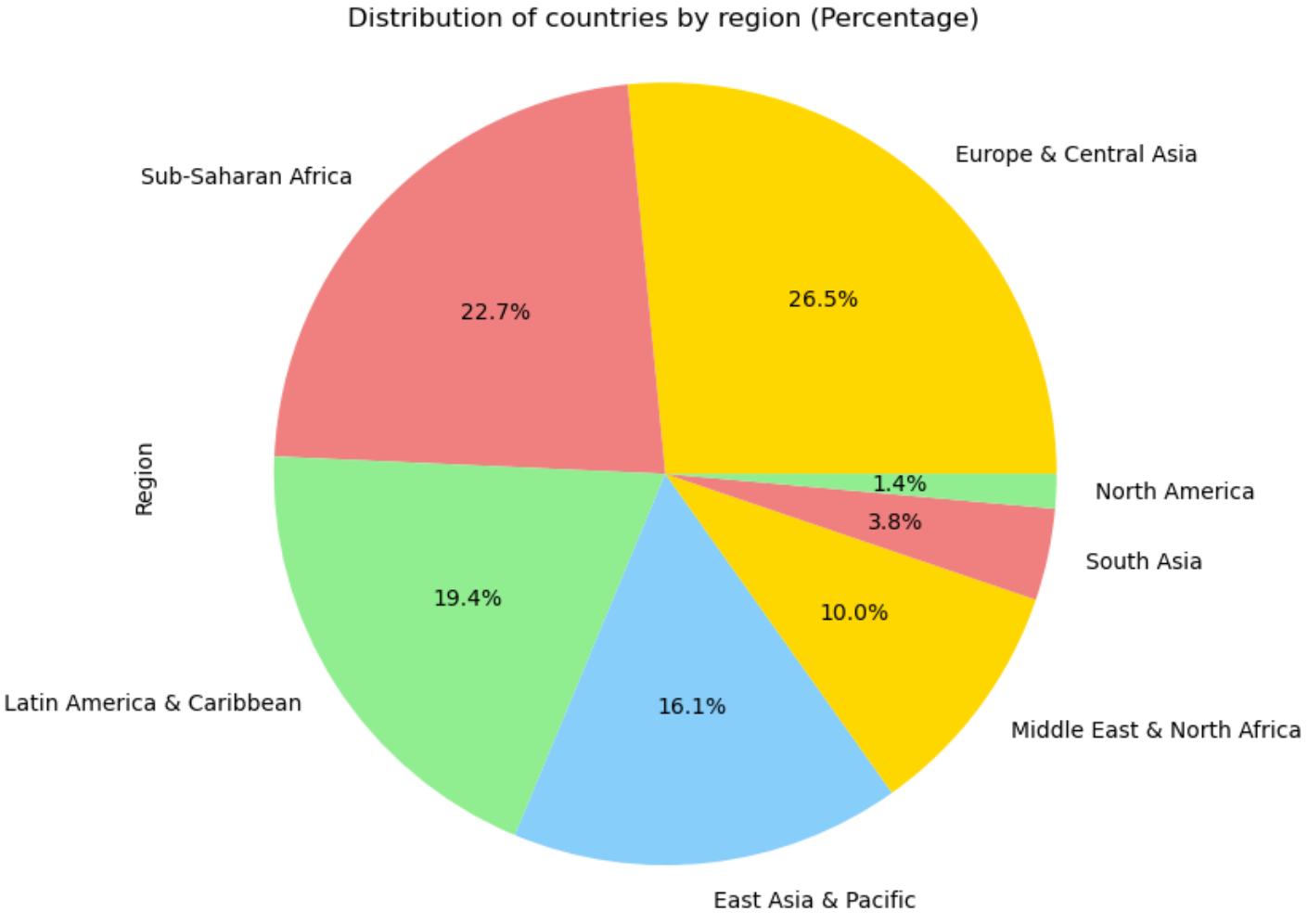
Pie Plot

In [32]:

```
plt.figure(figsize=(15,6))
plt.subplot(1,2,2)
region_percentage = (region_counts / region_counts.sum())*100
colors = ['gold', 'lightcoral', 'lightgreen', 'lightskyblue']

region_percentage.plot(kind='pie', autopct='%1.1f%%', colors=colors)
plt.axis('equal')
plt.title("Distribution of countries by region (Percentage)")

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



Thank you!