Lab Assignment 22

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Topic: Matplotlib Bar Plot and Histogram

Plotting Histogram in Python using Matplotlib

Matplotlib is a library in Python and it is a numerical-mathematical extension for the NumPy library. **Pyplot** is a state-based interface to a Matplotlib module which provides a MATLAB-like interface.

Matplotlib Histogram

A histogram is used to represent data provided in the form of some groups. It is an accurate method for the graphical representation of numerical data distribution. It is a type of bar plot where the X-axis represents the bin ranges while the Y-axis gives information about frequency. Python's Matplotlib Library provides us with an easy way to create Histograms using Pyplot.

Matplotlib pyplot.hist() Syntax

In Python **hist() function** in the pyplot of the Matplotlib library is used to plot a histogram.

Syntax: *matplotlib.pyplot.hist(x, bins=None, range=None, density=False, weights=None, cumulative=False, bottom=None, histtype='bar', align='mid', orientation='vertical', rwidth=None, log=False, color=None, label=None, stacked=False, *, data=None, **kwargs)*

Parameters: *This method accept the following parameters that are described below:*

- ***x :*** *This parameter are the sequence of data.*
- ***bins :*** *This parameter is an optional parameter and it contains the integer or sequence or string.*
- ***range :*** *This parameter is an optional parameter and it the lower and upper range of the bins.*
- ***density :*** *This parameter is an optional parameter and it contains the boolean values.*
- ***weights :*** *This parameter is an optional parameter and it is an array of weights, of the same shape as x.*
- ***bottom :*** *This parameter is the location of the bottom baseline of each bin.*
- ***histtype :*** *This parameter is an optional parameter and it is used to draw type of histogram. {'bar', 'barstacked', 'step', 'stepfilled'}*
- ***align :*** *This parameter is an optional parameter and it controls how the histogram is plotted. {'left', 'mid', 'right'}*
- ***rwidth :*** *This parameter is an optional parameter and it is a relative width of the bars as a fraction of the bin width*
- ***log :*** *This parameter is an optional parameter and it is used to set histogram axis to a log scale*
- ***color :*** *This parameter is an optional parameter and it is a color spec or sequence of color specs, one per dataset.*

- ***label :*** *This parameter is an optional parameter and it is a string, or sequence of strings to match multiple datasets.*
- ***normed :*** *This parameter is an optional parameter and it contains the boolean values.It uses the density keyword argument instead.*

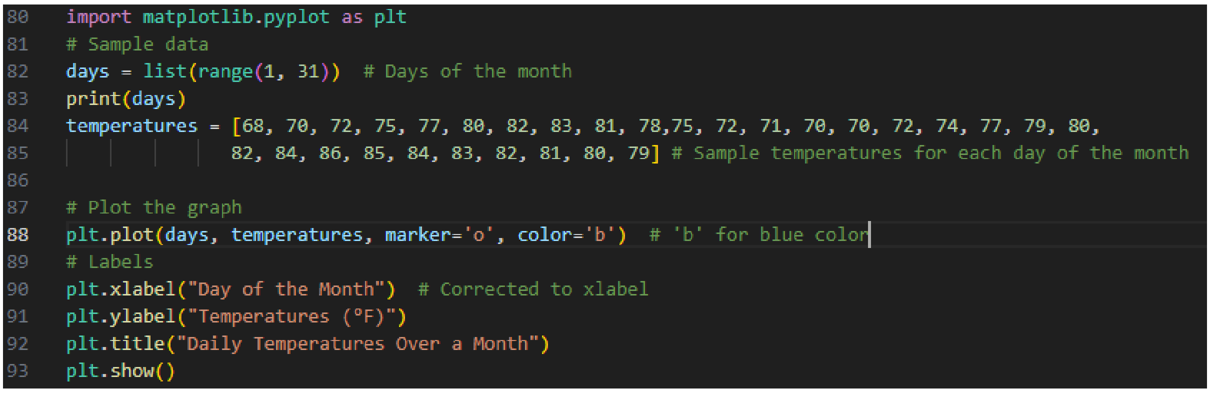
Returns: *This returns the following*

- ***n :****This returns the values of the histogram bins.*
- ***bins :****This returns the edges of the bins.*
- ***patches :****This returns the list of individual patches used to create the histogram.*

Question:

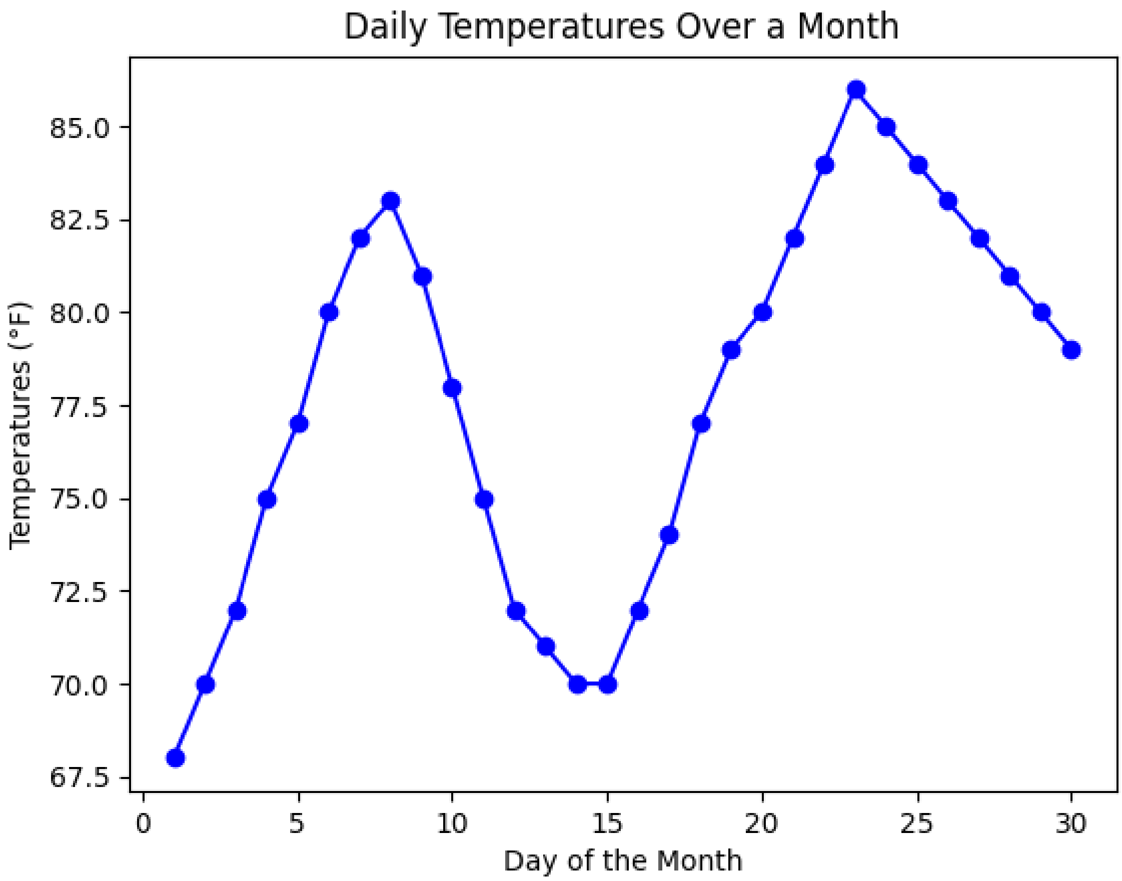
1. Visualize daily temperature in a specific location

Code:



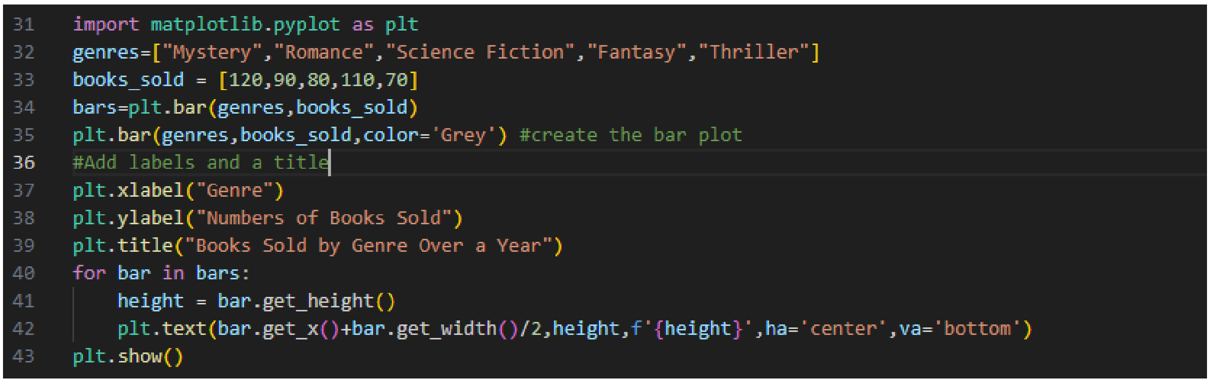
```python
import matplotlib.pyplot as plt
# Sample data
days = list(range(1, 31))  # Days of the month
print(days)
temperatures = [68, 70, 72, 75, 77, 80, 82, 83, 81, 78,75, 72, 71, 70, 70, 72, 74, 77, 79, 80,
               82, 84, 86, 85, 84, 83, 82, 81, 80, 79] # Sample temperatures for each day of the month

# Plot the graph
plt.plot(days, temperatures, marker='o', color='b')  # 'b' for blue color
# Labels
plt.xlabel("Day of the Month")  # Corrected to xlabel
plt.ylabel("Temperatures (°F)")
plt.title("Daily Temperatures Over a Month")
plt.show()
```

Output:



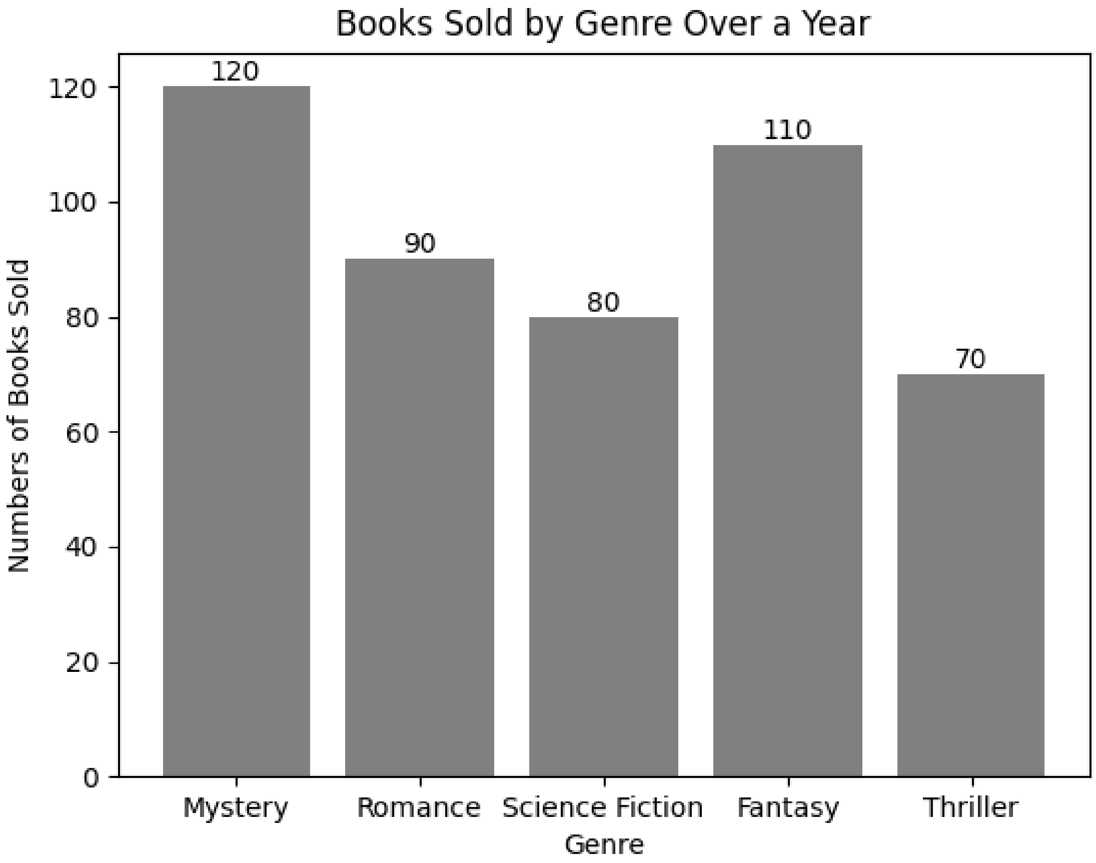
2. Visualize the number of books sold in a bookstore by genre over a year

Code:



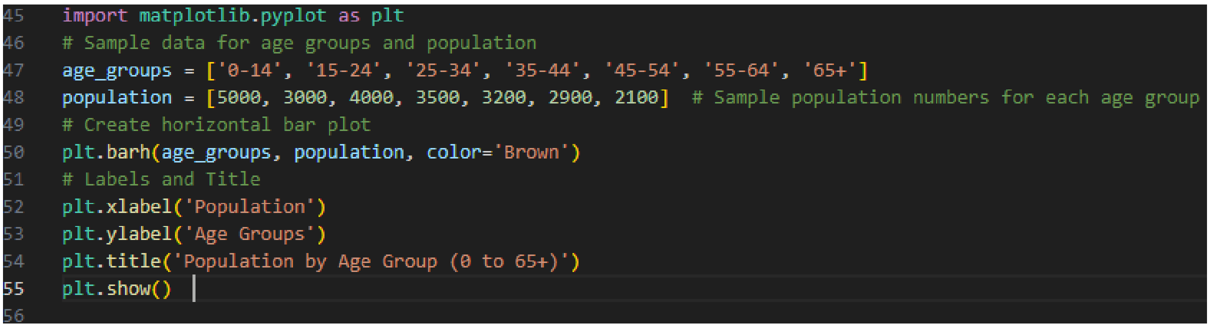
```python
import matplotlib.pyplot as plt
genres=["Mystery","Romance","Science Fiction","Fantasy","Thriller"]
books_sold = [120,90,80,110,70]
bars=plt.bar(genres,books_sold)
plt.bar(genres,books_sold,color='Grey') #create the bar plot
#Add labels and a title
plt.xlabel("Genre")
plt.ylabel("Numbers of Books Sold")
plt.title("Books Sold by Genre Over a Year")
for bar in bars:
    height = bar.get_height()
    plt.text(bar.get_x()+bar.get_width()/2,height,f'{height}',ha='center',va='bottom')
plt.show()
```

Output:



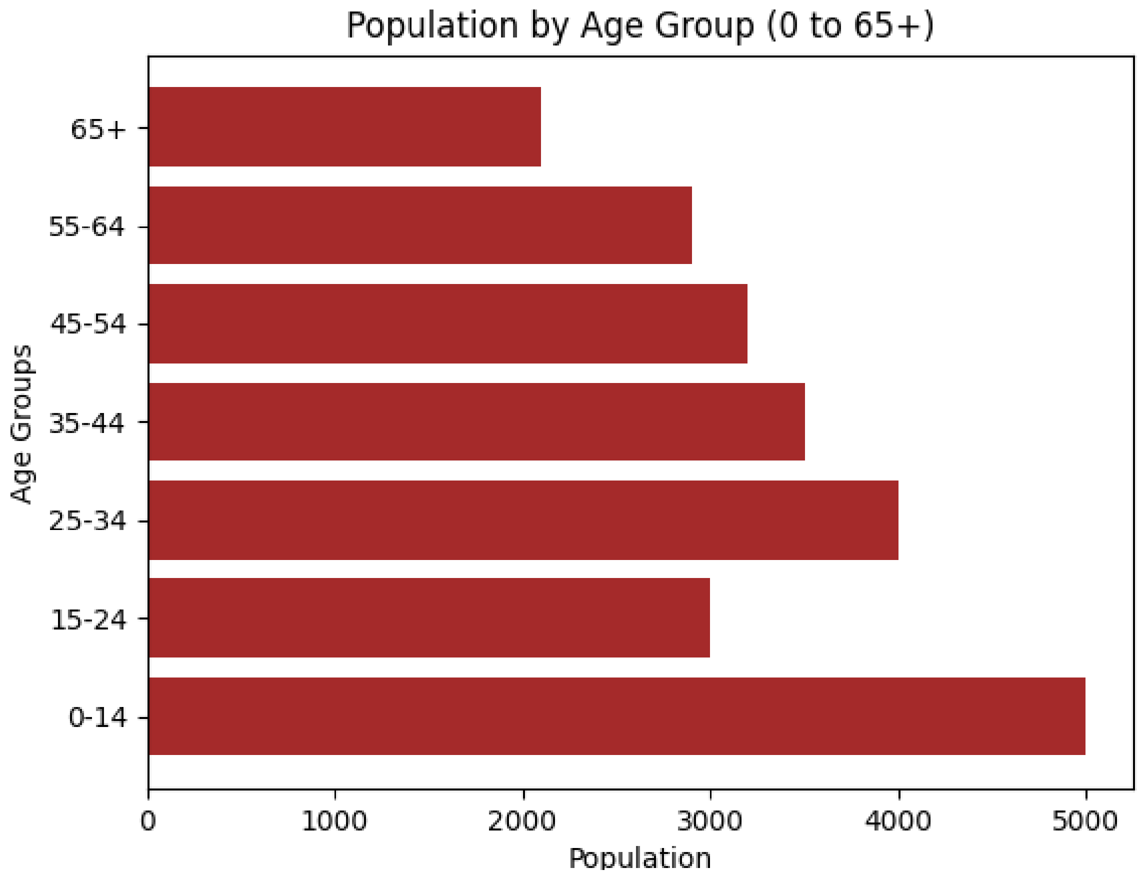
3. Horizontal Bar Plot in Python over age groups and population.

Code:



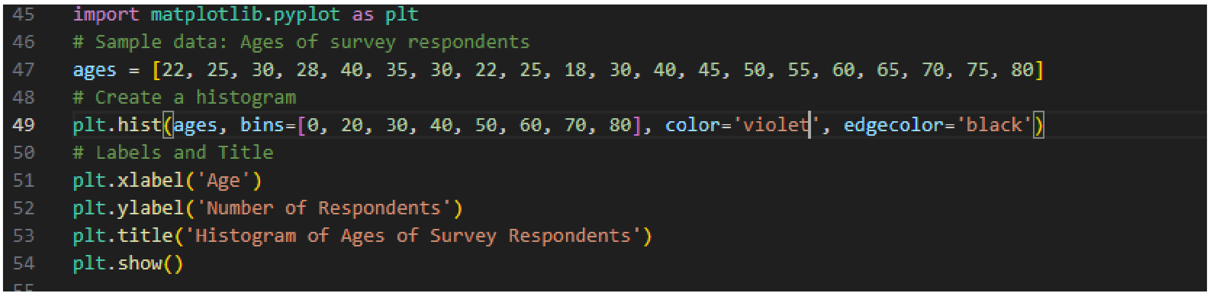
```python
import matplotlib.pyplot as plt
# Sample data for age groups and population
age_groups = ['0-14', '15-24', '25-34', '35-44', '45-54', '55-64', '65+']
population = [5000, 3000, 4000, 3500, 3200, 2900, 2100]  # Sample population numbers for each age group
# Create horizontal bar plot
plt.barh(age_groups, population, color='Brown')
# Labels and Title
plt.xlabel('Population')
plt.ylabel('Age Groups')
plt.title('Population by Age Group (0 to 65+)')
plt.show()
```

Output:



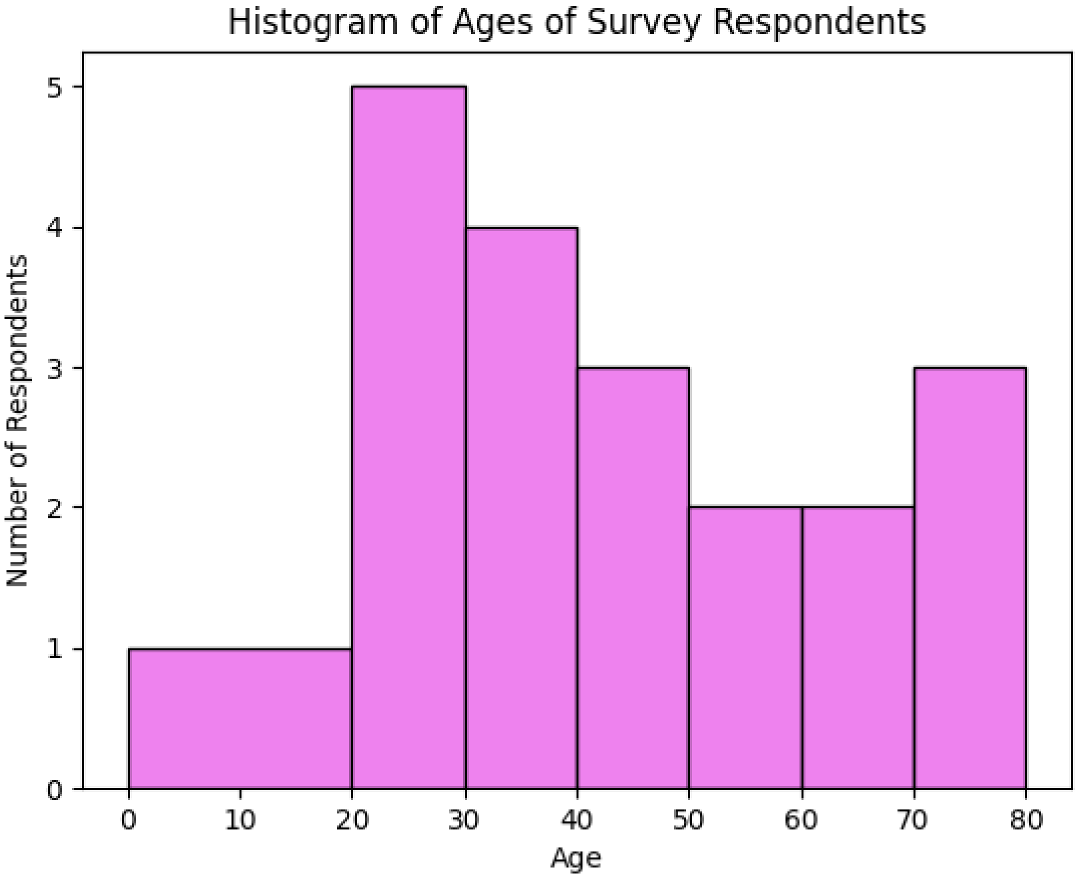
4. Histogram of Ages of Survey Respondents

Code:



```
import matplotlib.pyplot as plt
# Sample data: Ages of survey respondents
ages = [22, 25, 30, 28, 40, 35, 30, 22, 25, 18, 30, 40, 45, 50, 55, 60, 65, 70, 75, 80]
# Create a histogram
plt.hist(ages, bins=[0, 20, 30, 40, 50, 60, 70, 80], color='violet', edgecolor='black')
# Labels and Title
plt.xlabel('Age')
plt.ylabel('Number of Respondents')
plt.title('Histogram of Ages of Survey Respondents')
plt.show()
```

Output:


Histogram of Ages of Survey Respondents
Number of Respondents
0
1
2
3
4
5
0
10
20
30
40
50
60
70
80
Age