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import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt

# Sample calculation for low range(lr), upper range(ur), percentile
array = np.random.randint(1, 100, 16) # randomly generate 16 numbers
between 1 to 100
print("Generated array:")
print(array)

print(f"Array mean: {array.mean()}")

# Calculate percentiles
print(f"25th percentile: {np.percentile(array, 25)}")
print(f"50th percentile: {np.percentile(array, 50)}")
print(f"75th percentile: {np.percentile(array, 75)}")
print(f"100th percentile: {np.percentile(array, 100)}")

# Outliers detection function
def outDetection(array):
    sorted(array)
    Q1, Q3 = np.percentile(array, [25, 75])
    IQR = Q3 - Q1
    lr = Q1 - (1.5 * IQR) # lower range
    ur = Q3 + (1.5 * IQR) # upper range
    return lr, ur

# Detect outliers
lr, ur = outDetection(array)
print(f"Lower range: {lr}, Upper range: {ur}")

# Visualize original data
print("\nVisualizing original data:")
sns.distplot(array)
plt.title('Original Data Distribution')
plt.show()

# Use histplot instead of deprecated distplot
sns.histplot(array, kde=True)
plt.title('Original Data with KDE')
plt.show()

# Filter out outliers
new_array = array[(array > lr) & (array < ur)]
print("Array after removing outliers:")
print(new_array)

# Visualize filtered data
print("\nVisualizing data after outlier removal:")
sns.distplot(new_array)

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plt.title('Data After Outlier Removal')
plt.show()

# Detect outliers again on the filtered array
lr1, ur1 = outDetection(new_array)
print(f"New Lower range: {lr1}, New Upper range: {ur1}")

# Final array (should be same as new_array since no outliers were detected)
final_array = new_array[(new_array > lr1) & (new_array < ur1)]
print("Final array:")
print(final_array)

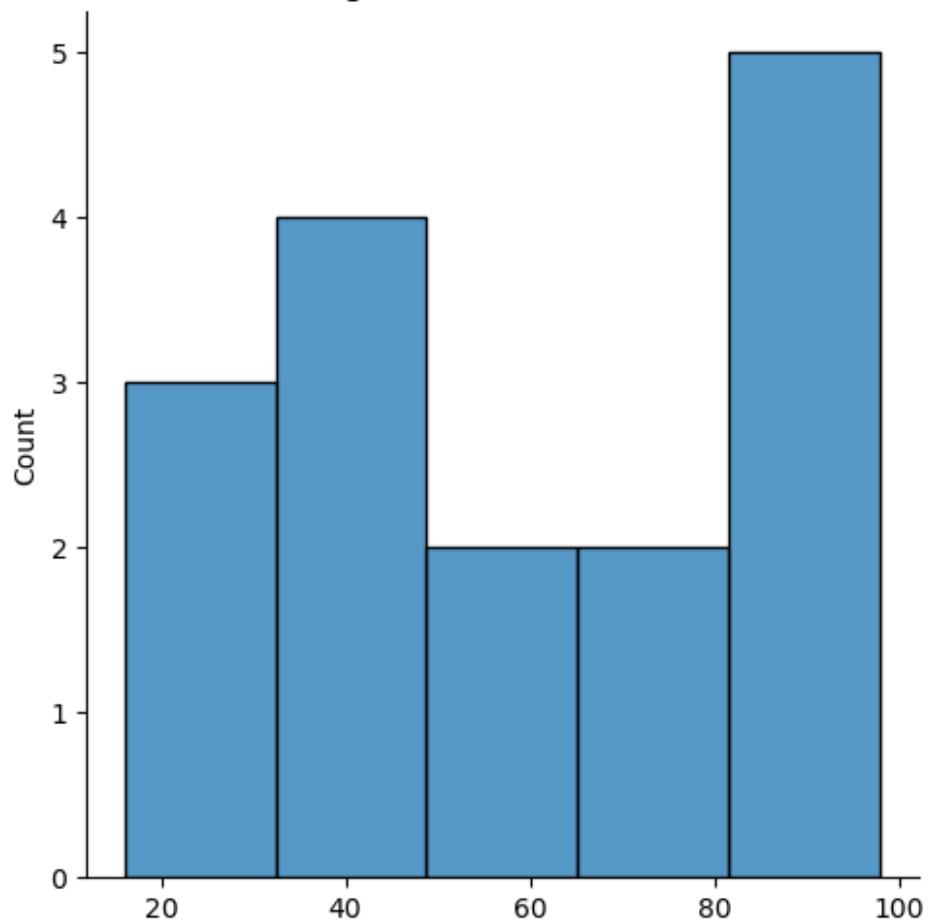
# Visualize final data
print("\nVisualizing final data:")
sns.histplot(final_array, kde=True)
plt.title('Final Data Distribution')
plt.show()

# Additional: Boxplot to visualize outliers
print("\nBoxplot visualization:")
sns.boxplot(x=array)
plt.title('Boxplot Showing Outliers')
plt.show()

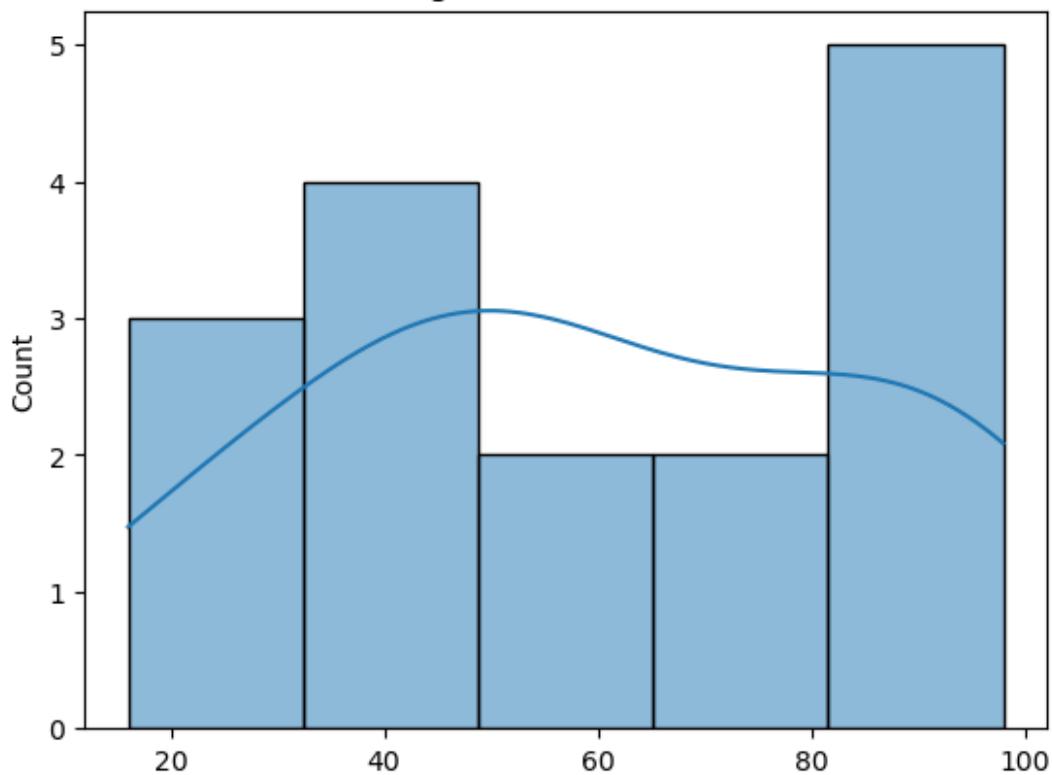
Generated array:
[55 69 29 98 71 43 41 47 57 97 20 90 48 86 90 16]
Array mean: 59.8125
25th percentile: 42.5
50th percentile: 56.0
75th percentile: 87.0
100th percentile: 98.0
Lower range: -24.25, Upper range: 153.75

Visualizing original data:
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Original Data Distribution



Original Data with KDE

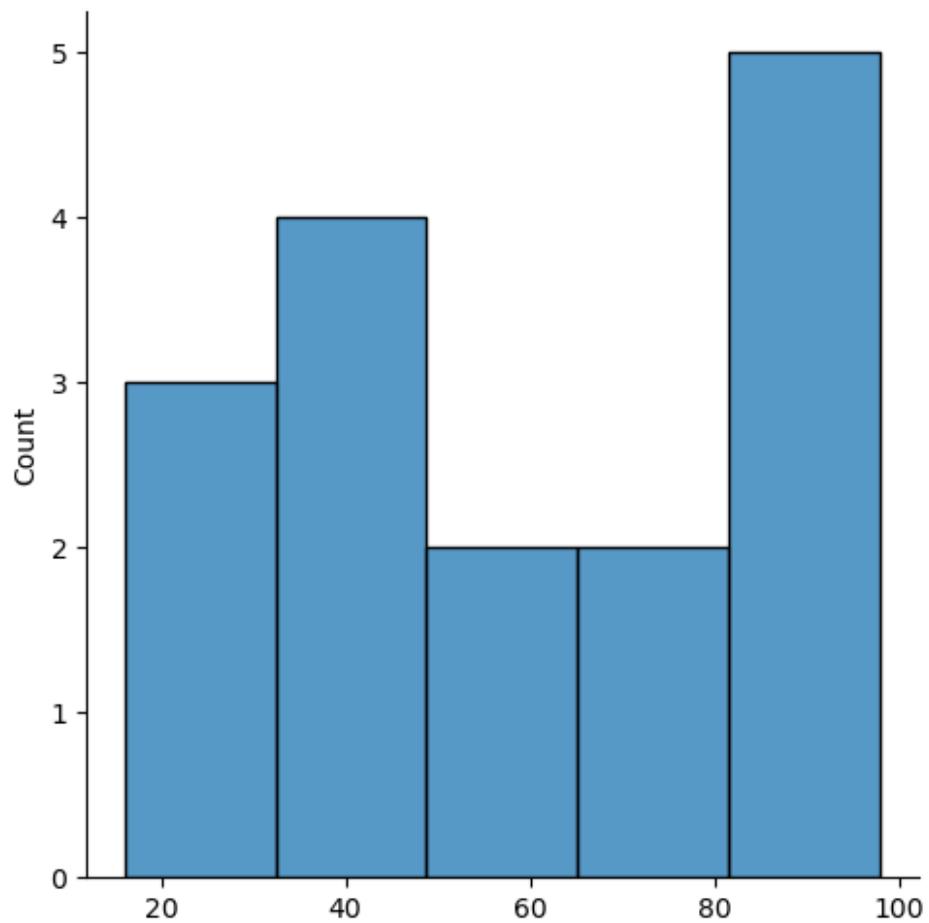


Array after removing outliers:

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[55 69 29 98 71 43 41 47 57 97 20 90 48 86 90 16]
```

Visualizing data after outlier removal:

Data After Outlier Removal



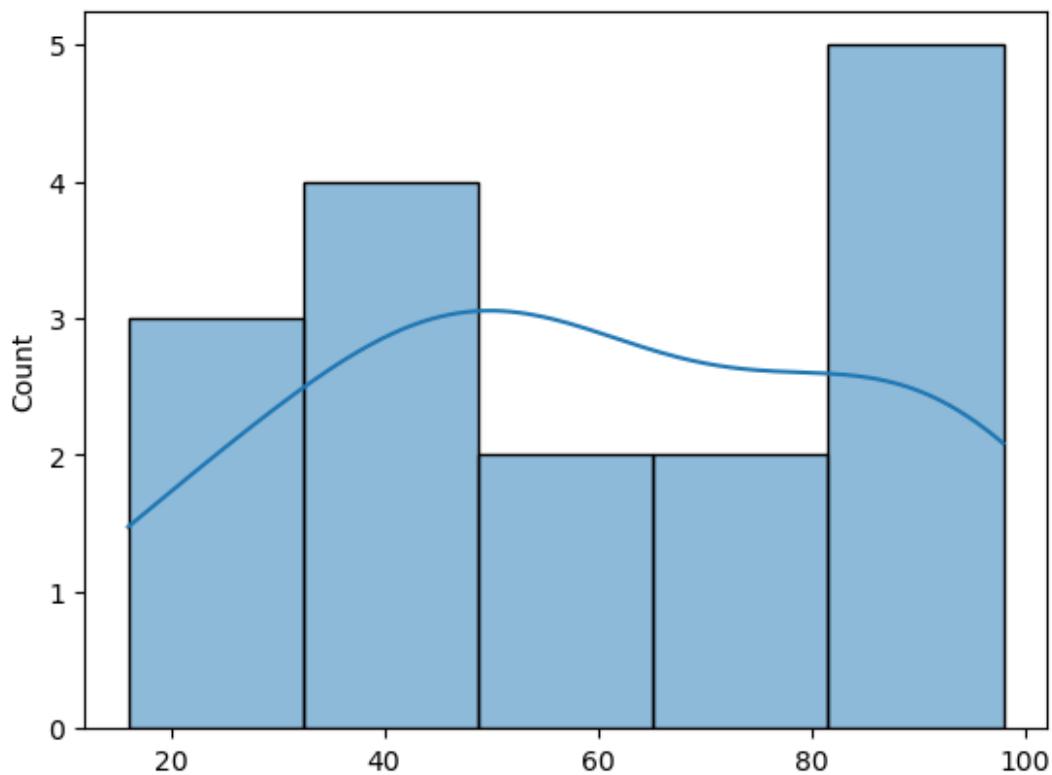
```
New Lower range: -24.25, New Upper range: 153.75
```

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Final array:
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```
[55 69 29 98 71 43 41 47 57 97 20 90 48 86 90 16]
```

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Visualizing final data:
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Final Data Distribution



Boxplot visualization:

Boxplot Showing Outliers

