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Practical 2: Statistics functions with and without using inbuilt functions in NumPy and Statistics

1. Using inbuilt functions

```
from statistics import geometric_mean,mode,harmonic_mean
import numpy as np
array = np.array([2, 3, 4, 7, 7, 8, 1])
array_stat = [2, 3, 4, 7, 7, 8, 1]
rangeStats = max(array) - min(array)
mean = np.mean(array)
median = np.median(array)
mode = mode(array_stat)
standardDeviation = np.std(array)
var = standardDeviation * standardDeviation
gm = geometric_mean(array_stat)
hm = harmonic_mean(array_stat)
print(
    f"Range: {rangeStats}\nMean: {mean}\nMedian: {median}\nMode (Stat):
{mode}\nVariance: {var}\n"
    f"Standard Deviation: {standardDeviation}\nGeometric Mean: {gm}\nHarmonic Mean:
{hm}")
```

Output:

```
import sys; print('Python %s on %s' % (sys.version, sys.platform))
sys.path.extend(['C:\\Users\\JaySs\\OneDrive\\Desktop\\Lab Works\\AI ML Classs'])

Python Console
Range: 7
Mean: 4.571428571428571
Median: 4.0
Mode (Stat): 7
Variance: 6.53061224489796
Standard Deviation: 2.5555062599997598
Geometric Mean: 3.695238487924817
Harmonic Mean: 2.8066825775656326
```

2. Without using inbuilt functions

```
def mean(array):
    return sum(array) / len(array)
def median(array):
    length = len(array)
    if length % 2 == 0:
        return array[length / 2] + array[(length / 2) + 1]
    else:
        return array[length / 2]
def variance(array, meanValue, whichType):
    sumValue = 0
    for i in range(len(array)):
        diff = (array[i] - meanValue)
        sumValue += diff * diff
    if whichType == "sample":
        return sumValue / len(array)
    elif whichType == "population":
        return sumValue / (len(array) - 1)
    else:
        return "Mention the Valid Type"
dataset = [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19]
meanV = mean(dataset)
print("Sample Type Variance: ", variance(dataset, meanV, "sample"))
print("Population Type Variance: ", variance(dataset, meanV, "population"))
```

Output:

```
import sys; print('Python %s on %s' % (sys.version, sys.platform))
sys.path.extend(['C:\\Users\\JaySs\\OneDrive\\Desktop\\Lab Works\\AI ML Classs'])

Python Console
Sample Type Variance:  33.25
Population Type Variance:  35.0
```