Experiment: 12 — NumPy Statistics (Mean, Median, Variance, Std Dev)

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1. Write a NumPy program to store marks of 10 students in an array. Calculate the mean, median, variance, and standard deviation of the marks.

```
import numpy as np
marks = np.array([78,85,62,90,56,73,88,95,67,80])
print('Marks:', marks)
print('Mean:', marks.mean())
print('Median:', np.median(marks))
print('Variance:', marks.var())
print('Std Dev:', marks.std())
```

Output:

```
Marks: [78 85 62 90 56 73 88 95 67 80]
Mean: 77.4
Median: 79.0
Variance: 146.84
Std Dev: 12.117755567760888
```

2. Store the daily temperature (in °C) of one week in an array. Use NumPy to find the average temperature, the median temperature, the variance, and the standard deviation.

```
import numpy as np
temps = np.array([25.0, 27.5, 26.0, 24.0, 23.5, 22.0, 26.5])
print('Temps:', temps)
print('Mean:', temps.mean())
print('Median:', np.median(temps))
print('Variance:', temps.var())
print('Std Dev:', temps.std())
```

Output:

```
Temps: [25.  27.5 26.  24.  23.5 22.  26.5]
Mean: 24.928571428571427
Median: 25.0
Variance: 3.102040816326531
Std Dev: 1.761261143705422
```

3. Given monthly sales data of a shop for 12 months, calculate the mean sales, median sales, variance, and standard deviation using NumPy.

```python
import numpy as np
sales =
np.array([12000,15000,13000,16000,17000,12500,14000,15500,16500,15000,14500,15800])
print('Sales:', sales)
print('Mean:', sales.mean())
print('Median:', np.median(sales))
print('Variance:', sales.var())
print('Std Dev:', sales.std())
```

Output:

```
Sales: [12000 15000 13000 16000 17000 12500 14000 15500 16500 15000 14500 15800]
Mean: 14733.333333333334
Median: 15000.0
Variance: 2315555.5555555555
Std Dev: 1521.694961401777
```

4. Take the exam scores of students in a class and find: The average score, The median score, Variance and standard deviation.

```python
import numpy as np
scores = np.array([45,78,88,92,56,67,73,81,59,95,68,74])
print('Scores:', scores)
print('Mean:', scores.mean())
print('Median:', np.median(scores))
print('Variance:', scores.var())
print('Std Dev:', scores.std())
```

Output:

```
Scores: [45 78 88 92 56 67 73 81 59 95 68 74]
Mean: 73.0
Median: 73.5
Variance: 207.5
Std Dev: 14.404860290887934
```

5. Create a NumPy array with heights (in cm) of 15 students. Compute mean, median, variance, and standard deviation of heights.

```
import numpy as np
heights =
np.array([160,165,170,155,180,175,168,172,158,162,169,174,166,171
,159])
print('Heights:', heights)
print('Mean:', heights.mean())
print('Median:', np.median(heights))
print('Variance:', heights.var())
print('Std Dev:', heights.std())
```

Output:

```
Heights: [160 165 170 155 180 175 168 172 158 162 169 174 166 171 159]
Mean: 166.93333333333334
Median: 168.0
Variance: 46.995555555555526
Std Dev: 6.85533044831214
```

6. Store the weights (in kg) of 12 patients in a NumPy array. Find average, median, variance, and standard deviation.

```
import numpy as np
weights = np.array([70,65,80,55,90,76,68,72,85,60,64,78])
print('Weights:', weights)
print('Mean:', weights.mean())
print('Median:', np.median(weights))
print('Variance:', weights.var())
print('Std Dev:', weights.std())
```

Output:

```
Weights: [70 65 80 55 90 76 68 72 85 60 64 78]
Mean: 71.916666666667
Median: 71.0
Variance: 97.90972222222221
Std Dev: 9.894934169676027
```

7. Given stock prices of a company for 7 days, calculate average stock price, median stock price, variance and standard deviation.

```python
import numpy as np
prices = np.array([150.5,152.0,149.0,153.5,155.0,151.0,154.0])
print('Prices:', prices)
print('Mean:', prices.mean())
print('Median:', np.median(prices))
print('Variance:', prices.var())
print('Std Dev:', prices.std())
```

Output:

```
Prices: [150.5 152.  149.  153.5 155.  151.  154. ]
Mean: 152.14285714285714
Median: 152.0
Variance: 3.9081632653061225
Std Dev: 1.9769075004425782
```

8. Store rainfall (in mm) of a city for 10 days. Calculate mean, median, variance, and standard deviation.

```python
import numpy as np
rain = np.array([5.0,0.0,10.5,2.0,0.0,1.0,3.5,4.0,0.0,6.0])
print('Rainfall:', rain)
print('Mean:', rain.mean())
print('Median:', np.median(rain))
print('Variance:', rain.var())
print('Std Dev:', rain.std())
```

Output:

```
Rainfall: [ 5.   0.  10.5 2.   0.   1.   3.5 4.   0.   6. ]
Mean: 3.2
Median: 2.75
Variance: 10.209999999999999
Std Dev: 3.195309061734091
```

9. Given electricity consumption (in kWh) of 8 households, use NumPy to find mean, median, variance, and standard deviation.

```python
import numpy as np
cons = np.array([250,300,200,180,220,270,260,240])
print('Consumption:', cons)
print('Mean:', cons.mean())
print('Median:', np.median(cons))
print('Variance:', cons.var())
print('Std Dev:', cons.std())
```

Output:

```
Consumption: [250 300 200 180 220 270 260 240]
Mean: 240.0
Median: 245.0
Variance: 1325.0
Std Dev: 36.40054944640259
```

10. Store the ages of 20 people in a NumPy array. Find the mean age, median age, variance, and standard deviation.

```python
import numpy as np
ages =
np.array([23,34,45,22,29,31,40,37,28,26,55,60,48,33,41,27,24,30,3
6,38])
print('Ages:', ages)
print('Mean:', ages.mean())
print('Median:', np.median(ages))
print('Variance:', ages.var())
print('Std Dev:', ages.std())
```

Output:

```
Ages: [23 34 45 22 29 31 40 37 28 26 55 60 48 33 41 27 24 30 36 38]
Mean: 35.35
Median: 33.5
Variance: 103.82750000000001
Std Dev: 10.189578008926572
```

11. Given the mileage (in km/l) of 10 cars, calculate mean, median, variance, and standard deviation.

```
import numpy as np
mileage =
np.array([15.5,18.0,14.2,20.0,13.5,17.5,16.0,19.0,14.8,18.2])
print('Mileage:', mileage)
print('Mean:', mileage.mean())
print('Median:', np.median(mileage))
print('Variance:', mileage.var())
print('Std Dev:', mileage.std())
```

Output:

```
Mileage: [15.5 18.  14.2 20.  13.5 17.5 16.  19.  14.8 18.2]
Mean: 16.669999999999998
Median: 16.75
Variance: 4.2781
Std Dev: 2.0683568357515103
```

12. Store cricket runs scored by a player in 8 matches. Find average runs, median runs, variance, and standard deviation.

```
import numpy as np
runs = np.array([34,50,12,67,23,45,0,56])
print('Runs:', runs)
print('Mean:', runs.mean())
print('Median:', np.median(runs))
print('Variance:', runs.var())
print('Std Dev:', runs.std())
```

Output:

```
Runs: [34 50 12 67 23 45  0 56]
Mean: 35.875
Median: 39.5
Variance: 460.359375
Std Dev: 21.455986926729796
```

13. Store salaries of 15 employees in an array. Use NumPy to calculate mean salary, median salary, variance, and standard deviation.

```
import numpy as np
salaries =
np.array([25000,30000,28000,35000,40000,27000,26000,32000,31000,2
9000,33000,34000,36000,38000,30000])
print('Salaries:', salaries)
print('Mean:', salaries.mean())
print('Median:', np.median(salaries))
print('Variance:', salaries.var())
print('Std Dev:', salaries.std())
```

Output:

```
Salaries: [25000 30000 28000 35000 40000 27000 26000 32000 31000 29000 33000 34000
 36000 38000 30000]
Mean: 31600.0
Median: 31000.0
Variance: 18106666.666666668
Std Dev: 4255.192905928786
```

14. Given prices of 12 houses in a city, calculate average house price, median house price, variance and standard deviation.

```
import numpy as np
houses =
np.array([4500000,5200000,4800000,5000000,4700000,5300000,4900000
,5100000,4950000,5050000,4850000,4750000])
print('House prices:', houses)
print('Mean:', houses.mean())
print('Median:', np.median(houses))
```

```
print('Variance:', houses.var())
print('Std Dev:', houses.std())
```

Output:

```
House prices: [4500000 5200000 4800000 5000000 4700000 5300000 4900000 5100000 4950000
 5050000 4850000 4750000]
Mean: 4925000.0
Median: 4925000.0
Variance: 46041666666.666664
Std Dev: 214573.21982639554
```

15. Take 10 blood pressure readings of a patient. Find mean, median, variance, and standard deviation using NumPy.

```
import numpy as np
bp = np.array([120,125,130,118,122,128,135,119,121,127])
print('BP readings:', bp)
print('Mean:', bp.mean())
print('Median:', np.median(bp))
print('Variance:', bp.var())
print('Std Dev:', bp.std())
```

Output:

```
BP readings: [120 125 130 118 122 128 135 119 121 127]
Mean: 124.5
Median: 123.5
Variance: 27.05
Std Dev: 5.200961449578338
```