Lab. Meteorological Statistics ........ Fourth stage

(First Semester)

Department of Atmospheric Sciences

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:The variance depends on the dispersion and the

divergence of the data from its mean, so the variance is large if the data is divergent from its mean and vice versa.

**1-Calculation the variance for unclassified data:**

$ S^{2}$**=** $\frac{\sum\_{}^{}x\_{i}^{2}}{n}$ **-** $\left(\frac{\sum\_{}^{}x\_{i}}{n}\right)^{2}$$ S^{2}$ **=** $\frac{\sum\_{}^{}x\_{i}^{2}}{n}$ **-** $ \overbar{x}^{2}$

***For example***\\ calculate the variance deviation of the following data?

|  |  |
| --- | --- |
|   |   |
| 3  | 9  |
| 3.5  | 12.25  |
| 4  | 16  |
| 4.5  | 20.25  |
| 5  |  25  |
| 20  |  82.5  |

 

 $ S^{2}$ **=** $\frac{\sum\_{}^{}x\_{i}^{2}}{n}$ **-** $\overbar{x}^{2}$

$ S^{2}$**=** $\frac{82.5}{5}$ **– 16** $ S^{2}$=**0.5**

**NOTS:** the standard deviation can be extracted by the second method.

1. **the standard deviation=**

**SD =** $\sqrt{ S^{2} }$ **SD =** $\sqrt{\frac{\sum\_{}^{}x\_{i}^{2}}{n} - \overbar{x}^{2}}$

***For example***\\ S.D.=  **whereas**: *=*

0.707\*0.707= 0.5

**2- Standard Deviation = SQRT (Variance )**

SD = SQRT (0.5)

2- **Calculation the variance for classified data:**

$ S^{2}$ **=** $\frac{\sum\_{}^{}x\_{i}^{2}f\_{i}}{\sum\_{}^{}f\_{i}}$ **-** $ \overbar{x}^{2}$

***For example***\\ calculate the variance deviation of the following data?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|   |   |   |   |   |   |
| 15-19  | 3  | 17  | 51  | 289  | 867  |
| 20-24  | 5  | 22  | 110  | 484  | 2420  |
| 25-29  | 7  | 27  | 189  | 729  | 5103  |
| 30-34  | 15  | 32  | 480  | 1024  | 15360  |
| 35-39  | 10  | 37  | 370  | 1369  | 13640  |
| 40-44  | 6  | 42  | 252  | 1764  | 10584  |
| 45-49  | 4  | 47  | 188  | 2209  | 8836  |
|   |   = 50  |   | 1640   |   | =56860  |

$\overbar{x} $**=** $\frac{\sum\_{}^{}f\_{i}x\_{i}}{\sum\_{}^{}f\_{i}}$ **=** $\frac{1640}{50}$**= 32.8** $\overbar{x} ^{2}$=32.8\*32.8=1075.84

$1- S^{2}$ **=** $\frac{\sum\_{}^{}x\_{i}^{2}f\_{i}}{\sum\_{}^{}f\_{i}}$ **-** $\overbar{x}^{2}$$ S^{2}$**=**$\frac{56860}{50}- 1075.84$$S^{2}$**=61.36**

2- S = $\sqrt{\frac{\sum\_{}^{}f\_{i}(x\_{i}-\overbar{x})^{2}}{\sum\_{}^{}f\_{i}}}$ S = $\sqrt{1137.2- 1075.84 }$= 7.833

 $S^{2}$ **=** $\left(7.833\right)^{2}$**=61.36**

**H.W (1) \\ find The Standerd deviation and the variance of the following data**

|  |  |  |
| --- | --- | --- |
| **Classes**  |   |   |
| 2-4  | 2  | 3 |
| 4-6  | 3  | 5  |
| 6-8  | 6  | 7  |
| 8-10  | 2  | 9  |
| 10-12  | 1  | 11  |
|   | =14  |   |

**H.W(2) \\ find the variance and The Standerd deviation of the following data** :

|  |  |
| --- | --- |
| **Class** | **fi** |
| **10-14** | **6** |
| **15-19** | **5** |
| **20-24** | **12** |
| **25-29** | **9** |
| **30-34** | **8** |