SUMMARY NOTES

MEASURES OF DISPERSION

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Illustrations

- Consider IQs of 2 groups of students , 10 per group. Each group having mean IQ of 100

- Group 1: range of 70-140

- Group 2; range of 90-120

- Latter group appear more homogenous than the other, and thus students would find it easier comparatively to understand lectures taught?

- Group A appear more varied? More conclusions which central tendency may not give

- Dispersion= 'away' from the centre, unlike central tendency which connotes 'towards the centre'

Introduction

- Spread
- Disperse
- Variability
- Scatter
- More useful than Central tendency
- Why are there differences in observations
- How far is data x from the center of the data

Some measures of dispersion

- Range
- Quartiles
- Mean deviation
- Variance
- Standard deviation: mostly used
- Coefficient of variation-sample variance/mean

Possible causes of variation

- Random measurement errors

- Instrument measurement errors

- Procedural errors

- Observer error

- Biological variability
  - Intra or
  - inter individual variability

Range, quartiles

- Range: Maximum-minimum

    Highest-lowest

Quartiles: Using the data provided

Step 1: arrange in increasing order of magnitude

Step 2: compute the cumulative frequencies

Q1=1st quartile= cumulative frequency containing 25% of one quarter of total frequency (n/4)

Calculation of Qs

- Q2= 2nd quartile=50%=n/2=median
- Q3=75%=three quarters
- Exercise: using the data provided
- Identify the class interval containing Q1, Q2 and Q3
- Calculate the precise values of Q1-Q3

Calculating precise values of Qs

- Q1=x0 + n/4-Fc/F1   * l

X0=lower limit of class interval in which n/4 falls

Fc=cumulative frequency in the immediately preceding class interval

F1=frequency in the interval where n/4 falls

L=class interval

Q2 is similar in formular to Q1 but 2*n/4

Q3 is similar in formular to Q1 but 3*n/4

Semi Interquartile range (SIR)

- Inter-quartile range=Q3-Q2
- Semi interquartile range or quartile deviation =average of distance of Q1 to Q2 and Q2 to Q3= half of inter-quartile range above
- SIR is employed when the
  - Median is the central location used
  - Distribution is skewed
  - Extremes are indeterminate

Mean deviation, Variance, Standard deviation

- Mean deviation =E(X-mean)/n
- X is the midpoint

- Variance=E(X-mean)2/n-1
- N for a population rather than sample(n)
- Standard deviation= square root of variance
- Add f to the formular(numerator) in case of grouped data with frequencies

Calculating variance and standard deviation

- Depending on the set of data given, whether grouped or not, class or no class interval
  - Draw the frequency distribution table
  - Calculate the mean
  - Find midpoint
  - Use the formular after creating the following columns
    - Midpoint-mean
    - (Midpoint-mean)2
    - (midpoint-mean)f
    - (midpoint-mean)2f

Assignment

- Write the formular for calculating
  - Mean
  - Mean deviation
  - Variance
  - Standard deviation
- Using the set of data provided, compute the
  - Semi interquartile range
  - Sample mean
  - Variance
  - Standard deviation