Toppersnotes
Unleash the topper in you

UGC-NET

Environmental Science

NATIONAL TESTING AGENCY (NTA)

PAPER – 2 || VOLUME – 6

STATISTICAL ANALYSIS & GLOBAL ISSUES OF ENVIRONMENTAL

SIERRA INNOVATIONS

CONTENT

UNIT - 9

Statistical Analysis Environmental Modelling

Common types of variables

UNIT - 10

Global Environmental Issues

Topperswotes
Unleash the topper in you

Central Tendency

Statistical Approaches and modelling in Environmental Sciences.

Common Types of variables:

* Categorical variable :-

- variables that can be put into categories. For example, the category "Toothpaste brands" might contains the variables colgate and Aquafresh.

* Confounding variable / Lurking variable :-

- extra variables that have a hidden effect on your experimental results or a "hidden" variable the affects the relationship between the independent and dependent variables.

* Continuous variable :

- a variable with infinite number of values, like "time" or "weight".

* Control variable

- A factor in an experiment which must be held constant, for example, in an experiment

to determine whether light makes plant grow faster, you would have to control for soil and quality and water.

* Dependent variable :

- The outcome of an experiment- As you change the independent variable, you watch what happens to the dependent variable.

* Discrete variable

- a variable that can only take on a certain number of values. For example — "number of cars in a parking lot" is discrete because a car park can only hold so many cars.

* Independent variable :-

a variable that is not affected by anything that you, the researcher, does usually plotted on the x-axis.

* A measurement variable :-

has a number associated with it. it's an amount of something or a number of something.

* Nominal variable

- Another name for categorical variable.

* Ordinal variable

- Similar to categorical variable, but there is a clear order. For ex – income levels of low, middle and high could be considered ordinal.

* Qualitative variable :-

- a broad category for any variable that can't be counted (i.e, has no ~~some~~ numerical value) Nominal and ordinal variables fall under this umbrella term.

* Quantitative variable :-

A broad category that includes any variable that fall into this category include discrete variables and ratio variables

* Random variables :-

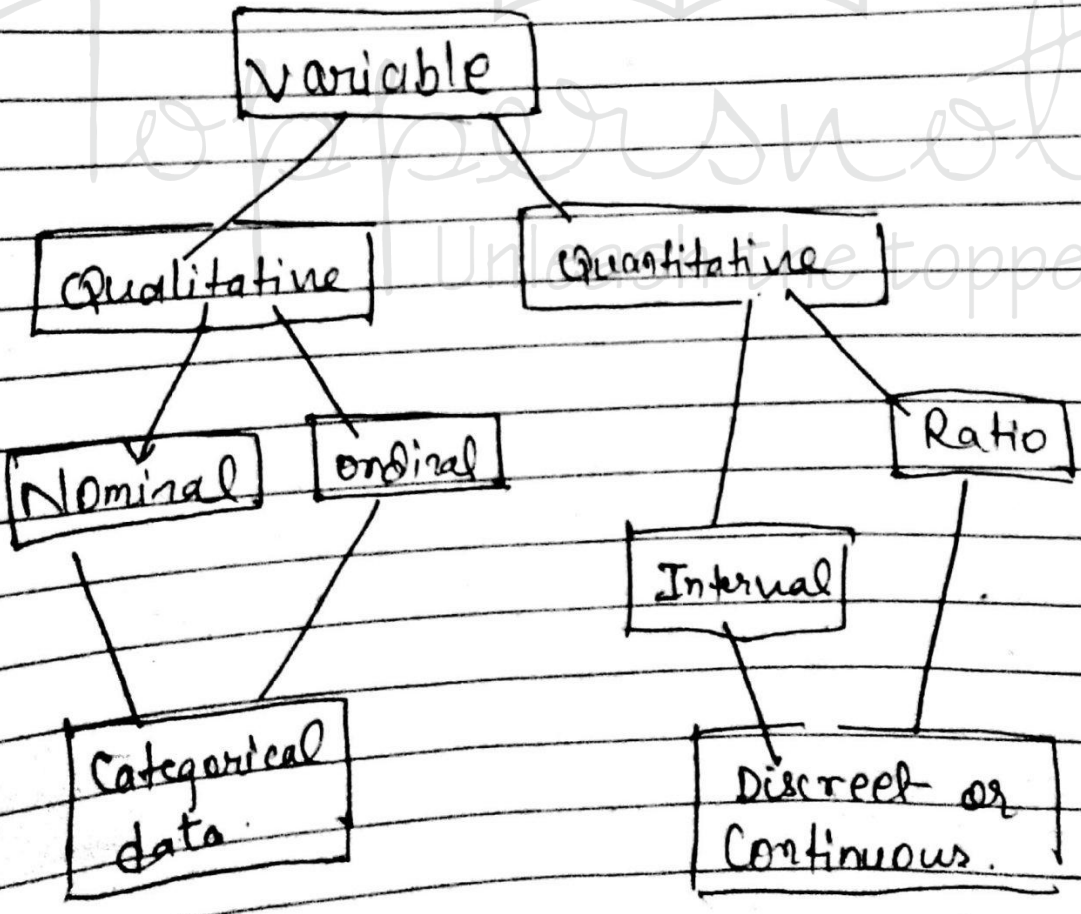
are associated with random processes and give number to outcomes of random events.

* A ranked variable :-

- is an ordinal variables, a variable where every data point can be put in order (1st, 2nd, 3rd etc).

* Ratio variables :-

Similar to ~~invest~~ internal variables, but has a ~~mean~~ meaningful zero.



▶ Qualitative Data (attribute)

* Qualitative Data (Commonly Called attribute) Contains value that expres a quality, a State of which we Cannot Calculate an average, a limit. They do not answer the question "how much".

- A brand : Ford, Peugeot
  One Color : Black, blue

* The qualitative data and variables are in two types :-

1. Nominal variable

- It is a variable of ~~nomic~~ nominal qualitative type, the values which can be taken by it being of type name (green, yellow, black and red ...) without any hierarchy being applicable between the modes listed (we can under no circumstances write yellow > red > green = black).

Example : Color

2. Ordinal variable

An ordinal qualitative variables has all the properties of the nominal qualitive variable plus the ability to position and prioritize the individual between them depending on the value attached to their character.

The operation allowed for the ordinal qualitative scale are in addition to the count by mode.

- A judgement : Good | Not good, small | large.

The Quantitative data

- Quantitative data or variables contains numerical values that refer to a recognized unit of measure. For this reason, they are sometimes referred to as metric variables.

- The size, the weight, the surface, the distance, the income, the age the turnover or even the population (in the sense of the number of inhabitant are

quantitative variables.

* All Simple and complex arithmetic operations are applicable to quantitative variables, count (absolute frequencies) and other Percentage calculation (relative frequencies) passing through the mean, median and Standard deviation up to Numerical modeling.

example – Rent of a house

More complex and especially able to be treated with a Substantial number of mathematical tools, this data can be classified into 2 Subgroups.

1) Variable Internal

- This type of relates to data referring to Constant units of measurement but whose zero point is arbitrarily fixed which does not correspond in any way to the absence of phenomena.

ex – The temperature.

Variable ratio :-

- Unlike the internal Scale, the ratio Scale is characterised by an equal proportion of the measured values in such a way that there is a direct and constant mathematical relationship between these values.
- The ratio scale has a unique and universal zero.
- It can be said that a person weighing 90 kg is twice as heavy as a person of 45 kg or even that a rent of £337.50/month is 1.5 times (or 50) higher than a rent of £225/month.

Discrete variable

- A variable is said to be discrete when it takes a finite or countable number of values.

ex – The number of inhabitants.

- The number of inhabitants of a country or city is a quantitative variable discrete ratio.

The set of values that can take the variable "Number of inhabitants belongs to all the integers N. It is therefore not possible to write that a city has 12283.18 inhabitants.

*) Continuous Variable :-

- A continuous variable may unlike the desenete variable take an infinite or uncountable number of values.

ex - the temperature.

- The variable "temperature" is a quantitative variable of continuous interval for ex - between 10 and 12°c, the variable can take any of the countless existing and measurable values: 10.007°c, 11.11°c or even 11.9999°c.

Quantitative

Discrete

- aka Attribute data
- Discrete Data is information that can be categorized into classifiable
- Based on Count
- Finite no. of values is possible and the values cannot be subdivided meaningfully.

eg - No of Parts damaged in Shipment.

Continuous

- Continuous data is information that can be measured on a continuum or scale.
- have numeric value & meaningfully subdivided into finer & finer increments

eg - length, size, width

Qualitative

Nominal

- variables with no inherent order or ranking sequence.

e.g - Gender, Race etc

Ordinal

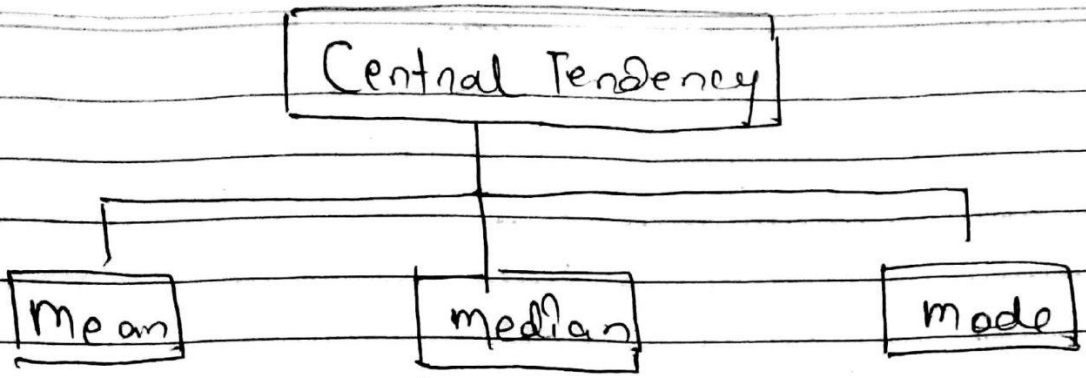
- variables with ~~only~~ an ~~two~~ ~~options~~ or ordered series

ex - blood Group Performance etc.

Binary

variable with only two option

eg - Pass/fail Yes/No



Mean

- The mean represents the average values of the Dataset. It can be Calculated as the sum of all the values in the dataset divided by the number of values. In general it is Considered as Arithmetic mean.

Some other measures of mean used to find the Central tendency are as follows:

1. Geometric Mean
2. Harmonic mean
3. Arithmetic mean

Arithmetic mean

- It is nothing but the average. It is Computed by adding all the values in the data set

divided by the number of observations i.e. n if. If we have the raw data, mean is given by the formula.

$$\text{Mean} = \bar{X} = \frac{\Sigma x}{n}$$

Harmonic mean

- It is the reciprocal of the arithmetic mean of the observations.

$$\text{Harmonic mean (HM)} = \frac{1}{\frac{\Sigma(1/x)}{n}} = \frac{n}{\Sigma(1/x)}$$

Geometric Mean

It is defined as the arithmetic mean of the values taken on a log scale. It is also expressed as the n^{th} root of the product of an observation

$$\sqrt[n]{x_1 \cdot x_2 \cdot x_3 \cdots x_n}$$

Median

- Median is the middle value of the dataset in which the dataset is arranged in the ascending order. When the dataset contains an even number of values, then the median values of the dataset can be found by taking the mean of the middle two values.

* Consider the given dataset with the odd number of observations arranged in ascending order — 2, 5, 6, 7, 9, 10, 12, 13, 15, 16, 18, 21 and 23.

Median

n is odd

$$\text{median} = \left(\frac{n+1}{2}\right)^{th} \text{observation}$$

n is even

$$\text{Median} = \frac{\left(\frac{n}{2}\right)^{th} + \left(\frac{n}{2}+1\right)^{th} \text{observation}}{2}$$

* In the dataset with odd number of observations, notice how the number 12 has six values above it and six below it.

Therefore 12 is the median of this dataset.

Median odd.
23
21
18
16
15
13
12
10
9
7
6
5
0

Median even

In the dataset with even number of values, you count in to the two innermost values and then take the average. The average of 27 & 29 is 28 consequently 28 is the median of this dataset.

Median Even
40
38
35
33
32
30
28 → 29
27
26
24
23
22
19
17