DATA.

Data divided into two main categories **qualitative** data and **quantitative** data .

The main difference between them is that quantitative data deals with numbers but qualitative data deals with words .

Quantitative data "numerical data" .

divided into :

Discrete (can be counted) : deals with normal integers

Like : I have 2 dogs you can't have 2.6 dogs .

continuous (can be measured) :

Like : my dog weights 10 kg.

Qualitative data .

Descriptive data based on observation .

Involves 5 senses (see , feel ,taste ,hear , smell)

Like : my dog's hair is black .

the different forms of scales of measurement .

1- Nominal scale data :

- Qualitative & Categorical
- Names , colors , labels , Gender , etc
- Order does not matter

Ex: if we did a survey and asked 10 people what is there favorite color

Red : 5.

Green : 2.

Blue : 3 .   here order does not matter , blue can become before green or red .

2- Ordinal Scale Data :

- Ranking ,Placement
- The order matters
- Differences can't be measured

Usually this scale use in ranking

Ex : 1st , 2nd ,3rd , and so on …

3- Interval Scale Data :

- The order matters
- Differences can be measured except (ratios)
- No true (0) starting point

Ex : temperature : 30 f , 60 f , 90 f .

The difference can be measured so we can say 60 – 30 = 30 the second place hotter than the first place by 30 f degree

But that doesn't mean it is 2 times hotter than the first place(ratios can not be measured)

And there is no true zero starting point because we can get negative values .

4- Ratio Scale Data :

- The order matters
- Differences can be measured including (ratios)
- Containing a (0) starting point

Ex : students grades . (0,30,44.56,66,80,90)

We can order or data , starts from (0) there is no student that can get less than 0 , we can measure the differences and ratios so we can say the highest student (90) get 60 point higher than the second student (30) or we can say the highest student got 3 times higher than the second student (ratios can be measured).

Hypothesis Testing :

When we make a hypotheses and data give us a strong evidence that the hypothesis is wrong then we can reject the hypothesis .

But if the data is similar to the hypothesis but not exactly the same then we fail to reject the hypothesis

There is also

Null hypothesis : which suppose that there is no difference between the 2 samples .

Alternative hypothesis : which suppose that there is a difference between the 2 samples .

P-Values : are numbers between 0 and 1 that quantify how confident we should be.

If p-value is closer to 0 that mean we are more confident in our conclusions

p-value doesn't imply the effect of sample size .

p-value helps us decide if we should reject the null hypothesis or not .

we only reject the hypothesis if $p\text{-value} < 0.05$.

there are two types of p-values : one_sided and two_sided .

P-value calculation =
   1-The probability random chance result in the observation +
   2-The probability of observing something else that is equally rare +
   3- The probability of observing something rare or more extreme

Ex : if we have a coin and flipped it 2 times

To calculate probability =

The numbers of times we got the outcomes / the total numbers of outcomes

Outcomes	Probability
2 heads	0.25
1 head , 1 tail	0.5
1 tail , 1 head	0.5
2 tails	0.25

Now lets suppose we want to calculate the p-value for 2 heads

p-value = 0.25 +0.25 +0 = 0.5