Statistics Portion of Math 156

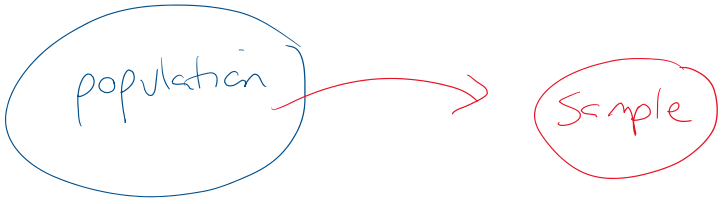
Wednesday, March 06, 2024 10:50 AM

Chapter 5: Describing Data

Section 5.1: Variables and Data

Statistics ≡ a branch of applied mathematics concerned with the collection and interpretation of data

ideas of collecting data:



population ≡ the entire set of measurements of interest

note: sometimes not practical or possible to collect data on the entire population

sample ≡ a subset of the measurements of interest

- must ensure as far as possible that your sample is representative

the sample should look like the population

two types of stetistics:

descriptive - what are the characteristics of your data set?

inferential - what does our sample tell us about the population?

variable ≡ a characteristic that either

(1) changes over time

example: the height of an individual tree measured over a period of years

(2) changes for different individuals or objects under consideration

example: the height of all trees within a certain area at a particular time

---

experimental unit - individual or object on which a variable is measured

example: we measure the height of a tree

height: variable

tree: experimental unit

---

univariate data - the result of a single variable measured on experimental units

- the height of a tree

bivariate data - two variables

- the height and diameter of a tree

multivariate data - more than two

---

qualitative variable - measure is a quality or characteristic

- does not result in a numerical value

example: nationality
favourite food
political party
model of car

quantitative variable - measure is a numerical quantity

examples: height, speed
number of students in a class

for quantitative variables, two types

discrete versus continuous

discrete - can only have finite or countable number of values

example of finite:
values can only be one of

example of finite:

values can only be one of
$\{3.75, 5.21, 8.32, 9.21\}$

example of countable:

shoe size: ... 7, 7½, 8, ...

continuous - can be any real number

examples: speed
mass
length
weight

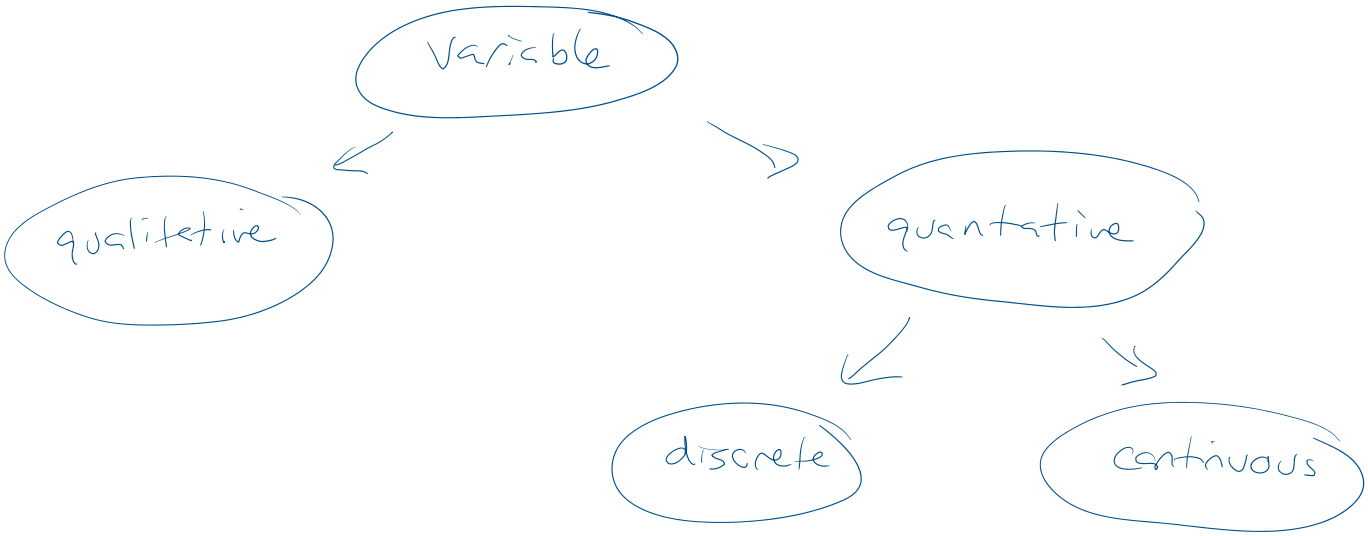
note: although height, for example, is in theory a continuous variable

practically speaking, we usually round our measurements to a certain precision
(certain number of decimal places, or "to the nearest millimetre")

due to

→ limitations of your measuring instrument

→ limitations on object being measured
(tennis balls are fuzzy and squishy)


Variable
qualitative
quantative
discrete
continuous