Humanism – Population Distribution

Population variables frequency distribution models – to identify variables in a population useful for further analysis

Humanism Processes Supported:
1.Observe

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Frame

Hypothesis: Frequency distributions can be used to observe populations

Questions

1. Are mathematical models a useful tool to model populations?
2. Are some mathematical models more useful and why?
3. What are the problems with frequency distribution?

Population: Individual Humans, Groups

Measure: Supporting model for – choosing variables, Observe, Manage Issues, Agree

Assumption: Information as variables which can be counted about humans can be described by patterns

Information Sources and Topics: Statistics, WWW - including those links provided.

Motivations: Identify bias and problems with models

Initial Conditions, Self reference: Numbers, group terms and language

Frequency Distributions

Things can be counted – e.g. apples.

Some things have different things about it which can be counted – e.g. height and weight

Things which can be counted can produce a frequency distribution with a variable on the x axis and the count on the y axis.

There are different types of variables which have different characteristics .e.g. Object or Event characteristic - continuous, discrete (categorical)

Count is an Event Discrete Variable – adding counts of object or event characteristics, Count is an infinite categorical variable.

https://www.statisticshowto.datasciencecentral.com/probability-and-statistics/types-of-variables/

http://www.statsoft.com/Textbook/Elementary-Statistics-Concepts#What%20are%20variables

Frequency Distributions

1. There are many mathematical models for frequency distributions. William & Mary University - http://www.math.wm.edu/~leemis/chart/UDR/about.html
2. Most of the distributions feature a high point and progressively reducing numbers to an unknown point. The Central Limit Theorem describes this.
   https://en.wikipedia.org/wiki/Self-organized_criticality
   Stephen Wolfram https://blog.stephenwolfram.com/2015/12/what-is-spacetime-really/,
   John Horton Conway https://en.wikipedia.org/wiki/Conway%27s_Game_of_Life
3. The Pareto, Poisson, gamma and normal distributions are useful – most people are familiar with the Normal so I will use that for illustration of the issues.

Normal Distributions

- **Carl Friedrich Gauss , Bell Curve, Pierre-Simon Laplace**
- Things can be mostly normally distributed in which case the 2 or 3 std deviation distance from the mean (average) has been a reliable and useful working approximation. Further than that there is much less certainty of the distribution.
- The normal distribution is one of the most common models for life. It demonstrates the harmonic and resilient result of competition between extreme sameness (equality) and extreme difference (diversity)

- Some distributions
  - Galtonboard.com https://galtonboard.com/probabilityexamplesinlife
  - Michael Mills https://www.psychologytoday.com/au/blog/the-how-and-why-sex-differences/201101/how-can-there-still-be-sex-difference-even-when-there-is
  - Donna L. Maney, The Royal Society https://royalsocietypublishing.org/doi/full/10.1098/rstb.2015.0119
  - Evan Goode https://sexdifference.org/

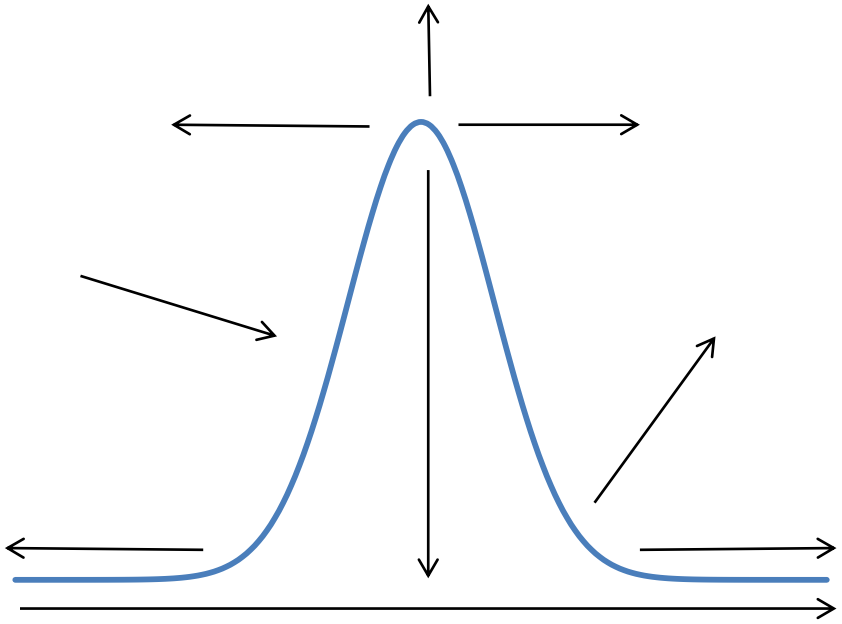
Variables

1. Producing a frequency graph requires a good well defined variable
2. Producing frequency graphs for each variable for a Population can help determine which variables to use in a 2 by 2 table analysis

		Measure=Live? Y	Measure=Live? N
Choice Option1?	Y	TP A. Option 1 and live	FN B. Option 1 and die
	N	FP C. Not Option 1 and live	TN D. Not Option 1 and die

Changing Characteristics of a Population

If we wanted to change a variable for a human population how would we describe that on a normal curve? If we draw a picture of the current state for a variable for a population and then draw a picture of the future state we could describe the success measures.



Normal

Extreme equality

Extreme diversity

Extreme Gaps Abrupt

Population Change Examples

Some humans believe they can engineer humanity wide extreme changes to underlying human based frequency distributions. These humans are called "extremists".

If we want every human to have the same value for a given variable then this is called extreme equality. If we want every human to have a different value this is called extreme diversity.

Changing the distribution so it no longer resembles the initial model is also extreme when:

- Extremely narrow or wide x values
- Gaps in x value count
- Abrupt changes in count as x increase or decreases

Extreme distributions are not stable or resilient.

Less extreme change options include:

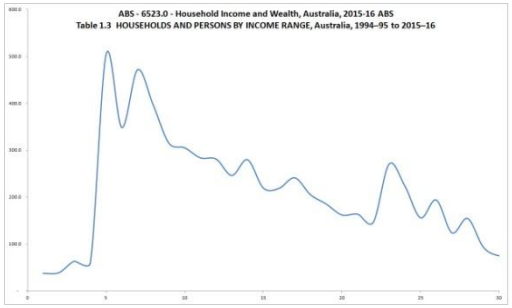
1. Move the bulge left or right (skew)
2. Move the bulge up or down (kurtosis)

3. Change the number of humans closer to the centre of the bulge

4. Move the upper and lower values of x

Murray Bourne, Bourne2Learn https://www.intmath.com/counting-probability/normal-distribution-graph-interactive.php

Population Change Issues

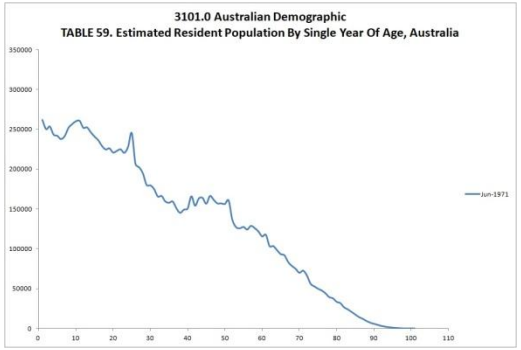


Human information can not always be usefully modeled using mathematical formulas. This graph of Australia's household income over a given number of years shows distribution clustered around the top and the bottom values. The lower cluster goes up and down and the higher cluster grows increasingly and brings along the middle values as it rises.

The low x values increases only slightly during the time period.

Looking at this graph the question emerges:

"What should household income distribution look like?"



This is a complex topic and involves looking at a number of other variables as well as understanding the purpose of the question. What are you trying to do? What outcomes do you want and why? Is household income a useful variable? How, Why?

Frame the topic appropriately before extrapolating from data.

Significance testing in 2*2 tables

Some additional notes of examining 2 variables.

https://en.wikipedia.org/wiki/Contingency_table#Measures_of_association
https://en.wikipedia.org/wiki/Karl_Pearson
https://en.wikipedia.org/wiki/Meta-analysis
https://en.wikipedia.org/wiki/Jacob_Cohen_(statistician)

Power analysis and significance testing

In addition to being an advocate of power analysis and effect size, Cohen was a critic of reliance on, and lack of understanding of, significance testing procedures used in statistics, especially misunderstandings of null hypothesis significance testing. In particular, he identified the "near universal misinterpretation of p as the probability that H_o is false, the misinterpretation that its complement is the probability of successful replication, and the mistaken assumption that if one rejects H_o one thereby affirms the theory that led to the test.[3] He encouraged instead a recognition of single studies as exploratory and a reliance on replication for support.

Additional References

Karl Pearson The chances of death, and other studies in evolution

by Pearson, Karl, 1857-1936
https://archive.org/details/cu31924097311579/page/n135

Thomas Henry Huxley (1825-1895)

"The fundamental proposition which runs through the writings, which thus extend over a period of twenty years, is, that the common a priori doctrines and methods of reasoning about political and social questions are essentially vicious; and that argumentation on this basis leads, with equal logical force, to two contradictory and extremely mischievous systems, the one that of Anarchaic Individualism, the other that of despotic or Regimental Socialism. Whether I am right or wrong, I am at least consistent in opposing both to the best of my ability."

http://www.gutenberg.org/files/2940/2940-h/2940-h.htm