

Normal Distribution (probability) Statistics (collected data)

What are some real world examples of normally distributed quantities?



I vote with Peter Flom and Terry Moore that nothing real follows a Normal distribution.

Answered January 12, 2017

What is true is that many quantities are approximately bell-shaped in their centers. These are the examples other answers are citing. The reason for that is the Central Limit Theorem, which says (roughly) that if something results from a lot of small influences that are not too correlated with each other, you'll get a Normal distribution. Height, for example, is controlled by lots of genes, plus nutrition and other factors that work more or less independently.

However the Central Limit Theorem works from the center of the distribution out. Even if there aren't that many factors, and some are big, and some are correlated; you can still get a distribution that looks pretty Normal for 80% or 95% of the observations. If there are many factors, none big, and no major correlations; maybe the distribution looks Normal for 99% or 99.9% of the observations. But never for 100%. With height, for example, there are outliers due to genetic conditions or stunting. In other cases, the problem is not outliers, but maximum or minimum values.

The reason this is important, is you can look at a lot of data and see it follows something reasonably Normal, and therefore make confidence intervals based on Normal assumptions. But you know (or should know) that tails are never Normal. Depending on the application, a single outlier may be more important than all the rest of your data put together.





Answered Jan 10

Real phenomena only follow discrete empirical distributions and even they are vulnerable to perturbative noise (alas we are creators of finitist measurement). The CLT puts the Gaussian on a pedestal as an asymptotic distribution for weighted averages under certain circumstances, but there are also CLTs for other asymptotic distributions such as the Poison.

Asymptotic normality seems to adequately describe some phenomena such as long sequences of fair coin-flipping.

One can use a divergence measure such as the KL-divergence to measure a difference between an empirical distribution (from a certain population sample $\{X_i\}$ of size n) $e_n(\{X_i\})$, and a proposed model $\mathcal{N}(\mu, \sigma^2)$;

$$D_{KL}\left(e_n(\{X_i\}) \parallel \mathcal{N}(\mu, \sigma^2)
ight) = \sum_{x \in \mathcal{X}} e_n(x) \log igg(rac{e_n(x)}{f(x)}igg)$$

where f(x) is the discretized normal density with parameters μ and σ .

There are other methods of measuring the approximate normality of a distribution based on using kernel density estimates.

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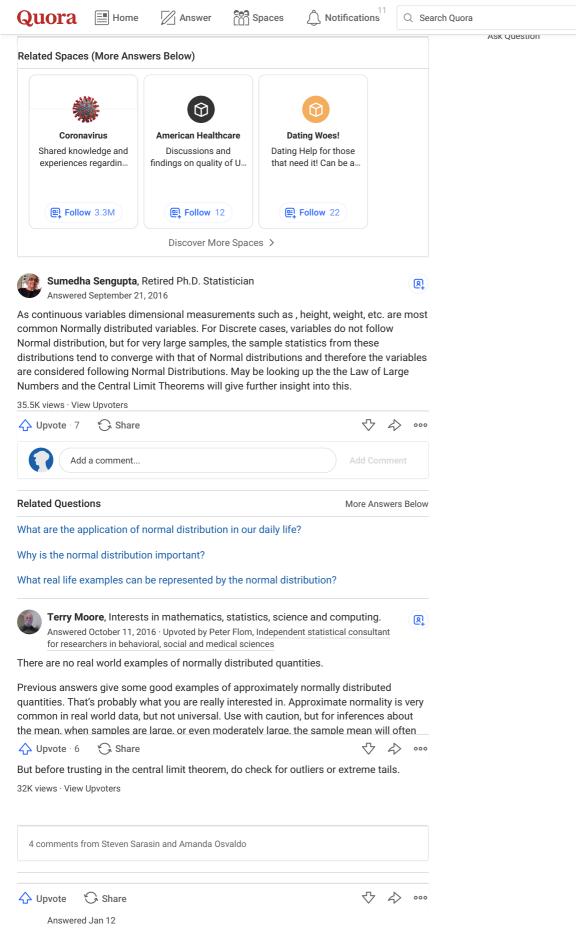
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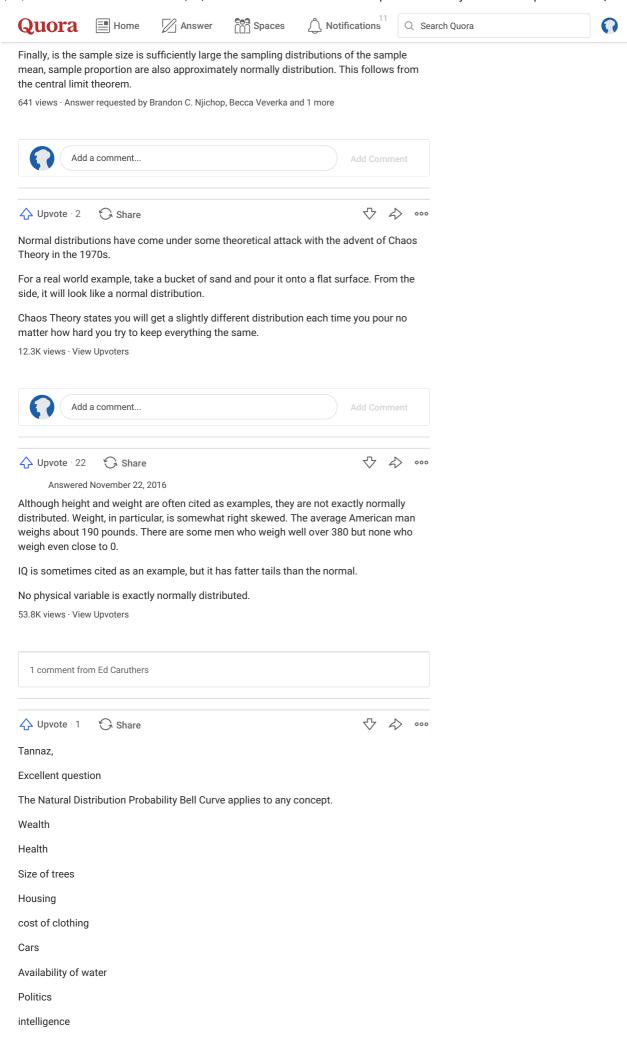
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Actually, there are no real normally distributed question u panties. The normal distribution is a conceptual math r magical idea.

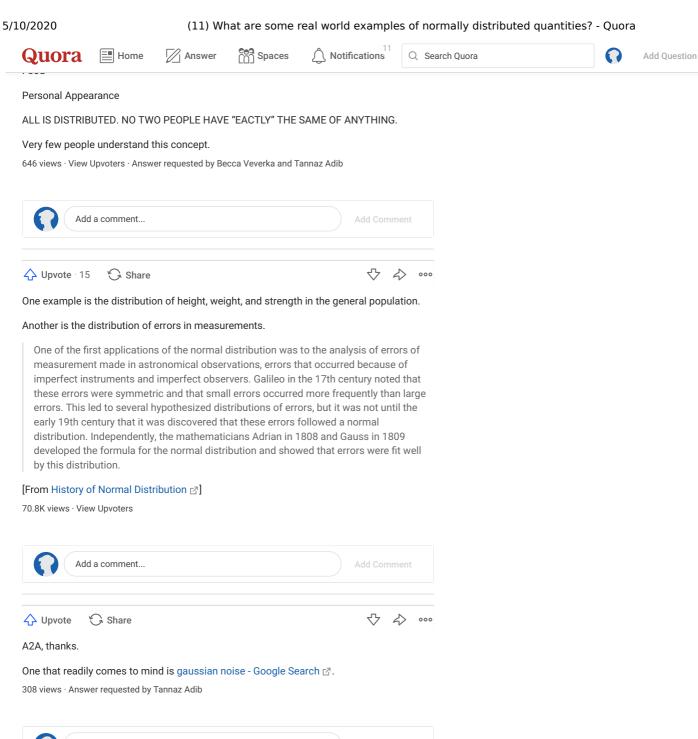
Approximately normally distributed quantities are height and weight are approximately distributed. Variation in the rate of return in some financial instruments are normally distributed.

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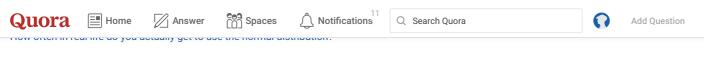
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