

THE CENTRAL LIMIT THEOREM OF HUMAN PERCEPTION

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1. DRAMATICS

Humans are an extremely dramatic species to say the least, every bad grade is a catastrophe, every rejection a debacle, and one bad day the end of the world. It wouldn't be wrong to call ourselves conceited and short-sighted. We see one individual event and accept it to be all of life.

Mathematics, however, is logical enough to see beyond the dramatic facade of everyday life to show that one isolated incident in fact does not define a human being.

Statistically, many datasets, when aggregated, tend toward a normal distribution, a simple curve shaped like a bell that represents the sum average of an entire status quo; no matter how complex or contradictory the variables.

When I came across this concept it sounded too good to be true, how could it be possible for something as messy as human emotions to be converted to quantifiable data only for them to form a smooth bell curve.

2. QUANTIFICATION

But the symmetry of mathematics is so that it doesn't follow the self-made constraints of the human mind. We quantify human emotion with the help of the Likert scale, like computers communicate in terms of binary 1s and 0s, we ask humans to respond on a scale from 1 to 5. Data now converted from analogue to digital is used to calculate the mean and move beyond the singularity of isolated incidents to a broader understanding of data and events.

Now that we've quantified these human emotions, swinging from one extreme to the other, we realize how chaotic and unpredictable human emotions really are. One day I am at my highest most optimistic say 5 and another I am at my lowest most wallowing self say 1, but where does my true self lie. I simply can not declare myself an optimist or a pessimist, a success or a failure, and a genius or a dunce simply on the basis of a small constricted data set, the very basis of an algorithm is the notion of analyzing huge sets of data.

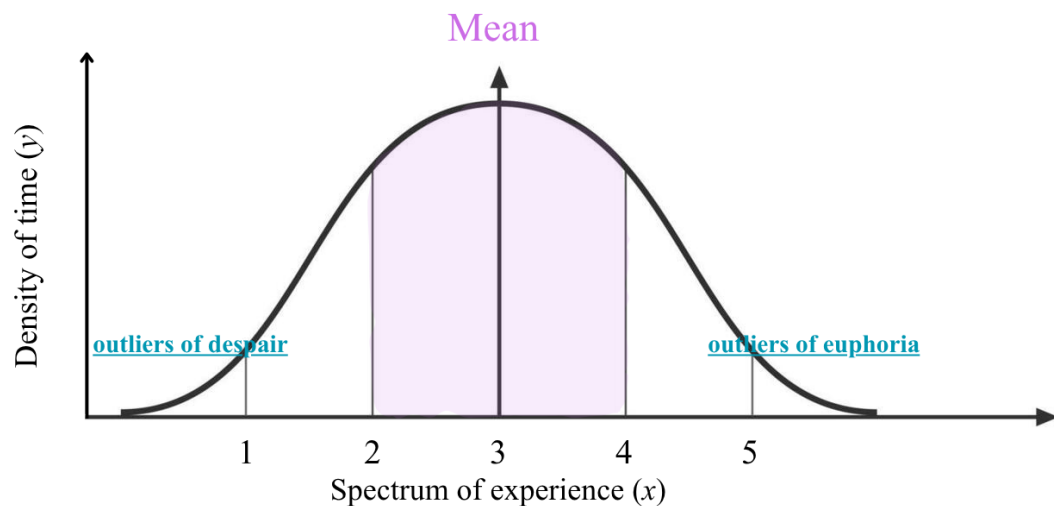
At the base of statistics lies the central limit theorem that allows us to go far beyond the theoretical world enabling us to even determine one's true self (theoretically of course). The central limit theorem states "The sum or average of many independent copies of a random variable is approximately a normal distribution." i.e., in the current example if we add up my particular sense of self over a period of time to collect a complete data set,

and then take the average of the data set it would ultimately result in a more or less normal distribution.

$$Z = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}}$$

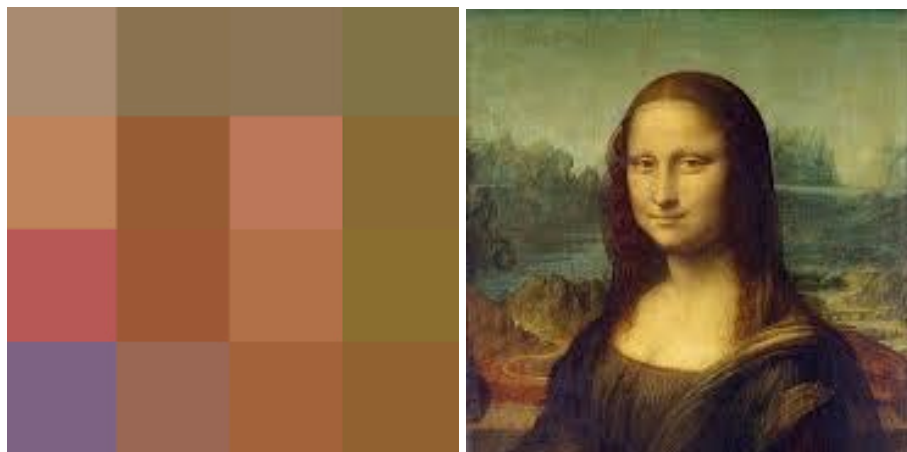
Yes, some days might seem like the worst, some days I might be on cloud 9, but in the end, the pattern tends toward balance, a quintary equilibrium, often resembling a bell curve.

While real human data may never fit perfectly into this model, the principle suggests something powerful: over time, extremes balance out, and patterns emerge.



3. PERSPECTIVES

For better understanding imagine a single pixel, alone it is a blur of colour, to call that single pixel the complete image would be a misrepresentation of facts and simply inaccurate. Now, when you zoom out and all other pixels come into view you realize that the image itself is much more detailed and clearer. Since, you don't judge an image from a single pixel why judge yourself or another individual from an insular, solitary view or aspect.



This is where the world of statistics and sociology collide, and we realize that mathematics doesn't only help us describe the world but also teaches us the rules of nature; it allows us to expand our view and in this case even learn to forgive ourselves because one bad grade, one mess-up, or one immoral act isn't a definite but an outlier what Quetelet might call a negligible deviation. Mathematics allows us to forgive ourselves and teaches us the path to redemption.

Alas, we cannot simply limit the wonders of the central limit theorem to self-realization, the central limit theorem also allows us to perceive the world and humans as a whole in a logical, broader, more comprehensive manner.

4. LIMITATION

For the theorem to work effectively it relies on the volume of one's experiences, represented by the sample size " n ". As n increases the standard error

$$\frac{\sigma}{\sqrt{n}}$$

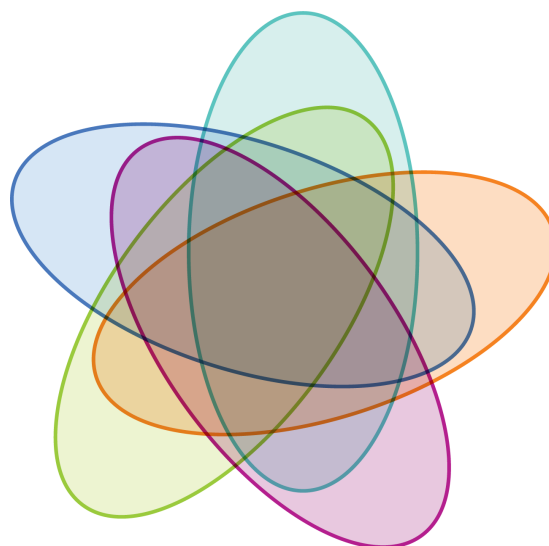
decreases. Hence, the more experiences we collect, the larger the data set, and the clearer and smoother the bell curve. When we are kids every "1" feels like the end of the world however, as we accumulate a lifetime of memories, experiences, ups and downs we learn that even the greatest of tragedies can be forgotten and even the greatest of triumphs can feel meaningless. Every new experience and addition to the data set brings us closer to the certified mean.

5. AT THE INTERSECTION OF HUMANITY

In today's world the concept of society has been reduced to merely cohabitation, we analyze ourselves as individuals rather than through the lens of a collective society. In doing so we fail to appreciate the role of each individual in shaping the whole.

We imagine ourselves as circles, individualistic, solitary and independent, but in reality we intersect with each other to form Venn diagrams of shared experiences and influences.

When we take the aggregate of these venn diagrams what we get in the end is larger patterns, much like data points forming a curve.



We spend all our lives in search of individuality, trying to get away from the masses and be the outliers. But mathematics proves that the "average" is not a mark of mediocrity, but a mark of equilibrium.

6. AVERAGE $\neq$ MEDIOCRE

Every person is an outlier even in their own stories, but the central limit theorem makes us realize why these outliers and individualistic differences, while bothersome to many, are simply necessary for society to work efficiently. Consider the human body for example, if specialization or individuality of cells did not exist, neither would we, each cell performs a different task but if every cell was just the mean or the average man, we would be a clump of undifferentiated tissue, incapable of breath or thought.

The outliers aren't errors or hindrances but integral to the formation of a perfect, logical bell curve. If these differences or specialization did not exist, the bell curve wouldn't either.

When we zoom out from our solitary Venn diagrams, we see that our intersections are not erasures of our identity, but the very points of contact that allow the curve to form. Even when we believe to be moving against the status quo and society we are simply allowing for the central limit theorem, contributing to the outliers that ultimately provide the volatile and unpredictable variables, the 1s and the 5s that complete the data set and the bell curve. Remove them, and the system collapses into uniformity, losing both resilience and meaning.

7. PARADOX

Some might argue that reducing human beings and the depths of their emotions is a disgraceful miscalculation and an insult to human intellectualism, and perhaps it is. But mathematics does not aim to capture the full depth of human emotion but rather it offers a framework through which we can better understand patterns, both within ourselves and across society.

But if human beings are defined by averages, how are they individualistic? The irony and the beauty of the central limit theorem is that no matter how hard you try to be the outlier, the anomaly, the deviation, you provide fuel for the central limit theorem to produce the perfect bell curve. The "average" isn't a disgrace but equilibrium of society, and individuality itself is a tool for the establishment of said equilibrium.

We are, therefore, both the exception and the rule.

8. CONCLUSION

We as a society have started to define people by isolated occurrences, we see one pixel of somebody's life and declare our verdict as if it were the whole image.

Hence, the lesson here is not to reject or chase the outlier, but to understand its place within the whole to maintain balance. Because one bad grade is not the end of the world. It is simply one data point. And you, like every other human being, are far more than a single point on a graph.

You are not your lowest point, neither are you your highest point; you are the distribution, and that is where mathematics offers something deeply human, not certainty, but perspective.