STATISTICAL DISTRIBUTION -2

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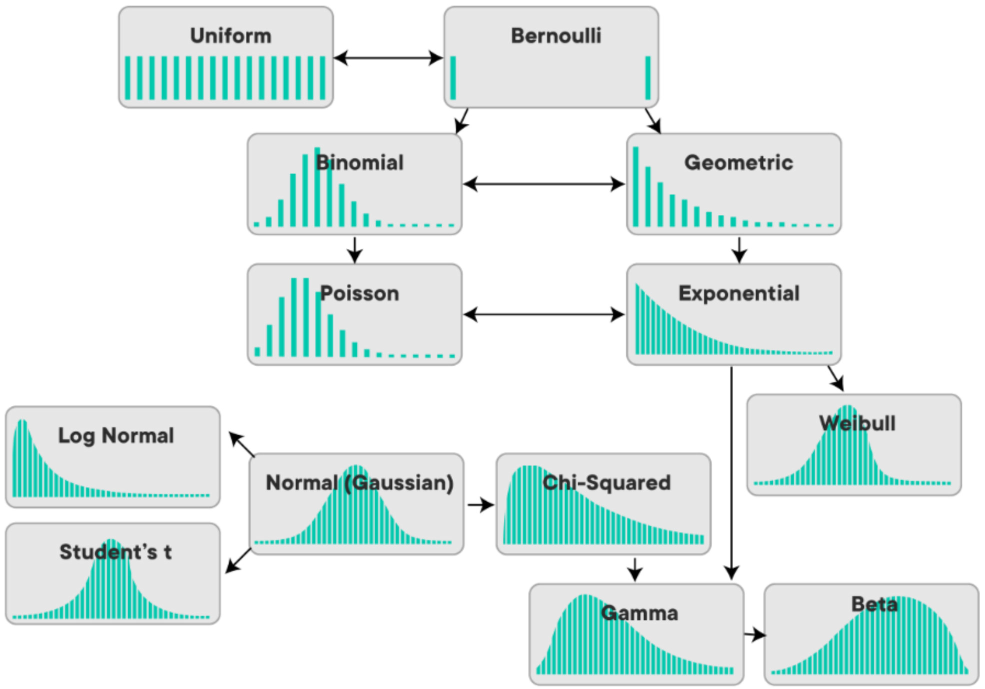


THE UNIFORM DISTRIBUTION

- Both discrete (Binomial) and continuous (Normal) distributions
- Describes an event where every possible outcome is equally likely
- Examples?

THE POISSON DISTRIBUTION

- Probability of a given event happening by examining the mean number of events that happen in a given time period

seems falliable to hidden factors

- Eg: Electricity bill daily

  An average of 20 customers walk into a store in a given hour. What is the probability that 25 customers walk into a store in the next hour?

P(bill) = $ * 5

This number is our $\lambda\lambda$ paramete

THE POISSON DISTRIBUTION

bernoulli with independent events

- Can we relate it to Binomial distribution?
- If we know that 6 customers walk into a store per hour, we also know enough to calculate the probability that a customer walks in during a given minute.

alson consider the customers nade this change for unknown factors

(by just dividing the mean number of customers by the length of our interval!)

- λ parameter.

could you say that distributions are showing what is happening and things like regression try to explore the why?

THE POISSON DISTRIBUTION

$$p(x) = \frac{\lambda^x e^{-\lambda}}{x!}$$

- μ : The average number of successes over a given time period.

  put the values from customer store in above equation

- x : Our random variable - the number of successes we want to find the probability mass of given our knowledge of μ

EXPONENTIAL DISTRIBUTIONS

- Describes the probability distribution of the amount of time it takes before an event occurs.

- Poisson Distribution lets you ask how likely **any given number of events are over a set interval of time**.

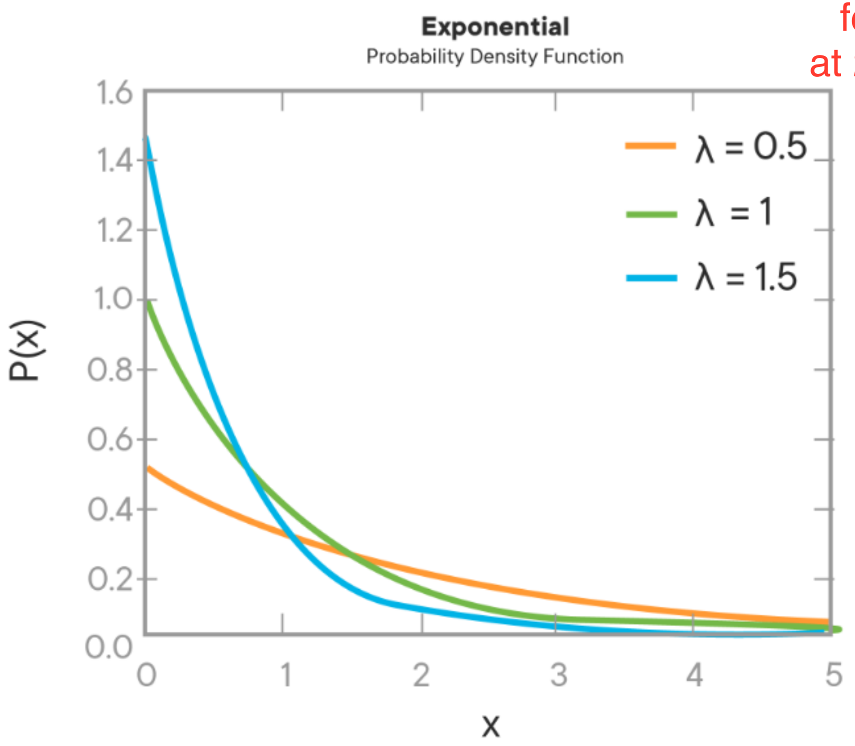
  The Exponential Distribution lets you ask how likely **the length of an interval of time is before an event occurs exactly once**

- Eg: How long will the next customer interaction take?

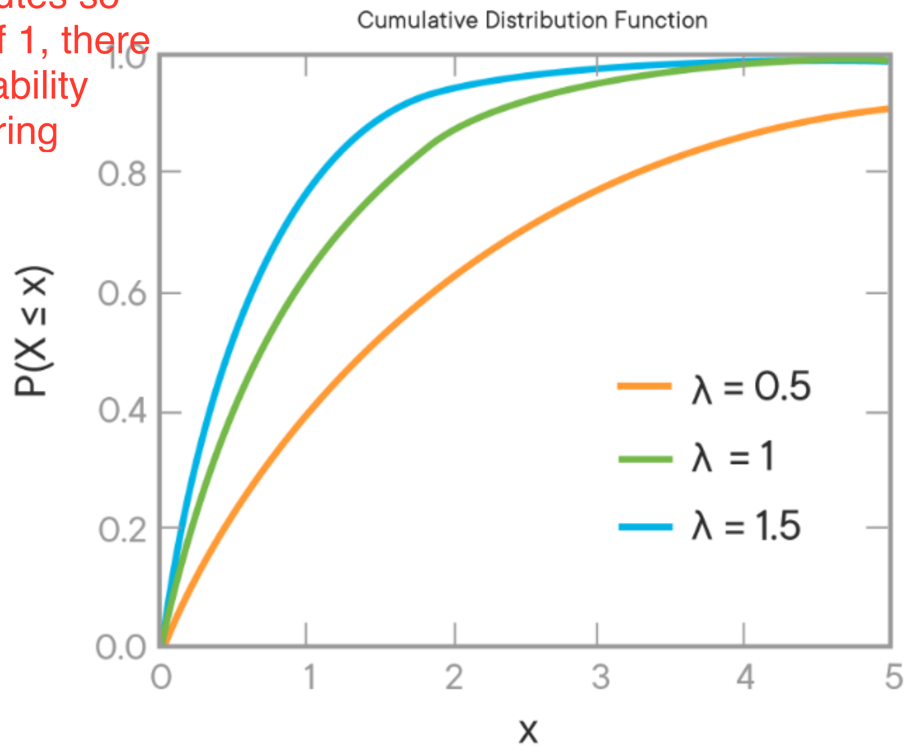
  How long before a sensor in this factory breaks down?

  How long until the next earthquake happens?

- Decay parameter $\lambda = \frac{1}{\mu}$
- "What is the probability that it takes exactly 4 minutes to ring up this customer?“ $PDF(x) = \lambda e^{-\lambda x}$
- Std = mean $\sigma = \mu$



!!! this is cool - this shows how likely the next event is to occur at the given amount of time. for example, x is minutes so at 2 min with lambda of 1, there is roughly .85 probability of the event occuring



CENTRAL LIMIT THEOREM

central limit theorem says that the larger the sample size with independent events, the distribution will converge to normal distribution bc normal dist is a natural phen.

so if all of our distributions would ideally be added to with different samples until it reaches normal dist, and I know what normal dist. looks like, and the point of dist. is to show me the shape of the, then why am I doing it?

- Example: Asthma rates

ans: although shape will be the same, mean will vary from different samples which will show us the problem is the thing we are looking at, not a sampling issue.

ex: we ahve a normal dist. for asthma rates in country and a normal dist for “” in chicago. if both shapes are the same through explanding sample sizes but the means are different, we can see the chi dist is still an appropriate same of the country in terms of represntation, just a higher or lower amounts

DISCUSSION

THANK YOU!!