Favorite Distribution

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The Poisson Distribution

The Poisson distribution is a discrete probability of a given number of events occurring in a fixed time interval or region of space. The mean is a known constant and outcomes are independent of previous events - Poisson processes have no memory.

Probability Mass Function

$$X \sim \text{ Poisson} = \frac{e^{-\lambda t}(\lambda t)^x}{x!}, \qquad x = 0, 1, 2, ...$$

where $\lambda =$ average number of outcomes,
and $t =$ time.

The Poisson distribution makes a few assumption:

- x is the number of times an event occurs in an interval and can take any positive value.
- Events occur independently, e.g. a previous occurrence has no impact on future occurrences.
- The mean is assumed to be constant but may have small variations.
- Two events cannot happen at the exact same time.

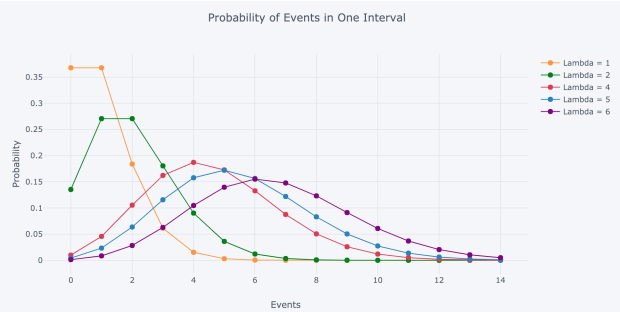

Figure 1: Multiple Poisson Distributions in a Single Interval

References

[1] WikiPedia, Poisson Distribution, https://en.wikipedia.org/wiki/Poisson_distribution#Probability_mass_function.

[2] The Poisson Distribution and Poisson Process Explained. https://towardsdatascience.com/the-poisson-distribution-and-poisson-process-explained-4e2cb17d459