

What are some real-life examples of the Poisson distribution?

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The Poisson distribution is a mathematical concept that describes the likelihood of a certain number of events occurring within a given time or space. It is commonly used in various real-life situations, such as:

1. Customer arrivals at a service counter: In a busy restaurant or bank, the number of customers arriving in a specific time interval can be modeled using the Poisson distribution. This helps the business to better plan their staff and resources.
2. Natural disasters: The occurrence of natural disasters, such as earthquakes or hurricanes, can also be described using the Poisson distribution. It helps in predicting the likelihood of these events happening in a particular region over a period of time.
3. Call center traffic: Call centers often use the Poisson distribution to forecast the number of incoming calls during a certain time period. This helps them to manage their staff and resources efficiently.
4. Website traffic: The number of visitors to a website in a given time can also be modeled using the Poisson distribution. This information is useful for website owners to plan their server capacity and manage their website traffic.
5. Defects in a manufacturing process: The Poisson distribution can also be used to analyze the number of defects or errors in a manufacturing process. This helps to identify potential issues and improve the overall quality of the product.

5 Real-Life Examples of the Poisson Distribution

The is a probability distribution that is used to model the probability that a certain number of events occur during a fixed time interval when the events are known to occur independently and with a constant mean rate.

In this article we share 5 examples of how the Poisson distribution is used in the real world.

Example 1: Calls per Hour at a Call Center

Call centers use the Poisson distribution to model the number of expected calls per hour that they'll receive so they know how many call center reps to keep on staff.

For example, suppose a given call center receives 10 calls per hour. We can use a to find the probability that a call center receives 0, 1, 2, 3 ... calls in a given hour:

$$\begin{aligned} P(X = 0 \text{ calls}) &= 0.00005 \\ P(X = 1 \text{ call}) &= 0.00045 \\ P(X = 2 \text{ calls}) &= 0.00227 \\ P(X = 3 \text{ calls}) &= 0.00757 \end{aligned}$$

And so on.

This gives call center managers an idea of how many calls they're likely to receive per hour and enables them to manage employee schedules based on the number of expected calls.

Example 2: Number of Arrivals at a Restaurant

Restaurants use the Poisson distribution to model the number of expected customers that will arrive at the restaurant per day.

For example, suppose a given restaurant receives an

average of 100 customers per day. We can use the to find the probability that the restaurant receives more than a certain number of customers:

$$\begin{aligned}P(X > 110 \text{ customers}) &= 0.14714 \\ P(X > 120 \text{ customers}) &= 0.02267 \\ P(X > 130 \text{ customers}) &= 0.00171\end{aligned}$$

And so on.

This gives restaurant managers an idea of the likelihood that they'll receive more than a certain number of customers in a given day.

Example 3: Number of Website Visitors per Hour

Website hosting companies use the Poisson distribution to model the number of expected visitors per hour that websites will receive.

For example, suppose a given website receives an average of 20 visitors per hour. We can use the to find the probability that the website receives more than a certain number of visitors in a given hour:

$$\begin{aligned}P(X > 25 \text{ visitors}) &= 0.11218 \\ P(X > 30 \text{ visitors}) &= 0.01347 \\ P(X > 35 \text{ visitors}) &= 0.00080\end{aligned}$$

And so on.

This gives hosting companies an idea of how much bandwidth to provide to different websites to ensure that they'll be able to handle a certain number of visitors each hour.

Example 4: Number of Bankruptcies Filed per Month

Banks use the Poisson distribution to model the number of expected customer bankruptcies per month.

For example, suppose a given bank has an average of 3 bankruptcies filed by customers each month. We can use the to find the probability that the bank receives a specific number of bankruptcy files in a given month:

$$\begin{aligned} P(X = 0 \text{ bankruptcies}) &= 0.04979 \\ P(X = 1 \text{ bankruptcy}) &= 0.14936 \\ P(X = 2 \text{ bankruptcies}) &= 0.22404 \end{aligned}$$

And so on.

This gives banks an idea of how much reserve cash to keep on hand in case a certain number of bankruptcies occur in a given month.

Example 5: Number of Network Failures per Week

Technology companies use the Poisson distribution to model the number of expected network failures per week.

For example, suppose a given company experiences an average of 1 network failure per week. We can use the to find the probability that the company experiences a certain number of network failures in a given week:

$$P(X = 0 \text{ failures}) = 0.36788 \\ P(X = 1 \text{ failure}) = 0.36788 \\ P(X = 2 \text{ failures}) = 0.18394$$

And so on.

This gives the company an idea of how many failures are likely to occur each week.