Poisson Distribution

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Poisson Distribution

Poisson Distribution is a *Discrete Distribution*.

It estimates how many times an event can happen in a specified time. e.g. If someone eats twice a day what is the probability he will eat thrice?

It has two parameters:

`lam` - rate or known number of occurrences e.g. 2 for above problem.

`size` - The shape of the returned array.

Example

Get your own Python Server

Generate a random 1x10 distribution for occurrence 2:

```
from numpy import random

x = random.poisson(lam=2, size=10)

print(x)
```

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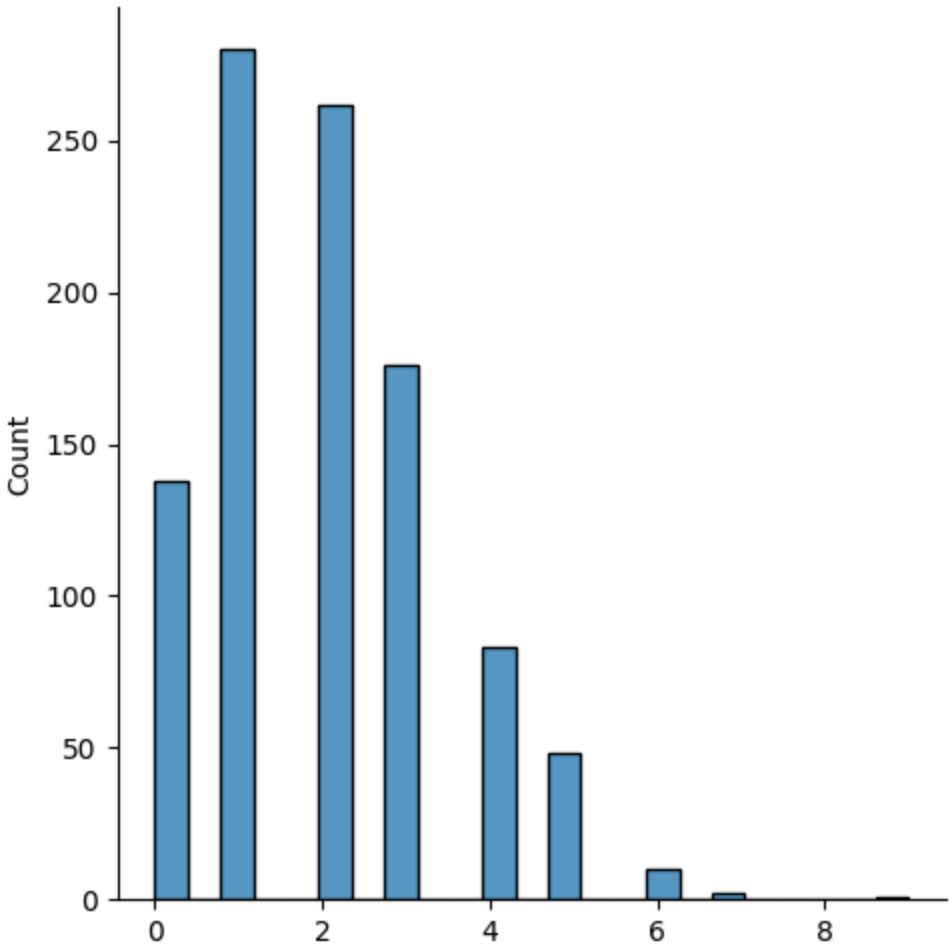
Example

```
from numpy import random
import matplotlib.pyplot as plt
import seaborn as sns

sns.displot(random.poisson(lam=2, size=1000))

plt.show()
```

Result



Difference Between Normal and Poisson Distribution

Normal distribution is continuous whereas poisson is discrete.

But we can see that similar to binomial for a large enough poisson distribution it will become similar to normal distribution with certain std dev and mean.

Example

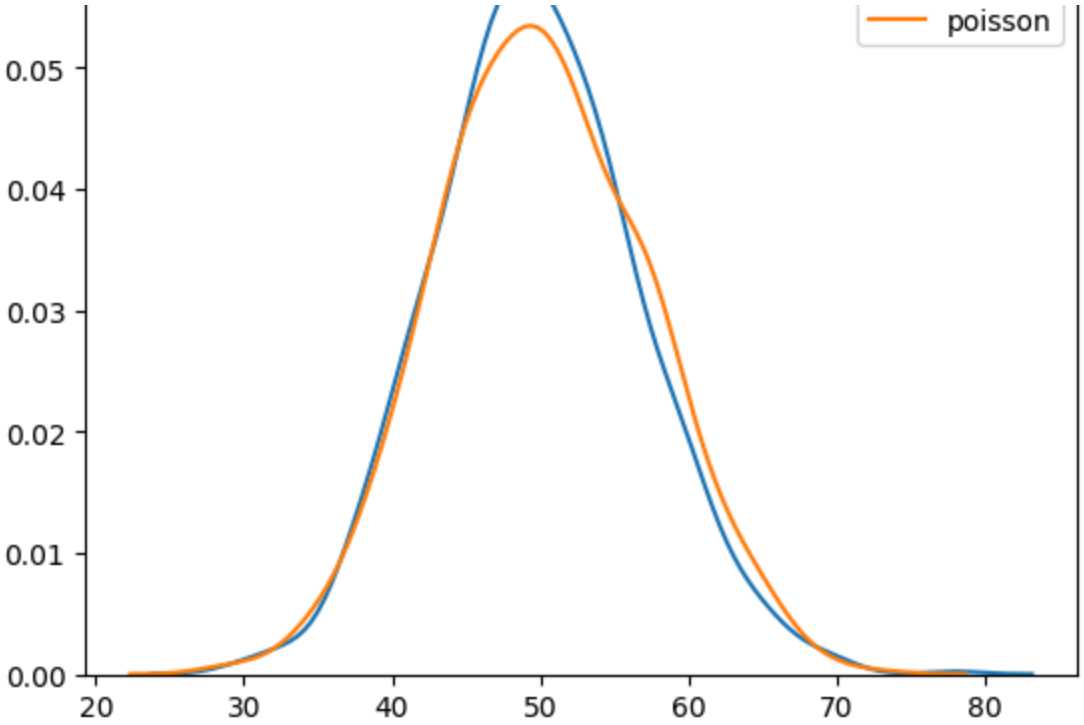
```
from numpy import random
import matplotlib.pyplot as plt
import seaborn as sns

data = {
  "normal": random.normal(loc=50, scale=7, size=1000),
  "poisson": random.poisson(lam=50, size=1000)
}

sns.displot(data, kind="kde")

plt.show()
```

Result



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Difference Between Binomial and Poisson Distribution

Binomial distribution only has two possible outcomes, whereas poisson distribution can have unlimited possible outcomes.

But for very large `n` and near-zero `p` binomial distribution is near identical to poisson distribution such that `n * p` is nearly equal to `lam`.

Example

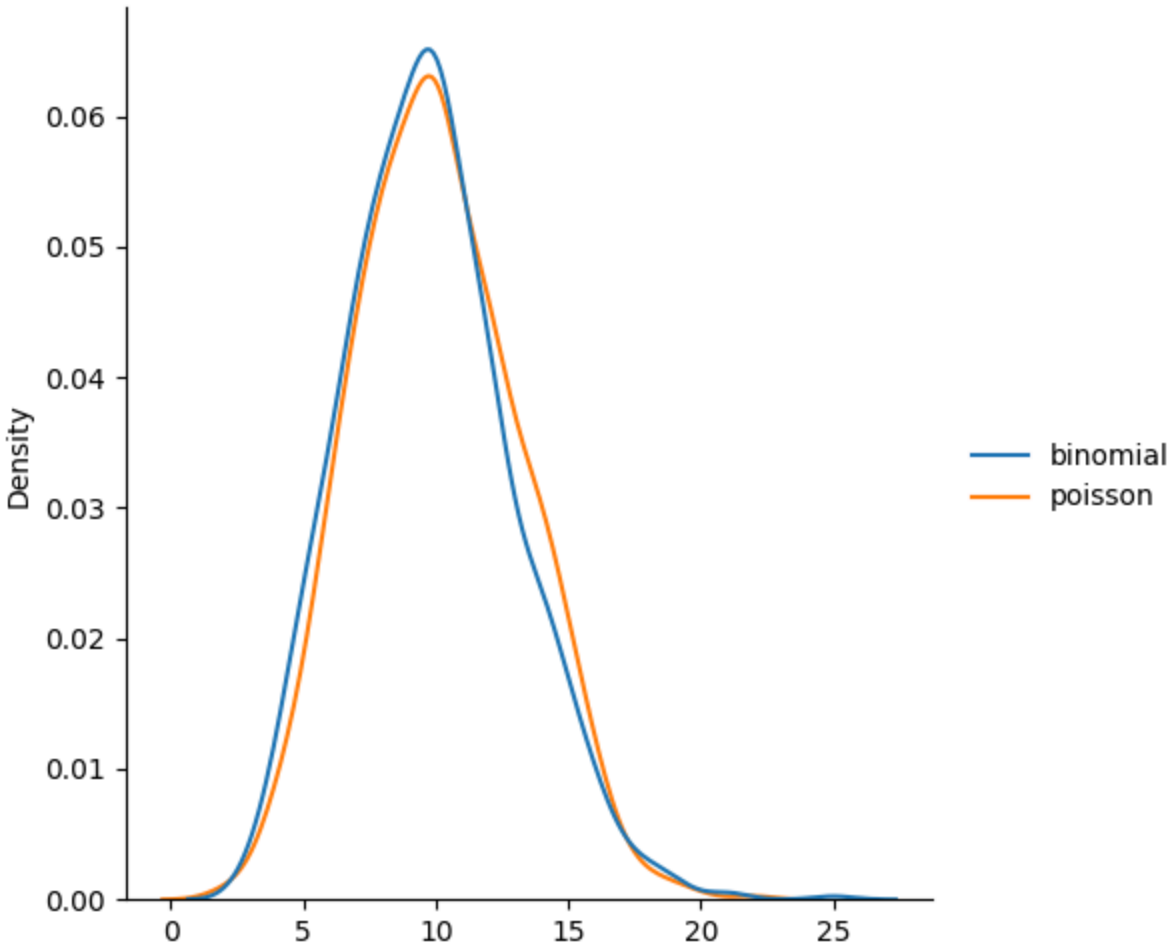
```
from numpy import random
import matplotlib.pyplot as plt
```

```
  "poisson": random.poisson(lam=10, size=1000)
}

sns.displot(data, kind="kde")

plt.show()
```

Result



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The `random.poisson()` method has two parameters, which ones?

- ○ `loc and size`
- ○ `dev and size`
- ○ `lam and size`

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