Distribución Hipergeométrica

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Supongamos que tenemos 20 animales, de los cuales 7 son perros. Queremos medir la probabilidad de encontrar un número determinado de perros si elegimos $k = 12$ animales al azar.

En R

```
library(Rlab)
```

```
## Rlab 2.15.1 attached.

##
## Attaching package: 'Rlab'

## The following objects are masked from 'package:stats':
##
##     dexp, dgamma, dweibull, pexp, pgamma, pweibull, qexp, qgamma,
##     qweibull, rexp, rgamma, rweibull

## The following object is masked from 'package:datasets':
##
##     precip
```

```
M = 7  # Tipo de animal que queremos
N = 13 # Tipo de animales que no queremos
k = 12 # Numero de estracciones.

dhyper(x = 0:12, m = M, n = N, k = k) # Densidad, el numero mas probable de perros que saldra es 4.
```

```
##  [1] 0.0001031992 0.0043343653 0.0476780186 0.1986584107 0.3575851393
##  [6] 0.2860681115 0.0953560372 0.0102167183 0.0000000000 0.0000000000
## [11] 0.0000000000 0.0000000000 0.0000000000
```

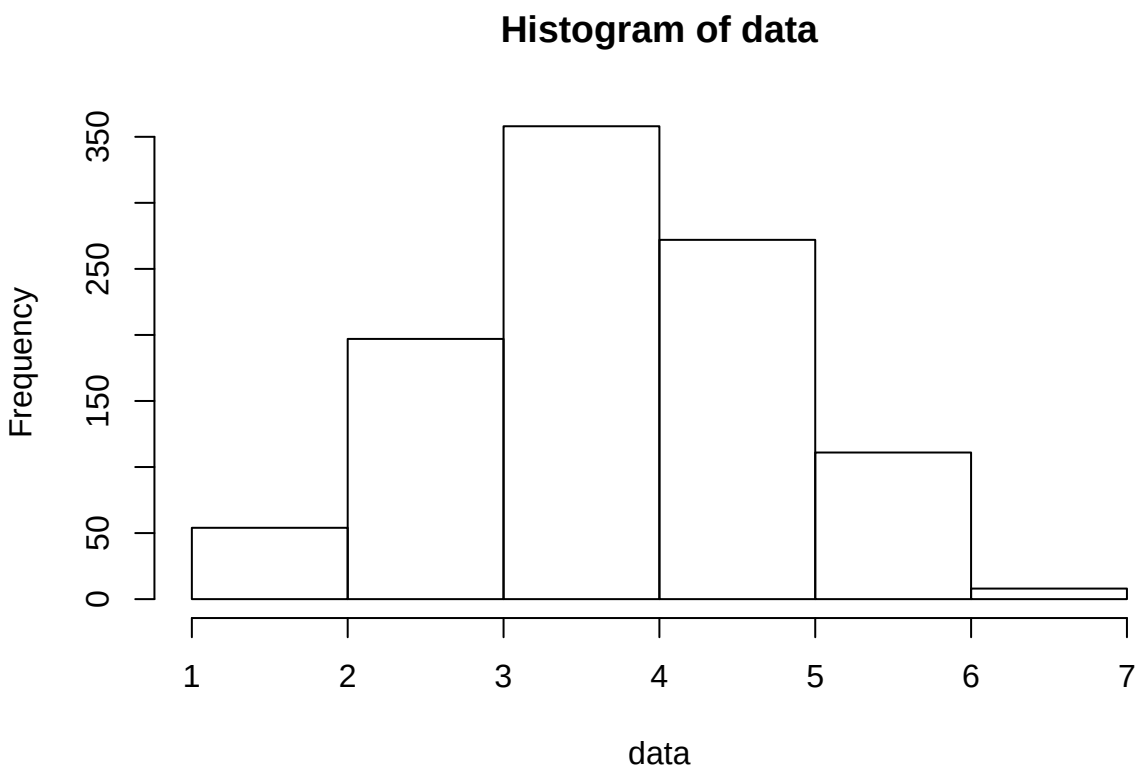
```
phyper(q = 0:12, m = M, n = N, k = k) # Acumulada, la mediana es 5
```

```
##  [1] 0.0001031992 0.0044375645 0.0521155831 0.2507739938 0.6083591331
##  [6] 0.8944272446 0.9897832817 1.0000000000 1.0000000000 1.0000000000
## [11] 1.0000000000 1.0000000000 1.0000000000
```

```r
qhyper(p = 0.5, m = M, n = N, k = k)
```

```
## [1] 4
```

```r
rhyper(nn = 1000, m = M, n = N, k = k) -> data
hist(data, breaks = 8) # Las veces que ha salido cada numero
```



En Python

```python
from scipy.stats import hypergeom
import matplotlib.pyplot as plt
import numpy as np

[M, n, N] = [20, 7, 6]
rv = hypergeom(M, n, N) # Valores aleatorios
x = np.arange(0, n+1)
y = rv.pmf(x)

mean, var, skew, kurt = rv.stats(moments = 'mvsk')
print("Media %f"%mean)
```

```
## Media 2.100000
```

```
print("Varianza %f"%var)
```

```
## Varianza 1.005789
```

```
print("Sesgo %f"%skew)
```

```
## Sesgo 0.132949
```

```
print("Curtosis %f"%kurt)
```

```
## Curtosis -0.203835
```

```
fig = plt.figure()
ax = fig.add_subplot(111)
ax.plot(x, y, 'bo' )
ax.vlines(x,0,y, lw = 2, alpha = 0.5)
ax.set_xlabel("Número de perros entre los 12 elegidos al azar")
ax.set_ylabel("Distribución de probabilidad de H(13,7,12)")
plt.show()
```