Re: calculating P(X>=Y)

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- *Date*: Wed, 04 Feb 2009 15:28:05 EST

Mark said:

Date: Feb 4, 2009 9:02 AM
Author: VonTressMS
Subject: Re: calculating P(X>=Y)

On Feb 4, 7:57 am, vontres...@xxxxxx wrote:

> On Feb 4, 12:41 am, sad...@xxxxxxxxx wrote:
>
> > hello, how do i calculate P(X>=Y), where X and Y having uniform
> > density on {0,1...N}?
> > thanks!
>
> It is (N+1)/(2*N) if X and Y are independent. This is because there
> are (N+1)N/2 points satisfying the condition X>=Y on an (X,Y) grid,
> and each point has a probability of 1/(N*N) under the assumption of
> independence.
>
> If you don't assume independence, then you have to resort to brute
> force summation of the probabilities where X and Y satisfy X>=Y.
>
> Mark

Sorry, it should be N/(2*(N+1)) since the probability for each point is 1/((N+1)*(N+1)). I forgot to count the zero in my answer above.

It gets messier if X and Y have different values of N, say Nx and Ny.
You run into these kinds of problems in the exact analysis of
categorical data, but the probabilities are binomial instead of
uniform. The uniform is a special case where you can get a simple
closed form solution. Mark

My Response

Let be Y =
_________0__1__2__3__... n−1__n

The probability to have X>=Y given Y , p(X>=Y|Y) are respectively

_(n+1)/(n+1), n/(n+1) , ... , 2/(n+1), 1/(n+1)

Then, because

1+ 2+ ...+ (n+1) = [(1+(n+1))/2]*(n+1)= (n+1)*(n+2)/2

One has, finally:

p(X>=Y) = (n+2)/(2*(n+1))

Suppose [0, 1, 2] , n=2 . Probability to get Y is always 1/3, those of X are 3/3 (for Y=0), 2/3 (for Y=1) and 1/3 (for Y=2) . Then results 3/9 + 2/9 + 1/9 = 6/9 = 2/3.
The formula above: (2+2)/(2*3)=2/3.

______________ X________
_________0_____1_____2__
Y=__ 0___*_____*_____*__
_____1__ *_____*________
_____2__ *______________

Mark´s formula, n/(2*(n+1)), gives p=1/3, wrongly, I guess.
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Luis A. Afonso
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