Re: X+Y | −w<=X−Y<=w

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* *From*: "bokdan.hermicz@xxxxxxxxxxxxxx" <bokdan.hermicz@xxxxxxxxxxxxxx>
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On 29 Jul., 17:19, "Stephen J. Herschkorn" <sjhersc...@xxxxxxxxxxxx>
wrote:

> In sci.stat.math, bokdan hermicz wrote:
>
>> if X and Y are Gaussian and independent and w=Inf P(X+Y |−w<=X−Y<=w)
>> is equal to the unconditional probability P(X+Y). This implies that
>> Z=X+Y follows a Gaussian with mean E(X)+E(Y) and
>> Var(Z)=Var(X)+Var(Y).
>
> I do not undertstand what you mean by "This implies that." The fact
> that has normal distrbution with parameters EX + EY and Var(X) +
> Var(Y) has nothing to do with your conditioning event.

If X and Y follow a uniform distribution with support (0,1) then Z=X+Y
(for X and Y independent) follows a triangular distribution. But the
density of P(Z | |X−Y| <= w) has a trapezoidal shape with a flat part
in the middle, if the condition really binds (w <1). Therefore the
resulting variance of Z depends on the conditioning event. Moreover,
the shape of the density depends on the conditioning event. And I
think this should also be the case, if X and Y are Gaussian. If X and
Y are independently uniformly distributed the variance of P(Z | |X−Y|
<= w) is smaller for larger values if w, because the shape of the
resulting variable Z approaches the shape of the triangular
distribution.

>> If w is smaller than Inf:
>> Intuition suggests that Var(Z) > Var(X)+Var(Y) but does anyone know a
>> formula / approximation for this?
>
> Let A = {|X − Y| <= w}. Are you asking if Var(Z | A) > Var(X | A) +
> Var(Y | A) when w is finite? That depends on the sign of Cov(X, Y |

> A). Do you have empirical evidence to suggest that this conditional covariance is always negative?

I am asking, if Var(Z | A) > Var(Z). As written above I do think that the variance (and the distribution) depends on the conditioning event. And this is the link to the second question, if the resulting Z can be approximated by a Gaussian and what is the approximated variance?