Long-range Dependence in a Cox process directed
by an alternating renewal process

A stationary random measure $\xi(A)$ defined on Borel subsets of the real line is long-range dependent (LRD) when it has finite second moment and $\limsup_{t \to \infty} \frac{\text{var}[\xi(0,t)]}{t} = \infty$. A Cox process $N$ directed by a stationary random measure $\xi$ has second moment $\text{var} N(0,t) = E[\xi(0,t)] + \text{var} \xi(0,t)$ so $N$ and $\xi$ have the same LRD properties. When $\xi(A) = \int_A I(u) \, du$ comes from the indicator process of (say) the ON periods of an alternating renewal process whose cycles have counting function $N_{\text{cyc}}$, $N$ and $N_{\text{cyc}}$ are either both LRD or neither, and have the same Hurst index but, as shown by example, their variance functions need not have the same asymptotic behaviour.

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