On spectrogram local maxima

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In close connection with time-frequency uncertainty relations, spectrograms have some built-in redundancy which constrains the landscape of their surface, thus calling for simplified descriptions based on a reduced number of salient features. This is investigated in some detail for the distribution of local maxima in the generic case of white Gaussian noise. A simple model, based on a randomized hexagonal lattice structure, is proposed for such a distribution considered as a spatial point process in the time-frequency plane. The rationale of the model is discussed, its relevance is tested with respect to the cumulative distribution function of nearest-neighbour distance between local maxima, and the deviation from the complete spatial randomness of an equivalent Poisson model is quantified. Attaching a Voronoi tessellation to local maxima ends up with a constrained distribution of cells that reflects uncertainty and paves the way for the modeling of spectrogram enhancements such as those offered by reassignment or synchrosqueezing.