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Assignment 5

i. How does beat tracking differ from onset detection?

It seems that while onset detection just tries to mark the events in a signal, usually the beginnings of notes (attacks, transients), beat tracking has a higher level musical goal- to discern tempo form a signal using two criteria: the first builds on onset detection, and tries to track the beginnings of notes. Then the beat tracking system tries to establish a locally-constant-inter-beat-interval, because regular spacing defines the idea of a pulse in music.

ii. What is onset strength? What is the onset strength envelope?
If a set of beat-times scores high then it has a high onset strength, and the strength is defined by a function that incorporates how tempo is realized in terms of weak and strong beats- so, an onset strength envelope is derived from the audio and tries to "make good choices for beats based on the local acoustic properties… the consistency between an inter-beat interval… and the ideal beat spacing defined by the target tempo." (Ellis, 3)

iii. What is a global tempo estimate?
Once you know the onset strength envelope, it's relatively easy to see regularity or structure in the signal- this can happen at integer multiples of the basic period, and a windowing esque operation is applied where you "take the inner product of the envelope with delayed versions of itself, and for delays that succeed in lining up many of the peaks, a large correlation occurs." (Ellis, 8)