SMC8 project proposal

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Given the chosen field of research for SMC8 (Music Information Retrieval), a project proposal is presented in brief.

This project aims to create variated rhythmic sequences based on a given percussive input signal. Here are the initial steps:

1. an analysis of the incoming signal, including onsets and tempo extraction;
2. an analysis of the probability of a specific subdivision inside the input signal given the beat, i.e. how many eighth notes or quarter notes are there?
3. an analysis of their positions given the metrical structure, i.e. if they mostly take place whether on a stressed or an unstressed beat;
4. a statistical model learning stage, which implies the choice of a specific strategy (*note: definition should be more defined*);
5. a synthesis stage which recombines the input audio material

It could be considered as a starting point for a real-time rhythmic pattern generation tool. This should react to a live input signal (*note: think of both percussive and a more general input*) providing the user with a meaningful rhythmic sequence. To do this, an online learning approach has to be thought.
That said, at the very beginning only percussive material and an off-line approach are used to let me get acquainted with this topic since it's the first time I deal with it.
Moreover, good connection with Sound and Music Signal Analysis mini-project could be possible.

(*note: maybe if interested in asking for long thesis*)
I'd really like to extend these aims beyond the end of the semester in a one-year master thesis. Some possible refinements could be:

a. detect dependencies and re-occurrencies inside a performance;
b. extend generation over harmonic and melodic context using live input audio;
c. analysis and learning of the performance style;
d. using constraints, e.g. let the machine improvise on a recognized theme and/or using whether a specific style or a blend of different ones