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Methodologies for Expressiveness Modeling of and for Music Performance  
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Another review paper on Music Performance that mainly talks about concepts related to expressiveness modeling of music performance. Author first gives information about the conceptual understanding of modeling and what it means. After that he connects this information to the main subject of musical performance modeling. A model is defined as conversion from an input vector of information to another vector as an output by numerical calculations.

To be able to build an expressiveness model, information about music performance should be considered. First, parameters that carry relevant information about music performance should be chosen carefully, considering the availability of them. At physical information level, these parameters should be about tempo, dynamics and articulation. We have already discussed each of these parameters in class in detail. They are probably the easiest to obtain from available recorded performances. Interrelation of these parameters is not understood properly, that's why they are investigated separately.

A key issue is how the constructed model represents the information. The most important aspect is the representation of time and it is investigated through two main variables: performance time, and score time. This understanding is totally opposes the idea of Todd's understanding of time where Todd tried to define the timing of the performance as a function of  $x$  (position) regardless of the score time.

Two kinds of models exist. Analysis models (models for understanding) and Synthesis models (models for producing). The main structure of an expressive model involves smaller parts working separately, and a final connection that gathers the information obtained from the smaller models.

Evaluation of performance is another issue. A subjective comparison of an original performance to the model performance output is a common choice. However, subjects with different backgrounds can have different expectations and preferences, so the evaluation becomes subjective and improper. On the other hand numerical objective evaluation is more appealing.

Different strategies have been developed for designing models such as 1) analysis by measurement: where the analysis aims at extracting regularities within recorded actual performances and converting this information to mathematical means, 2) analysis by synthesis: where the synthesis aims at understanding the results of the previous stages and understand performance perception, 3) machine learning: trying to predict the validity of a model by testing it with real data, 4) case based reasoning: directly using the information from human performance samples, and 5) expression recognition models: models aim to extract and recognize expression from performance.

Different models for synthesis, and also for multimedia applications have been developed for automatically producing expressive performance. The author also discusses how the idea of automatic production of expressive performance is in question and I think this point concludes the ideas very well. We should first discuss why we should worry about modeling expressive performance, instead of how.