



## **Analysis-by-Synthesis of Rhythm in South Indian Art Percussion Performances by Means of Statistical Analysis**

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Computational analysis of music performances has been focused so far mainly on Eurogenetic Classical music. The present work, contributes to the diversity of performance studies by investigating rhythmic structure in Carnatic or South Indian Art *ādi tāla* percussion performances. The aim of the paper is twofold: Firstly, on the side of analysis, we aim to obtain insights into the rhythmical organization of recorded performances using audio signal analysis and clustering pattern modeling. Secondly, on the generative side, we test a methodology of automatically generating Carnatic style percussive rhythms, based on the analysis results. The analysis results in a set of rhythmic pattern, along with transition probabilities between them. To obtain these patterns, the audio signal is annotated based on the frequency of the stroke (low/mid/high) and energy changes are extracted for the different percussion strokes. Next, the onsets of each stroke category is clustered to reveal a set of rhythmic patterns, and conditional probabilities are estimated that describe the transitions between these patterns. We present a real-time software, in which all aspects of a performance can be controlled through intuitive graphic displays of rhythm patterns, and through a visualization of conditional probabilities that influence the temporal progression of the performance.