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Inferring Musical Structure - A Hybrid Approach Combining Probabilistic Models and Reinforcement Learning

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Abstract

How do humans infer the structural interpretations of a piece of music from its basic elements? Since recursive elaboration is an important structural principle in several musical traditions, generative probabilistic models are a useful tool for characterizing musical interpretation as a probabilistic inference problem. However, due to the high degree of ambiguity and combinatorial complexity of even short excerpts of music, exact inference (e.g. finding the "best" structural interpretation of a piece) is usually not feasible. The present work proposes a hybrid approach to this problem. An explicit and interpretable probabilistic top-down model is complemented with a heuristic parser that reverses the generative process in a greedy fashion and adapts to feedback from the top-down model via deep reinforcement learning. The combination of these two models bridges the gap between explicit but slow top-down knowledge and immediate musical intuitions on various levels of musicianship.