Extended playing techniques:
the next milestone in musical instrument recognition

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ABSTRACT

The expressive variability in which a musical note can be produced conveys some essential information to the modeling of orchestration and style. Yet, although the automatic recognition of a musical instrument from the recording of a single "ordinary" note is now considered a solved problem, the ability of a computer to precisely identify instrumental playing techniques (IPT) remains largely underdeveloped. In this paper, we conduct a benchmark of machine listening systems for query-by-example browsing among 143 instrumental playing techniques, including the most contemporary, for 16 instruments in the symphonic orchestra, thus amounting to 469 triplets of instrument, mute, and technique. We identify and discuss three necessary conditions for significantly outperforming the classical mel-frequency cepstral coefficients (MFCC) baseline: the inclusion of second-order scattering coefficients to account for the presence of amplitude modulations; the inclusion of long-range temporal dependencies; and the resort to large-margin nearest neighbors (LMNN), a supervised metric learning that reduces intra-class variability in feature space. We report a P@5 of 99.7% for instrument recognition (baseline at 89.0%) and of 61.0% for playing technique recognition (baseline at 44.5%).

CCS CONCEPTS

• **Computer systems organization** → **Embedded systems**; *Redundancy*; Robotics; • **Networks** → Network reliability;

KEYWORDS

ACM proceedings, LaTeX, text tagging

1 INTRODUCTION

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