Title: The Importance of Gesture in Automatic Piano Fingering: Expanding Corpora to Promote Complex Understanding of Digital Piano Music

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Text of Abstract:
Since Parncutt and associates' formalization of a model for automatic piano fingering in 1997, there have been rapid advances in the problem space and thereby in digital understanding of piano music. The last five years have seen wildly intelligent statistical methodologies: improved modeling of sequential dependence on the current note and its predecessors via transitional probabilities within hidden Markov models; consideration of future notes within a phrase using bidirectional long short-term memory mechanisms in recurrent neural networks; calculation of hand-positional costs in the reward functions of reinforcement-learning agents—and the list goes on. While these and other advancements are undoubtedly important, contributions across the literature share a common omission about pianism that is more directly acknowledged in the realm of embodied music cognition: gesture.

Gesture has been an essential part of piano playing since the time of Chopin, whose own approach highlighted the primacy of the arm over action at the fingers. In affecting the movement of the elbow and wrist, arm motion forms a vital component to developing and assessing worthy fingerings, communicating pianistic interpretation, and therefore in cultivating a digital understanding of piano repertoire. In studying how pianistic gestures vary in accordance with differing levels of emotional expression, it has been demonstrated that the movements at these portions of the arm are remarkably consistent—inextricably linked to the sequencing of hand positions—and thus they hold great potential for improving models of automatic fingering systems.

This research primarily reports progress in expanding relevant corpora for automatic piano fingering with elements that underscore how gesture is inherent to the musicology of computationally understanding piano music. More broadly, it argues that to formulate an approach with enduring usefulness to pianists and musicologists, it is this gestural language that a model must learn, treating fingerings as a natural and flexible byproduct.

Reference list: See next page.

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