Department of Electrical and Computer Engineering
University of Rochester, Rochester, NY
Ph.D. Public Defense

Tuesday, November 24, 2015
9:30AM
Computer Studies Building, Room 426

Computational Modeling of Musical Performance Expression: Feature Extraction, Pattern Analysis, and Applications

Michael (Gang) Ren

Supervised by
Professor Mark Bocko

Abstract

In this thesis we investigate the extraction and analysis of musical expressive features from recorded music. Musical expressive features are signal features in audio recordings of music that reflect the performance dimensions beyond the notations of the conventional western music score. This feature extraction process can be viewed as an extended version of music transcription, in which important features that depict the artistic interpretations of performing musicians are extracted and annotated. For instrumental music performance, the musical expressive features employed include pitch deviation, dynamic level, timing, timbre, articulation and vibrato. For popular vocal music analysis, additional feature dimensions of “pitch glide” and timing deviation are included. The pattern analysis part of this thesis is based on sequential motif discovery, which is a statistical method widely employed in bioinformatics to extract frequently recurring patterns from data sequences. We interpret frequently recurring sequential motifs as indicative of musical performance style and we implemented a musical performance style classification method based on sequential motif discovery. The thesis concludes with a discussion of the application of these methods to music pedagogy, music search, and music recommendation systems.