Maestro: Improving Kinesthetic Skill Learning of Music Conductors

Yonatan Sasson
Advisors: Prof. Andrea Brown & Prof. Gil Weinberg
Center for Music Technology
Georgia Institute of Technology

INTRODUCTION

❑ The use of technology in music conductor training is a growing area of interest

❑ The expressive, subtle and meaning-rich conducting gestures serve as a fruitful ground for innovative research in artificial vision, gesture following and musical mapping

❑ Very little work has been done in capturing subtle and sophisticated gestures that are aimed at improving kinesthetic skills for conductors, combining tempo, duration, articulation, and dynamics

❑ System that allows real-time and offline audio-visual feedback will allow limitless practice opportunities for musicians and will allow accurate evaluation and advancements in music education

INNOVATIONS

The research project suggests innovations in three different fields:

I. Complex gesture tracking and sensing

II. Gesture classification through machine learning

III. Audio feedback through Physical Modeling based sound synthesis with sophisticated one-to-many mapping of a single gesture to a rich audio feedback

VISION AND GOALS

❑ We propose to develop technology to improve learning of kinesthetic skills of conducting gestures, as well as pedagogy that will utilize the proposed system

❑ The system will give a student the ability to practice conducting skills while receiving audio-visual performance feedback in real-time

❑ Using the virtual learning tool, we seek to enhance current conducting pedagogy and increase the mastery rate of kinesthetic conducting skills

METHODS

The system consists of four parts: a conductor's baton; a tracking/sensing system; a computer vision application to analyze the gestures, and an interface for audio/video feedback that uses physical modeling to synthesize sounds.

Wireless Baton

A real physical conducting baton, connected via Blue Tooth, allows the simulation of a realistic conducting environment

Tracking & Sensing

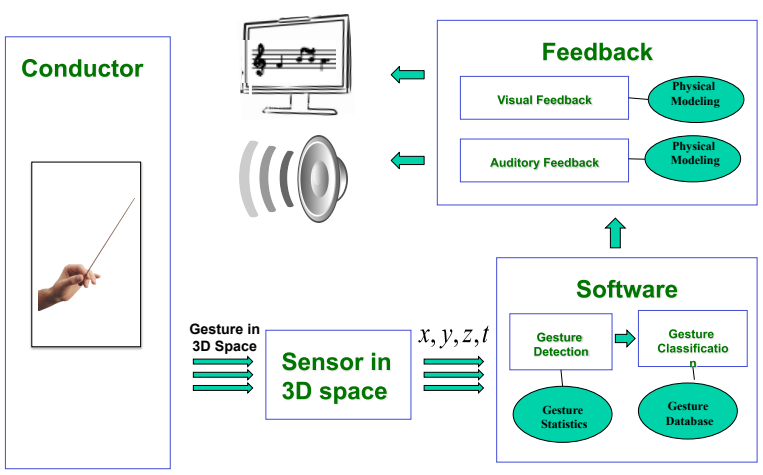
High speed tracking system (~ 100 Hz) allows the detection and analysis of subtle nuances in performed gestures

Machine learning

Novel classification techniques are used to map the performed gesture in 3D space to a set of parameters, and finally to an auditory feedback

Physical Modelling

Analytical models of acoustic instruments allow the synthesis of naturally sounding yet computer-generated audio feedback



RESULTS

The current system supports the following:

❑ Detection of discrete conducting gestures

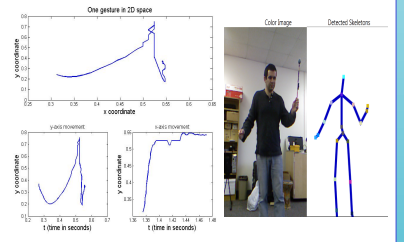
❑ Classification of gestures with respect to dynamics, articulation, and duration

❑ Single tone audio feedback

❑ Gesture visual feedback

Example of real-time visual feedback

Left panel: captured gesture; right panel: feedback on posture



FUTURE WORK

❑ First iteration of the system is scheduled to be tested over the summer of 2012

❑ *Maestro* will be used as an educational auxiliary tool for a first year undergraduate conducting course in the University of North Carolina at Greensboro the following semester

❑ Future iterations of the system are planned to include analysis of musical information conveyed from torso and left hand gestures

❑ A user friendly interface to allow individual practice and assignment management for instructors