Interative training environments typically include feedback mechanisms designed to help trainees improve their performance through either guided- or self-reflection. When the training system deals with human-to-human communications, as one would find in a teacher, counselor, enterprise culture or cross-cultural trainer, such feedback needs to focus on all aspects of human communication. This means that, in addition to verbal communication, nonverbal messages must be captured and analyzed for semantic meaning.

The goal of this dissertation is to employ multimodal machine-learning algorithms that semi-automate and, where supported, automate event tagging in training systems developed to improve human-to-human interaction. The specific context in which we prototype and validate these models is the TeachLivE teacher rehearsal environment developed at the University of Central Florida. The choice of this environment was governed by its availability, large user population, and existing reflection tools found within the Avatar Mediated Interactive Training and Individualized Experience System (AMITIES) framework underlying the TeachLivE system. Our contribution includes accuracy improvement of the existing data-driven gesture recognition utility from Microsoft; called Visual Gesture Builder. Using this proposed methodology and tracking sensors, we created a gesture database and used it for the implementation of our proposed online gesture recognition and feedback application. We also investigated multiple methods of feedback provision, including visual and haptics. The results from the conducted user studies indicate the positive impact of the proposed feedback applications and informed body language in teaching competency.

In this dissertation, we describe the context in which the algorithms have been developed, the importance of recognizing nonverbal communication in this context, the means of providing semi- and fully-automated feedback associated with nonverbal messaging, and a series of preliminary studies developed to inform the research. Furthermore, we outline future research directions on new case studies, and multimodal annotation and analysis, in order to understand the synchrony of acoustic features and gestures.

Major: Computer Science

Educational Career:
Bachelor’s of Computer Engineering , BS, 2008, Kharazmi University
Master’s of Artificial Intelligence , MS, 2012, Iran University of Science and Technology

Committee in Charge:
Charles Hughes, Chair, Computer Science
Hassan Foroosh, Computer Science
Gita Sukthankar, Computer Science
Lisa Dieker, Child, Family, and Community Sciences

Approved for distribution by Charles Hughes, Committee Chair, on June 23, 2016.

The public is welcome to attend.