Synchronized Multimodal Recording and Analysis of Violin Performance with Motion Capture Systems

Ksenia Kolykhalova Casa Paganini - InfoMus DIBRIS - University of Genova Piazza S. Maria in Passione 16123 Genova, Italy david.cabrera@upf.edu Erica Volta Casa Paganini - InfoMus DIBRIS - University of Genova Piazza S. Maria in Passione 16123 Genova, Italy david.cabrera@upf.edu

Corrado Canepa Casa Paganini - InfoMus DIBRIS - University of Genova Piazza S. Maria in Passione 16123 Genova, Italy david.cabrera@upf.edu Simone Ghisio Casa Paganini - InfoMus DIBRIS - University of Genova Piazza S. Maria in Passione 16123 Genova, Italy david.cabrera@upf.edu

Gualtiero Volpe Casa Paganini - InfoMus DIBRIS - University of Genova Piazza S. Maria in Passione 16123 Genova, Italy david.cabrera@upf.edu

ABSTRACT

Learning to play a musical instrument (either traditional or new) encompasses complex motoric tasks needing a long and accurate training, Multimodal interactive systems can offer students guidance during self-study and can help teachers and students to focus on details that would be otherwise difficult to appreciate. This contribution introduces a multimodal corpus consisting of the recordings of expert models of success, provided by four professional violin performers. The corpus includes audio, video, motion capture, and physiological (EMG) data. The initial analyses carried out on the corpus will be introduced as well.

Author Keywords

Multimodal interactive systems, movement analysis, movement data corpora, technology-enhanced learning.

ACM Classification

H.5.5 [Information Interfaces and Presentation] Sound and Music Computing.

1.INTRODUCTION

Research in this contribution is carried out in the framework of the EU-H2020-ICT TELMI project, investigating technologyenhanced learning of musical instruments with a particular focus on the violin. This contribution introduces the recordings of expert models of success – provided by four professional violin performers and teachers – that make the reference archive of data for the project. Recordings consist of synchronized audio, video, motion capture, and physiological (EMG) data.

The multimodal corpus is currently used in TELMI for research, technological, and educational purposes, including developing feature computation and analysis techniques, modeling and automatically measuring the technical quality of a violin performance, comparing students with masters to provide ways of improving students' technique, designing feedback for students, and providing students with reference examples of performances. The final goal is to develop a multimodal interactive system for technology-enhanced learning of violin playing. With respect to existing corpora (e.g. [1][2]), this one is not oriented to a specific tasks (e.g., emotion recognition) or music pieces. Rather, it is organized in a structured collection of exercises, following a precise learning path. Moreover, it includes data for several rich sources.

2.DATA CORPUS

Participants. Four professional violin players recruited by Royal College of Music, London: Madeleine Mitchell, John Haspel Gilbert, Eulalie Charland, and Berent Korfker.

Material. 41 exercises concerning: (i) handling the instrument, (ii) techniques of the right hand, (iii) techniques of the left hand, (iv) articulation. The exercises were selected under the guidance of professional violinist Madeleine Mitchell.

Set-up: a 13-cameras Qualysis motion capture system, two video cameras JVC GY-HD251 (720p, 50fps), one MS Kinect v.2, one pick-up Fishman PRO-V20-0VI connected via radio mounted on the violin, two Neumann KM184 microphones for ambient audio, two Myo sensor for EMG data.

Procedure. Each participant was informed in advance of purpose and requirements. Upon arrival s/he was dressed with a motion capture suit and was given time to get used to play in the required conditions. The motion capture system was calibrated and a recording test was performed. During the recording session, the player was free to play the exercises in the order s/he preferred. The player could replay each exercise how many times s/he wanted. Players were also given the opportunity to check the recordings after the session The players signed a consent form.

3. RESULTS

The material was uploaded in the repoVizz repository and will be made publicly available. Current movement analysis consists of extraction of low-level (e.g., kinematics), and selected midlevel features (e.g., coordination, tension, and regularity).

4. ACKNOWLEDGMENTS

This work has been partly funded by the European Union Horizon 2020 research and innovation programme under grant agreement No. 688269 (TELMI).

5.REFERENCES

- Gillet, O. and Richard, G. 2006. Enst-drums: an extensive audio-visual database for drum signals processing. In Proc. 7th Intl. Symposium on Music Information Retrieval.
- [2] Maestre, E., Papiotis, P., Marchini, M., Llimona, Q., Mayor, O., Pérez, A., and Wanderley, M.W, 2017. Enriched Multimodal Representations of Music Performances: Online Access and Visualization. *IEEE MultiMedia* 24, 1, 24–34.