Computational analysis of style in traditional fiddle playing

Dr.Islah Ali-MacLachlan

Background and Motivation

The fiddle, dimensionally the same as a violin but played in a folk style, has been historically central to the traditional music of the British Isles and many European countries. Since the middle ages, it has been one of the most popular instruments for accompanying traditional dancing (Ling, 1997). As one of the most widely played folk instruments, musicians who play in a range of folk styles are widely accessible, including those participating in the Royal Birmingham Conservatoire's Folk Ensemble.

I am building a research group in Computational Ethnomusicology, the computational analysis of ethnic and folk music (Gómez et al., 2013) at BCU. I completed a PhD in this area (Ali-MacLachlan, 2018) and contributed to a number of published papers exploring the Irish flute as the main instrument of study, from the perspective of data acquisition (Köküer et al., 2019, 2014) and the use of machine learning to analyse aspects of playing style (Ali-MacLachlan et al., 2018, 2017, 2016, 2015). I am working with colleagues in the Royal Birmingham Conservatoire as well as machine learning specialists in CEBE to ensure high quality in the computational and musicological aspects of the work. I am also a member of the steering committee for FMA (Folk Music Analysis) international workshop and chaired the event at BCU in 2019, assistant editor of the AAWM (Analytical Approaches to World Music) journal and a member of the IOA (Institute of Acoustics) education board.

This project is an excellent way to provide a PhD student with a project that comes from a team with a proven track record and a subject area where there is relatively easy access to musicians and associated data. It is also an excellent way to explore an important next step in research that brings together computational, musicological and ethnographic study.

Proposed Research

The research project would consist of the following phases:

- Identifying the key differences in playing style and how to automatically classify them
- Curating a collection of recordings and developing a ground truth dataset
- Developing algorithms for classification of stylistic differences, including temporal and timbral analysis
- Recording of a dataset based on more detailed understanding of stylistic differences
- Further development of algorithms and techniques to classify stylistic differences between players

It is anticipated that the project would use machine learning techniques as a method for developing accurate note onset detection and understanding of differences in timbre used as part of playing

styles. In traditional Irish flute research, note onset detection methods using machine learning and ground truth timing data from flute recordings have successfully out-performed other leading methods (Ali-MacLachlan et al., 2017). Flute-based player recognition systems using deep learning techniques have returned over 97% accuracy. (Ali-MacLachlan et al., 2018)

Potential Impact

The folk music of the British Isles has great international impact because the music is played in many countries. Historically, each county had an identifiable regional playing style (Cooper, 2010) though communication methods and learning styles now mean that players learn from a wider range of sources. If the project were to look particularly at one country, Irish traditional fiddle styles can still be placed into four main geographical areas (Haigh, 2016). Studies of this type, using computational analysis alongside ethnographic and musicological studies, are important in identifying key trends in cultural history (Gómez et al., 2013).

The DMTLab at BCU has a history of producing high quality papers on MIR (Music Information Retrieval) subjects in international publications. As leader of a team looking to advance research in this area, the PhD studentship forms an important part of growth and potential output in this area. There is potential to quickly become the leading UK team in computational ethnomusicology and this has already been evidenced by participation in various international committees.

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