CHARACTERISATION OF COMPOSER STYLE USING HIGH LEVEL MUSICAL FEATURES

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ABSTRACT

This paper outlines two preliminary studies researching the characterisation of composer style using features automatically extracted from symbolic data, our initial results, and future objectives. Our main research question is whether is it possible to systematically encode music-theoretic constructs in a computational framework in order to yield musicological insights regarding style characteristics and compositional techniques. Our long term goal is to train a computer to be able to make high-level inferences concerning musical style, historical context, genre, composer, and creative influences.

The problem of composer style characterisation is twofold: which higher level musical features are most likely to reveal unique stylistic traits of individual composers, and what methods to employ to robustly derive these features.

Our first study, using Kern data [1], analyses works from a small set of composers from the Late Renaissance (1560-1600) and Baroque (1600-1750) periods. The aim is to discover distinctive uses of counterpoint [4] in their compositions. Vertical notegroups occurring on strong metrical positions are evaluated for their adherence to strict species counterpoint, in particular, the treatment of dissonance, perfect consonances, parallel intervals, and contrapuntal motion. The vertical interval content is calculated for every notegroup slice, modified by the durational value of the group.

The second experiment uses a much more varied corpus of MIDI recordings, among others, including works by Haydn, Beethoven, Debussy, and Alexander Scriabin. The corpus is restricted to solo keyboard music to preclude any style indicators arising from instrumentation considerations. Features extracted include vertical interval data, a measure of consonance calculated from the total vertical interval content for all combinations of voices adjusted by duration and multiplied with the Malmberg consonance rankings [5]. A measure of tonality is derived using Krumhansl's [2] key algorithm, and interval transformation data from an implementation of David Lewin's iFUNC [3].

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For both experiments, a composer classification task is performed using the WEKA machine learning system to test the ability of the feature sets to characterise composer style.

For the Baroque data set, out of 66 pieces, 44 are correctly classified (66%), and 22 are incorrectly classified (33%). The confusion matrix shows that Bach and Buxtehude, both German Baroque composers of very similar florid contrapuntal style, are difficult to distinguish, as are Buxtehude and Vivaldi, and to a lesser extent, Vivaldi and Corelli. These three pairs account for 16 out of the 22 total errors. Ruggero, a composer from the Late Renaissance, is clearly identified by his almost complete lack of the tritone interval. The classification task performs well in the identification of Monteverdi, Corelli, and Frescobaldi, with 9/10, 8/10, and 9/10 pieces correctly attributed.

In the second classification test, the J48 decision tree algorithm classifies 31 pieces (52%) correctly, and 29 incorrectly (48%). The classification scores are most accurate for Bach and Buxtehude, with 9/10 and 8/10 pieces correctly classified. Debussy, and Scriabin both have 6/10 correct attributions. Three scores by Debussy are confused with Scriabin, similarly Haydn is mixed up with Beethoven, thus grouping pairs of composers who could be considered quite similar in style.

We presented classification experiments investigating the problem of composer identication. We conclude that although the computation of higher level features is challenging, it can give useful insights into characteristics of style which are not revealed by more statistical approaches.

1. REFERENCES

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