STELUPA: A MUSIC SCORE SEARCH ENGINE

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ABSTRACT

STELUPA is a web based software application developed as part of a PhD dissertation at the University of Technology in Sydney, Australia. It facilitates the searching of music scores, and allows users to search across a wide range of criteria including title, composer, performer, tempo range, year range (both of composition and performance), any given musical phrase, any rhythmic pattern, and any chord progression. Any text written on the score (such as performance markings and dynamics) can also be searched. Returned search results are in the form of brief excerpts taken from the relevant music score. Search results can be annotated, pinned to a user area and saved.

1. MOTIVATION

The problem of searching and analysing large databases of music scores is an ongoing challenge in the MIR field. Applications such as Peachnote, Musipedia and Kooplet provide powerful ways with which to explore the information held in music scores [6]. STELUPA aims to both leverage off the possibilities inherent in these applications, as well as develop these in tandem with front-end web frameworks (such as AngularJS and ReactJS). These frameworks are increasingly coming to offer powerful ways to reimagine the internet as an immersive, data-driven, and multi-modal experience [3,5], and STELUPA has been designed with this in mind.

2. FEATURES OF THE APPLICATION

The main page of STELUPA consists of three components: a search area, a results area, and a results-saving area (seen in Figure 1, from left to right). The search results can be viewed in both piano-roll view and traditional music notation view. It is possible to both pan and zoom the returned results in piano-roll view, and different instruments are color-coded (either individually or as instrument groups). An aggregated search view makes it possible to view the relationship between any of the given search results and the wider corpus.

The scores used are derived from MusicXML files, prepared with the Python Pandas library. The MusicXML has been enhanced to make it more amenable to various data aggregations (such as n-gram calculation[7], and the tagging of idiomatic harmonic progressions[1,4]). STELUPA allows users to play the related audio recordings of search results and also allows synthesized audio playback at variable speeds. In synthesized audio play-back mode,it is possible to mute instruments the user does not wish to hear.

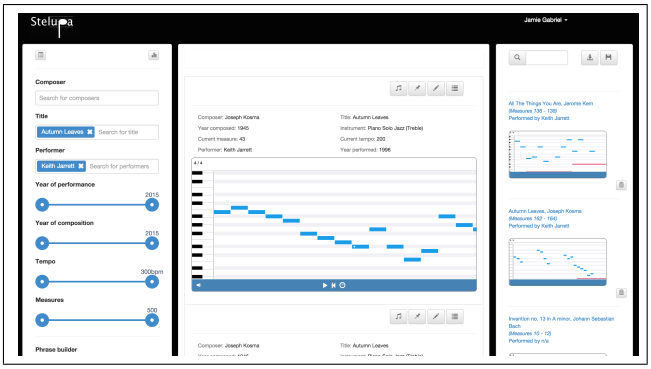

Figure 1. Screenshot of STELUPA

STELUPA is typical of web-applications that have embedded social networking functionality, in that it records all user interactions and utilizes this information to find and build user-networks. Users can share their searches with other STELUPA users, or explore the search habits of similar users.

3. USE CASES

STELUPA provides a just-in-time environment for composers to search across a wide range of compositional techniques and instrumental combinations, and provides a mechanism with which to save and manage this information. It is an especially powerful tool for film and television composers who are required to work across many genres and quickly need access to a wide range of different compositional techniques.

The original purpose of STELUPA was to undertake a musicological analysis of jazz piano solos. My PhD dissertation explores the different approaches taken to improvisation by two jazz pianists, Keith Jarrett and Chick Corea. STELUPA was created to provide a novel way to show that note-choice in jazz improvisation is underpinned by local musical context rather than any overarching theoretical paradigm. STELUPA also provided a powerful way to share this information between jazz musicians and jazz musicologists.

STELUPA can also be used as a powerful tool to under-

pin music education: Music Teachers can easily find examples that can be used to cement musical ideas, and provide real-world examples of how composers have solved problems and when they have seen fit to break the rules of composition. Teachers can also use the application to see a complete history of which part of the corpus students have been searching, and use this to guide instruction. It is also possible to use STELUPA to create aural training modules derived from a particular part of the music corpus.

The music score is often regarded as a shallow metadata of music itself, however when used in this way, to underpin a multi-modal search engine, it can deliver rich intuitions about how music can be created as well as helping users acquire practical skills in musianship. The aggregation module in STELUPA also provides insights into how creative decision-making takes place both over the course of a single composition and through a composers lifetime output of composition.

4. TOOLS USED AND FUTURE USE

STELUPA has been built on the AngularJS web framework with a MongoDB database. The data store is comprised of MusicXML files that have been modified with the Python Pandas library, before being exported into a JSON data store. All the data visualizations have been created using D3.js, an SVG javascript library.

The current iteration of the application should be regarded as a proof-of-concept prototype. A new release is being planned for 2016 that will be trialled for music students working in film and television, with a far larger corpus.

The application is currently hosted via Heroku and is in the process of being moved to servers housed at the University of Technology, Australia. STELUPA is hosted at www.stelupa.com.

5. REFERENCES

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