A DEMONSTRATION OF THE SYNCPLAYER SYSTEM

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ABSTRACT

The SyncPlayer system is an advanced audio player for multimodal presentation, browsing, and retrieval of music data. The system has been extended significantly in the last few years. In this contribution, we describe the current state of the system and demonstrate the functionalities and interactions of the novel SyncPlayer components including combined inter- and intra-document music browsing.

1 SYNCPLAYER OVERVIEW

The SyncPlayer is a client-server based software framework integrating various MIR-techniques such as music synchronization, content-based retrieval, and multimodal presentation of audio recordings and associated annotations [3]. The framework basically consists of three components: a server component, a client component, and a toolset for data administration (see also Figure 1):

- The user operates the *client component*, which in its basic mode acts like a standard software audio player for `*.mp3` and `*.wav` files. Additional interfaces, e.g., for performing content-based queries as well as various visualization tools, are provided through plug-ins (see Figure 2).
- A remote computer system runs the *server component*, which is capable of identifying audio recordings played by the client and which supplies the client with metadata and annotations for those recordings. Furthermore, the server comprises several types of music search engines.
- Several server-side *administration tools* are used for maintaining the databases and indexes underlying the SyncPlayer system.

In a typical SyncPlayer scenario we assume that, on the server-side, there exists a large collection of music documents. Here, for each given piece of music, various digital representations (e. g., audio, MIDI, MusicXML, scanned images of sheet music) as well as associated metadata should be accessible by the server. In the following, this kind of data will be referred to as *raw data*. The raw data is further processed to generate what we refer to as *derived data*. The derived data comprises high-level audio features, various kinds of synchronization and linking data, or structural data, which reveals musically relevant characteristics as well as existing relations within the underlying raw data. Such data may be generated efficiently in a purely automatic fashion by means of MIR techniques. Other types of derived data may include textual annotations of audio recordings aligning the lyrics to a corresponding recorded song or synchronization data linking scanned sheet music with a corresponding audio recording. Using the SyncPlayer administration tools, the raw data as well as the derived data are indexed and stored in databases, which can then be efficiently accessed by the SyncPlayer server. The generation of the derived data as well as the data organization and indexing can be done offline in some preprocessing step (Figure 1). For further technical details concerning the data administration and the SyncPlayer implementation, we refer to [2, 3].

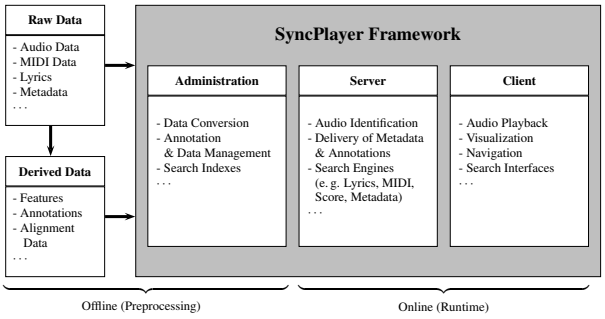

Figure 1. Overview of the SyncPlayer framework.

The SyncPlayer framework offers two basic modes for accessing audio documents and corresponding content-based data such as annotations. First, a user operating the client system may choose locally available audio recordings for playback. The client then extracts features from the audio recordings which are sent to the remote SyncPlayer server. The server subsequently attempts to *identify* the audio recording based on the submitted features. Upon success, the server searches its database for available annotations (such as lyrics or notes) which are then sent back to the client. The client system offers the user several visualization types for the available annotations. Examples are indicated by Figure 2, which shows from top to bottom the SyncPlayer client, a visualization plug-in for a karaoke-like display for lyrics information, a piano-roll style display for note (MIDI) information, and a display for the repetitive audio structure. Further plug-ins are available for displaying the waveform, the spectogram, or scanned

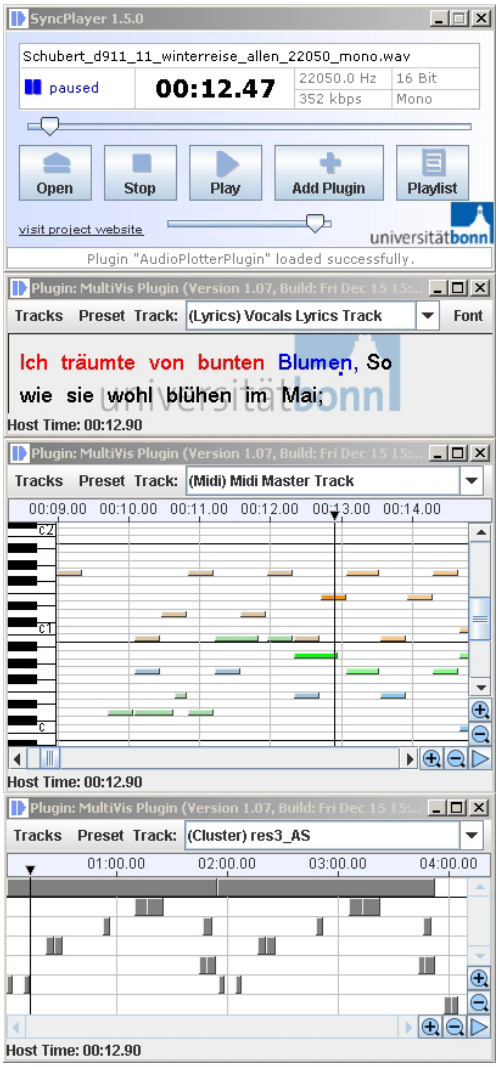

Figure 2. The SyncPlayer with three visualization plug-ins showing different annotations (lyrics, piano roll, structure) for Schubert's Winterreise D911 No. 11.

images of sheet music synchronously to audio playback.

The plug-in displaying the audio structure allows the user to instantly switch between blocks of musically similar content within a single music document. For example, musically similar blocks might be repetitions or variations of a musical theme. We call this application *intra-document browsing* because the user browses through particular blocks of a single music document. In addition, we have developed the *Audio Switcher* plug-in (see Figure 3), which offers *inter-document browsing* similar to the MATCH System by Dixon et al. [1]. It allows the user to open several synchronized interpretations of the same piece of music. The user may listen to one of the selected interpretations and then, at any time during playback, switch to another interpretation. The playback in the target interpretation will continue at the position that musically corresponds to the position inside the previously selected interpretation.

The second method for accessing audio documents using the SyncPlayer is by means of appropriate query engines. In this scenario, the user operates a query plug-in offered by the client. Queries are submitted to the SyncPlayer server which, depending on the query type, schedules the queries to an appropriate query engine. A ranked list of retrieval results is returned to the client and displayed to the user. The user may then select particular query results for playback which are subsequently streamed from the server along with available annotation data. Currently, query engines for lyrics- and melody-based retrieval exists for performing symbolic queries. For searching audio recordings, a query engine for audio matching [4] has been implemented.

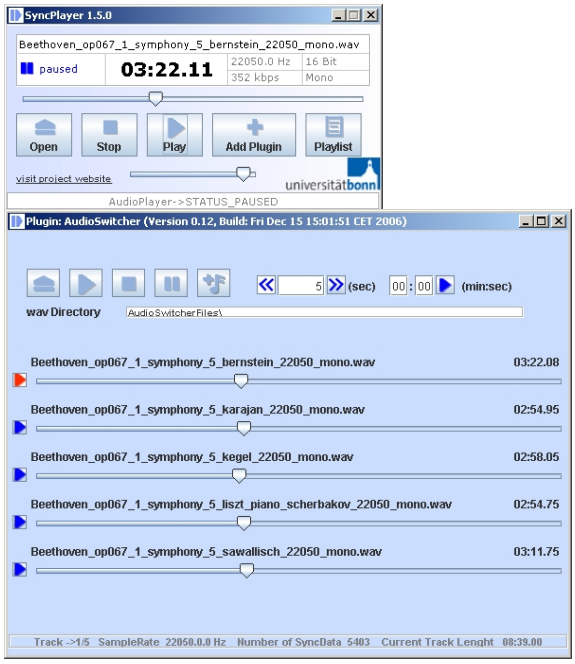

Figure 3. The SyncPlayer on top of the Audio Switcher plug-in. Here, five different interpretations of Beethoven's Fifth Symphony are selected in the Audio Switcher.

For detailed information on the SyncPlayer framework we refer to [2, 3]. A demo version of the SyncPlayer is available for download at the SyncPlayer Homepage [5].

2 REFERENCES

[1] S. Dixon and G. Widmer, *MATCH: A Music Alignment Tool Chest*, in Proc. ISMIR, London, GB, 2005.

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[3] F. Kurth, M. Müller, D. Damm, C. Fremerey, A. Ribbrock, and M. Clausen, *Syncplayer—an advanced system for content-based audio access*, in Proc. ISMIR, London, GB, 2005.

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