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A Search Through Time: Connecting Live Playing to Archive Recordings of Traditional Music

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A SEARCH THROUGH TIME: CONNECTING LIVE PLAYING TO ARCHIVE RECORDINGS OF TRADITIONAL MUSIC

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1. INTRODUCTION

This poster describes new developments in the popular Tunepal project. Tunepal is a query-by-playing music score search engine used primarily by musicians on smartphones in traditional music sessions and classes. Using Tunepal, a musician can quickly identify the name of a melody being played and download the score for later study. Since 2009, there has also been a version of Tunepal that runs in a web browser that allows a musician to play a tune extract and find the name of the tune. Over the summer of 2015, we embarked on a project to redevelop the Tunepal website in HTML5. Additionally we aimed to connect Tunepal searches which normally return music scores, to recordings of those scores, through the Eurpoeana Sounds project. Finally, we aimed to make the core Tunepal technology open source and provide API access to the Tunepal corpus and search engine so that others could build on our work[1].

2. BACKGROUND

Tunepal is predominantly used on IOS and Android smartphones and it allows users to search for a music score by playing a 12 second extract on a traditional instrument. The transcription is then sent to the Tunepal server where it is matched against over 23K music scores and the results are returned to the user in order of similarity to the audio search query. Tunepal has in excess of 20K users in over 40 countries who submit around 1K music searches per day. For a more detailed description of the functionality and impact of Tunepal see (Duggan and O'Shea, 2011). Since 2009 there has been a browser hosted version of the Tunepal search engine that used a Java applet to record and transcribe audio. However by 2015, it was clear that this needed to be redeveloped given that browsers were increasingly dropping support for Java applets.

The Europeana Sounds project unifies access to artifacts stored by digital libraries and museums across Europe through a common API. It aims is to provide one million audio recording by January 2017 whilst improving access and promoting the creative reuse of these recordings (Europeana Sounds, 2016).

3. GOALS

Over the summer of 2015 we embarked on an ambitious project to redevelop the Tunepal website in HTML5 and add the ability to find matching audio artifacts from the archives of Comhaltas Ceoltoiri Eireann, the Irish Traditional Music Archive and Tobar an Dualchais through the Europeana Sounds API.

Our goals were as follows:

- Replace the Java applet with record and transcription functionality implemented in HTML5

- Return recordings of music, not just music scores.

- Make all the functionality of the Tunepal, including query-by-playing work similarly across all devices including smartphones.

- Open-source Tunepal and make an API server available to other projects.

4. IMPLEMENTATION

Our team consisted of a back end developer, a front end developer and two experts in music archiving and digital libraries who provided leadership and support from Historypin. Three of the team were based in London whilst the back end developer and project coordinator was based in Dublin. The team communicated regularly using Google Hangouts and Slack, while all the coding was managed in git repositories.

Over the summer, the back end technology that performs Tunepal searches was redeveloped as a JSON API using Jersey (Jersey, 2016). The front end of the project was redeveloped using Materialize and AngularJS, open source frameworks that allows web applications to developed in HTML/CSS and Javascript that conform to Google's Material Design principles (Materialize, 2016). Emscripten was used to cross-compile the ABC2MIDI library on which Tunepal depends from C to Javascript (Emscripten, 2016; Shlien, 2011). To display music scores in the browser, the ABCJS library is used (Rosen and Dyke, 2016).

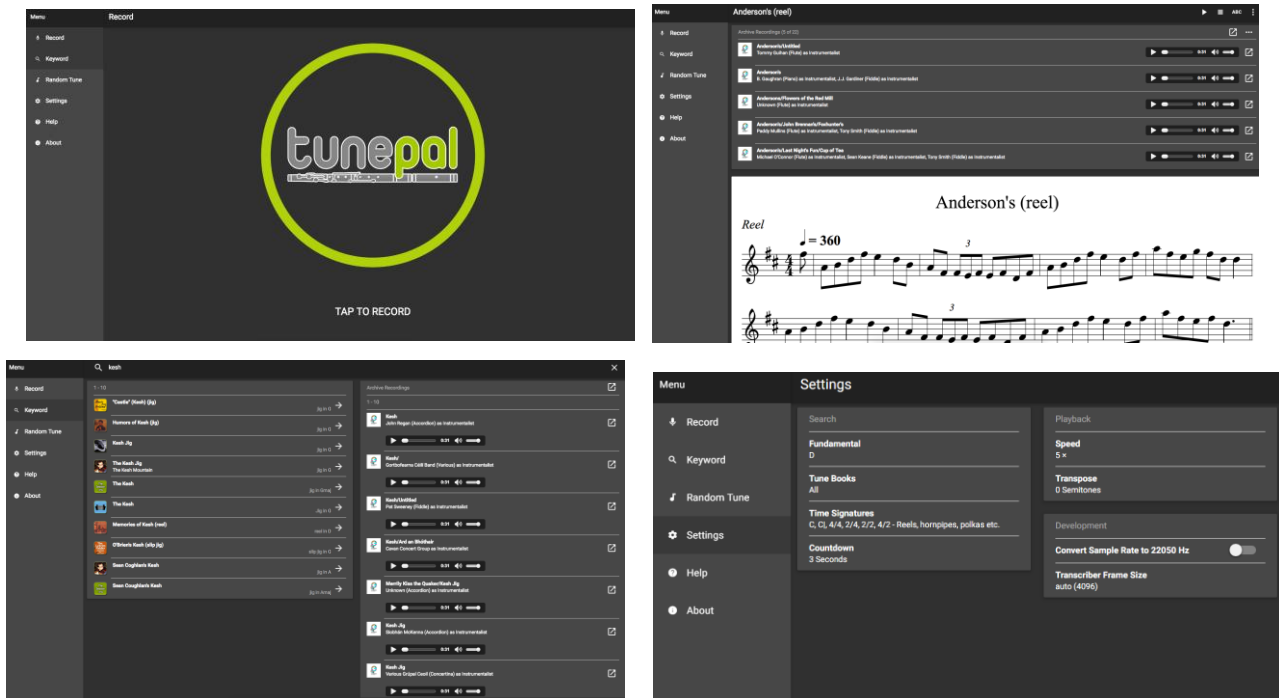
[1] See http://github.com/skooter500

Figure 1: Screenshots of the new Tunepal web application

In the new Tunepal web application, whenever a user makes a query-by-playing search for a tune, we also perform a Europeana API search for the title of the closest matching Tune returned by Tunepal. When a user searches for a title, we also search for that title in Europeana Sounds. Also when a user loads a specific tune in Tunepal, we also show search results from Europeana Sounds. We limit our searches to those collections in Europeana Sounds we know to have most traditional music content. Figure 1 illustrates some of these workflows.

5. EVALUATION

We evaluated our work by running user trials for the week of Feadh Ceoil na hEireann in various locations in Sligo in August 2015. In total 40 users tested the new version of Tunepal.

From our user trials, we established that users valued the provision of archive recordings greatly, though we did discover that transcription in the browser version of Tunepal was not as accurate as the version implemented in the apps. We are still investigating this and hope to provide improved accuracy in future a version. Also, although Comhaltas provides the majority of archive recordings, these are currently limited to 30 seconds extracts. Often these extracts are from recordings of sets of tunes and sometimes the tune being searched for is not in the first 30 seconds of the recording. We are currently working with Comhaltas to resolve this issue.

Typically we are handling around 2K music searches per month through the new, browser hosted version of Tunepal. This compares to around 20K music searches that originate in the native app versions of Tunepal.

6. CONCLUSIONS & FUTURE WORK

We achieved our goal of redeveloping the Tunepal website using modern technologies and also integrating search results from Europeana. We have made a number of enhancements and bug fixes since launch including defaulting to HTTPS connections which was necessary to support access to the microphone on the Chrome browser. When the functionality works, the experience is compelling. It is possible to start an interaction by playing an unknown melody and conclude with the music score from several manuscript collections in addition to recordings of the tune played by iconic musicians on a variety of instruments and contexts. We are also happy to report that the core Tunepal technology is now being integrated into other projects including thesession.org. We aim to build on our work by improving transcription accuracy, including key invariant searches and improving the utility of the archive recordings returned. We are hopeful that as more people become aware of the functionality of the new version of Tunepal, that it will broaden access to a wealth of cultural heritage available through Europeana Sounds.

7. REFERENCES

Duggan, B., O'Shea, B., 2011. Tunepal: searching a digital library of traditional music scores. OCLC Syst. Serv. 27, 284–297.

Emscripten, 2016. kripken/emscripten [WWW Document]. GitHub. URL https://github.com/kripken/emscripten (accessed 4.18.16).

Europeana Sounds, 2016. About. Eur. Sounds.

Jersey, 2016. Jersey [WWW Document]. URL https://jersey.java.net/ (accessed 4.18.16).

Materialize, 2016. Materialize [WWW Document]. URL http://materializecss.com/ (accessed 4.18.16).

Rosen, P., Dyke, G., 2016. abcjs [WWW Document]. URL https://abcjs.net/ (accessed 4.18.16).

Shlien, S., 2011. The ABC Music project - abcMIDI [WWW Document]. URL http://abc.sourceforge.net/abcMIDI/ (accessed 1.27.11).