

# MEL: A MUSIC ENTITY LINKING SYSTEM

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## ABSTRACT

In this work, we present MEL, the first Music Entity Linking system. MEL is able to identify mentions of musical entities (e.g., album, songs, and artists) in free text, and disambiguate them to a music knowledge base, i.e., MusicBrainz. MEL combines different state-of-the-art libraries and SimpleBrainz, an RDF knowledge base created from MusicBrainz after a simplification process. MEL is released as a REST API and as an online demo Web.

## 1. INTRODUCTION

When we refer to the Music Domain in a Natural Language Processing (NLP) context we refer to music product reviews, artist biographies, or even song lyrics. While these are valuable resources in NLP, Music Information Retrieval (MIR) has barely exploited the information that can be extracted from them. This opens up a vibrant area of research. Nevertheless, the information expressed in text is not understood by machines. A first step towards this understanding is the semantic annotation of texts. The identification of who and what is mentioned on a text is an NLP task called Entity Linking.

In this work we present MEL (Music Entity Linking), the first entity linking system able to identify musical entities (i.e., artists, albums, places, and songs) present in unstructured text, and link them to a music knowledge base, i.e., MusicBrainz.

## 2. ENTITY LINKING

Named Entity Recognition (NER) is the task to identify mentions to entities belonging to a set of predefined categories [8]. Traditionally, the most widely covered types of entities are PERSON, LOCATION and ORGANIZATION, as well as numeric expressions or time-spans. While NER is a widely studied topic, the advent of large knowledge repositories and collaborative resources has contributed to the emergence of another discipline: Entity Linking (EL), i.e. to discover mentions of entities in text and link them to a suitable knowledge repository [2].

In many circumstances, it may be useful to obtain annotations for Music entity mentions in text, either simply as Music types (e.g. tagging ‘Yellow Submarine’ as Song) or performing Entity Linking, e.g. tagging ‘Yellow Submarine’ as [http://en.wikipedia.org/wiki/Yellow\\_Submarine\\_\(song\)](http://en.wikipedia.org/wiki/Yellow_Submarine_(song)). However, this is not a trivial task as mentions to music entities show language and register idiosyncrasies. Let us consider multi-word music entities, which usually are those who pose greatest challenges for entity linking. They are difficult to discover because they may not be restricted to a single Noun Phrase or may be abbreviated (by means of acronyms, dropping entire words or even full rephrasing). Moreover, song and album names may be easily confused with other entities, such as places or simply objects (e.g. Moon, New York New York).

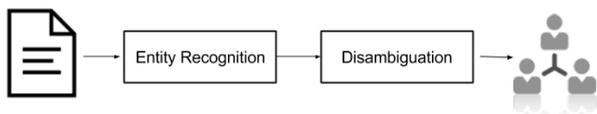
Among the few works on entity linking for the music domain, let us refer to [1], who describe an approach for detecting musical entities in informal text. In addition, [7] describe a system for musical EL in the Chinese language based on Hidden Markov Models. In [4] an integration system that combines the output of different general-purpose entity linking systems is proposed and used to create a large dataset of annotated musical entities. In [5], type information is used to improve the accuracy of the musical entities identified. Moreover, entity linking systems have revealed as useful tools to boost the performance of music recommendation systems that exploit textual data [6].

## 3. SIMPLIFYING MUSIC BRAINZ

MusicBrainz<sup>1</sup> is an open music encyclopedia of music metadata, which is built collaboratively and is openly available. The database schema of MusicBrainz is very comprehensive, and it is able to model the music discography world properly. However, the model is very complex if we are interested in the abstract concepts of albums and songs, and not in the different releases or recordings of these works. For instance, if you want to query the songs present in an album, you have to join 4 tables at least. In addition, in many occasions, a unique song is represented with several recordings in the database. In MusicBrainz there is the concept of work, which represents a song as a composition. A work may have different recordings. However, many recordings do not have a corresponding work in MusicBrainz, as they have not been created yet. Therefore, we tried to solve these two problems by applying the fol-



<sup>1</sup><https://musicbrainz.org/>



**Figure 1.** MEL architecture.

lowing processes. First, we grouped all recordings from the same artist and with the same name and create a new work entry if it was not previously created in MusicBrainz. Second, we performed a simplification of the schema. To this end, we created three new tables that directly relates entities (release-groups with works, artists with works, and release-groups with artists).

We used the simplified information to create a novel RDF version of MusicBrainz, which we called SimpleBrainz. Following a similar approach to the one used in the LinkedBrainz project<sup>2</sup>, a mapping between the MusicBrainz database to RDF was created. This novel RDF database contains all artists, release-groups, and works and their direct relations based on the album credits information. In addition, we added all other relations between entities stored in MusicBrainz relationships tables. This graph database is then used by our entity linking system<sup>3</sup>.

#### 4. MEL

The proposed Music Entity Linking system is composed of two blocks: named entity recognition and disambiguation (see Figure 1). The first block is performed using the python library spaCy<sup>4</sup>. spaCy identifies text spans to be disambiguated, and also provides a category for each span (e.g., person, organization, work of art). Then, in the second block, the text and the candidate spans are fed to AGDISTIS<sup>5</sup>, an entity linking system that exploits RDF knowledge bases [3]. AGDISTIS uses the graph information contained in SimpleBrainz to find the best candidates for disambiguation. Using type information provided by spaCy and the scores of the candidates provided by AGDISTIS, our system selects the best possible candidate for each text span. MEL acts as a REST API<sup>6</sup> that receives a text and returns a list of disambiguated entities with their corresponding MusicBrainz URLs. An online demo of the API is also available<sup>7</sup>. The released prototype is still in an early stage of development. We observed that the precision of the entities linked by MEL is rather high, but recall should be still improved.

#### 5. CONCLUSIONS

We perceived that the performance of general-purpose entity linking systems in music related texts is rather low. In addition, we observed that there is no entity linking system

able to disambiguate entities to a music knowledge base. For these reasons we created MEL, a music entity linking system able to disambiguate entity mentions present in free texts to MusicBrainz. To this end we created a new RDF version of MusicBrainz called SimpleBrainz, and exploited it in an entity linking pipeline. The entity linking system combines different state-of-the-art systems to provide good disambiguations of musical entities to a music knowledge base. Entity linking is a useful tool for the semantic enrichment of music-related documents, which may have impact in Music Information Retrieval tasks, such as music recommendation and classification.

#### 6. ACKNOWLEDGMENTS

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<sup>2</sup><http://linkedbrainz.org/>

<sup>3</sup><https://github.com/andrebola/simplebrainz>

<sup>4</sup><https://spacy.io/>

<sup>5</sup><http://aksw.org/Projects/AGDISTIS.html>

<sup>6</sup><http://mel.mtg.upf.edu/annotate>

<sup>7</sup><http://mel.mtg.upf.edu>