Opera and Classical Music

Knowledge Engineering project 2020/21

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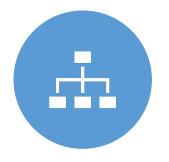


COMPOSERS



MUSICAL PERFORMANCES.

Background



DIFFERENT ORGANIZATIONS (DIFFERENT GOALS)



LACKING A CENTRAL ORGANIZED STRUCTURE.



HISTORICAL DATA
INCOMPLETE OR
INCONSISTENT

Goal





TO INTEGRATE INFORMATION COMING FROM DIFFERENT DATASETS

TRANSFORM DATA FROM
HETEROGENEOUS FORMAT INTO
A OWL KNOWLEDGE GRAPH

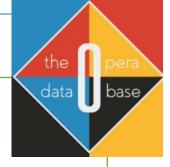
Resources

AudioLabs



- Cross-Composer
- Cross-Era

OperaDatabase



- Operas + Arias
- Zarzuelas + arias
- Art-songs

Resources

Alignment

- MuziekSchatten
- Corago
- ArCo

Linking

DBpedia

User Story 1

Maria is a conservatory student writing a thesis about Opera in the 18th century. Her thesis concerns the analysis of trends in opera compositions in that period. She would like to understand if composers of the 18th century shared the same style of writing, analysing the types of instruments and voices used within their works.

- CQ1: Which composers have composed works for piano in the 19th century?
- CQ2: What are Mozart's compositions that employ baritone singers?
- CQ3: Which are the operas with soprano or tenor singers?

User Story 2

Alejandro is a violinist which is going to perform in a theatrical event. He want to exercise on Spanish classic pieces of 19th century, and particularly on pieces which contain violin parts. He also want to improve its knowledge about the violinists of that period.

- CQ4: What are the Spanish works of the second half of the 1800s?
- CQ5: What are the Spanish operas with Soprano voices?
- CQ6: Who are the musicians who have played a piece written by an author died in 19th century containing a violin part?



Python libraries

Pandas RDFLib BeautifoulSoup

Tools



Ontology design

Protégé Limes

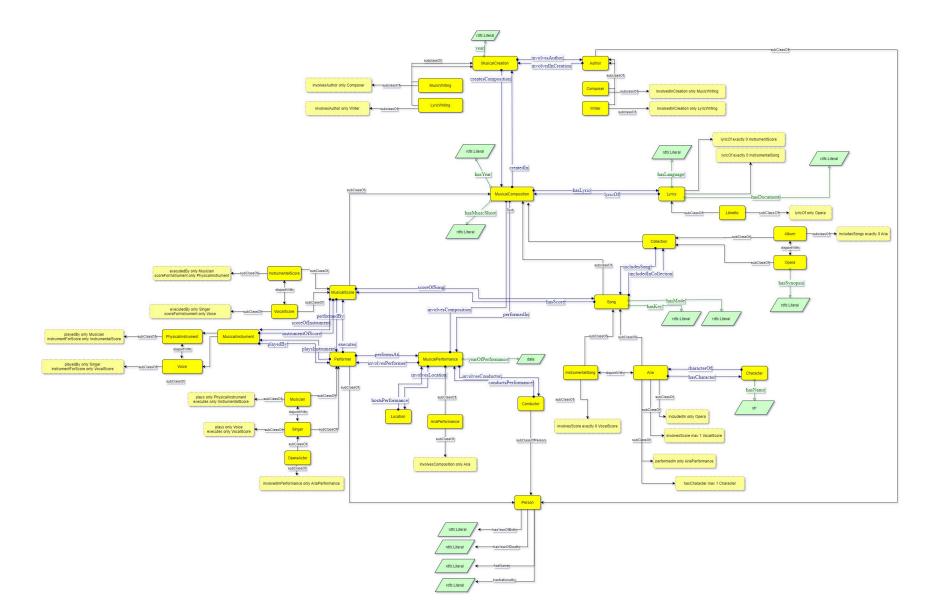


Development

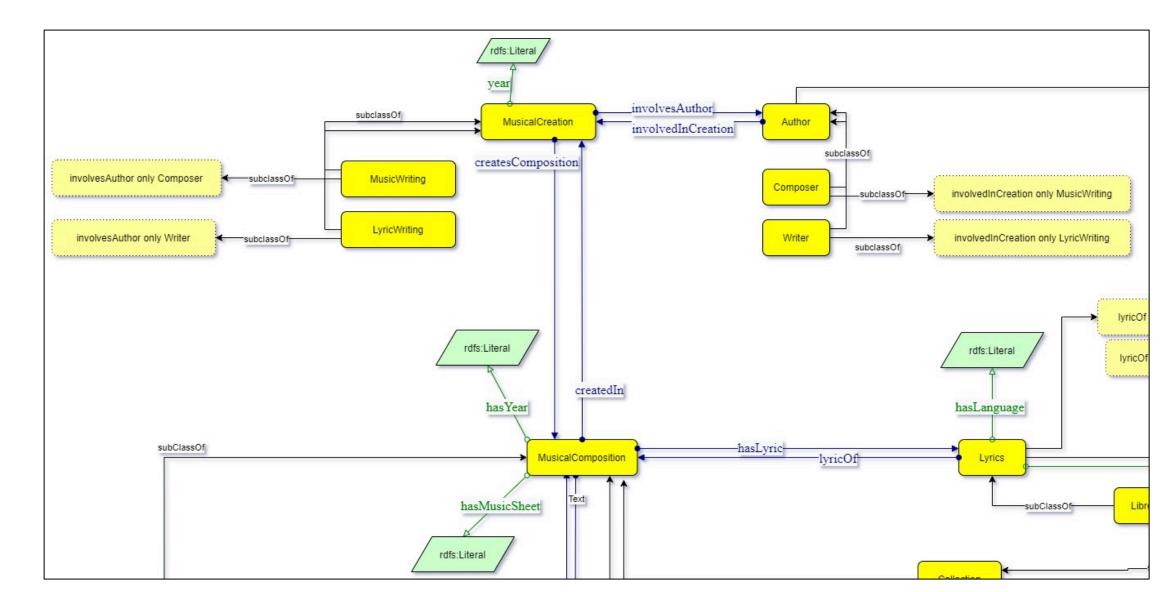
Virtuoso Lode

LodeView WebVowl

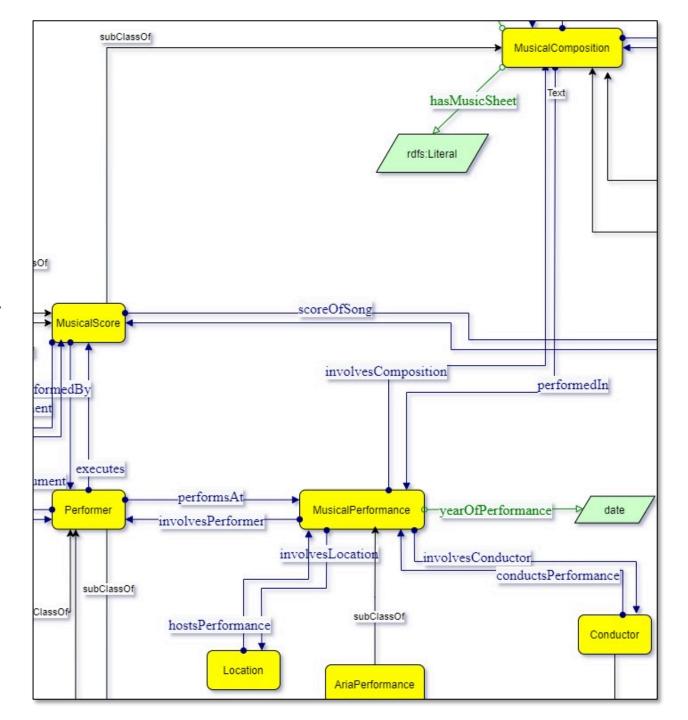




«Musical Creation» Situation

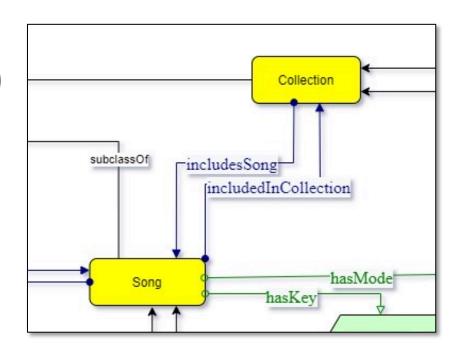


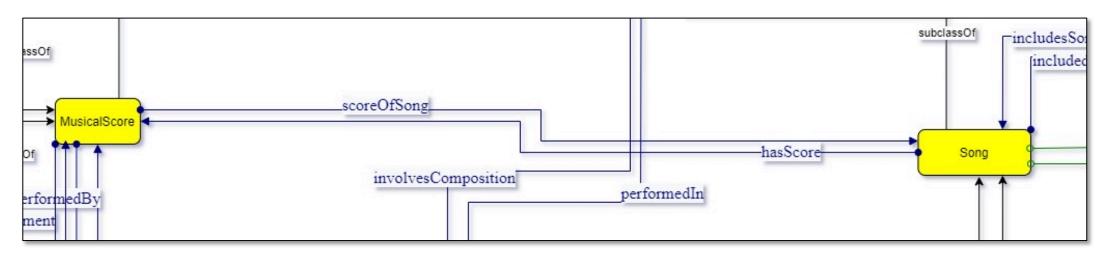
«Musical Performance» Situation



Collection (containment)

- Song in Collection
- Score in Song





Results

CQ2: What are Mozart's compositions that employ baritone singers?

```
select ?title ?language ?year where {
  ?creation ocm:involvesAuthor ?composer;
        ocm:createsComposition ?opera .
  ?composer ocm:hasYearOfBirth ?year.
  ?opera rdf:type ocm:Opera ;
         ocm:hasLyrics ?lyric;
          ocm:hasTitle ?title.
    ?lyric ocm:hasLanguage ?language .
  FILTER (?language = "Spanish").
  FILTER (xsd:integer(?year) >= 1850).
  FILTER (xsd:integer(?year) <= 1900).
```

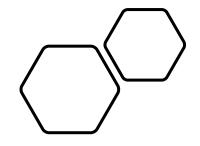
	title	\$ language	\$ year	\$
1	La Mulata	Spanish	1875	
2	La Primera Vara	Spanish	1875	
3	El Pino Del Norte	Spanish	1851	
4	Los Nuestros	Spanish	1851	
5	El Cocodrilo	Spanish	1851	
6	Las Hijas Del Zebedeo	Spanish	1851	
7	El Cisne De Lohengrin	Spanish	1851	
8	El Alma Del Pueblo	Spanish	1851	
9	Los Mostenses	Spanish	1851	
10	Tupinamba	Spanish	1877	

Results

CQ6: Who are the musicians who have played a piece containing a violin part written by an author died in 19th century

```
select ?pname ?instrname ?cname ?title ?death where {
   ?performer ocm:playsInstrument ?instr.
 ?performer ocm:performsAt ?performance;
             ocm:hasName ?pname.
  ?composition ocm:performedIn ?performance;
              ocm:hasTitle ?title.
 ?creation ocm:createsComposition ?composition;
       ocm:involvesAuthor ?author.
 ?author ocm:hasYearOfDeath ?death:
         ocm:hasName ?cname.
 ?instr rdfs:label ?instrname.
 filter(?instrname = "Violin").
 filter(xsd:integer(?death) > 1800)
 filter(xsd:integer(?death) < 1900)
```

	pname	φ	instrname	cname	÷	title	death
1	Nishizaki Takako		Violin	Felix Mendelssohn		Violin Concerto In E Minor Op. 64 Andante Allegro Non Troppo	1847
2	Nishizaki Takako		Violin	Johannes Brahms		Brahms Vc In D Major Op.77 II. Adagio	1897
3	Nishizaki Takako		Violin	Felix Mendelssohn		Violin Concerto In E Minor Op. 64 Allegro Molto Appasionato	1847
4	Nishizaki Takako		Violin	Felix Mendelssohn		Allegro	1847
5	Nishizaki Takako		Violin	Felix Mendelssohn		Andante	1847
6	Nishizaki Takako		Violin	Johannes Brahms		Andante	1897
7	Nishizaki Takako		Violin	Felix Mendelssohn		Violin Concerto In E Minor Op. 64 Allegretto Non Troppo Allegro Molto Vivace	1847
8	Nishizaki Takako		Violin	Johannes Brahms		Brahms Vc In D Major Op.77 III. Allegro Giocoso Ma Non Troppo Vivace Poco Piu Presto	1897
9	Nishizaki Takako		Violin	Johannes Brahms		Brahms Vc In D Major Op.77 I. Allegro Non Troppo Cadenza	1897
10	Bisengaliev Marat		Violin	Johannes Brahms		No.17 In F Sharp Minor	1897
11	Bisengaliev Marat		Violin	Johannes Brahms		No.5 In G Minor Original In F Sharp Minor	1897
12	Bisengaliev Marat		Violin	Johannes Brahms		No.7 In A Major	1897
13	Bisengaliev Marat		Violin	Johannes Brahms		No.13 In D Major	1897
14	Bisengaliev Marat		Violin	Johannes Brahms		No.10 In F Major Original In E Major	1897
15	Bisengaliev Marat		Violin	Johannes Brahms		No.12 In D Minor	1897
16	Bisengaliev Marat		Violin	Johannes Brahms		No.16 In G Minor	1897



Conclusions and ideas

We focused only on some aspects, but there are many others which can be involved to amplify the capabilities for interrogating the knowledge base.

Conclusions and ideas

Possible techniques for data augmentation

 Text mining (sentiment analysis over songs)

 Audio feature extraction (speed, scales, pitches)

Thanks for your attention