SESEMMI FOR LINKEDMUSIC: DEMOCRATIZING ACCESS TO MUSICAL ARCHIVES VIA LARGE LANGUAGE MODELS

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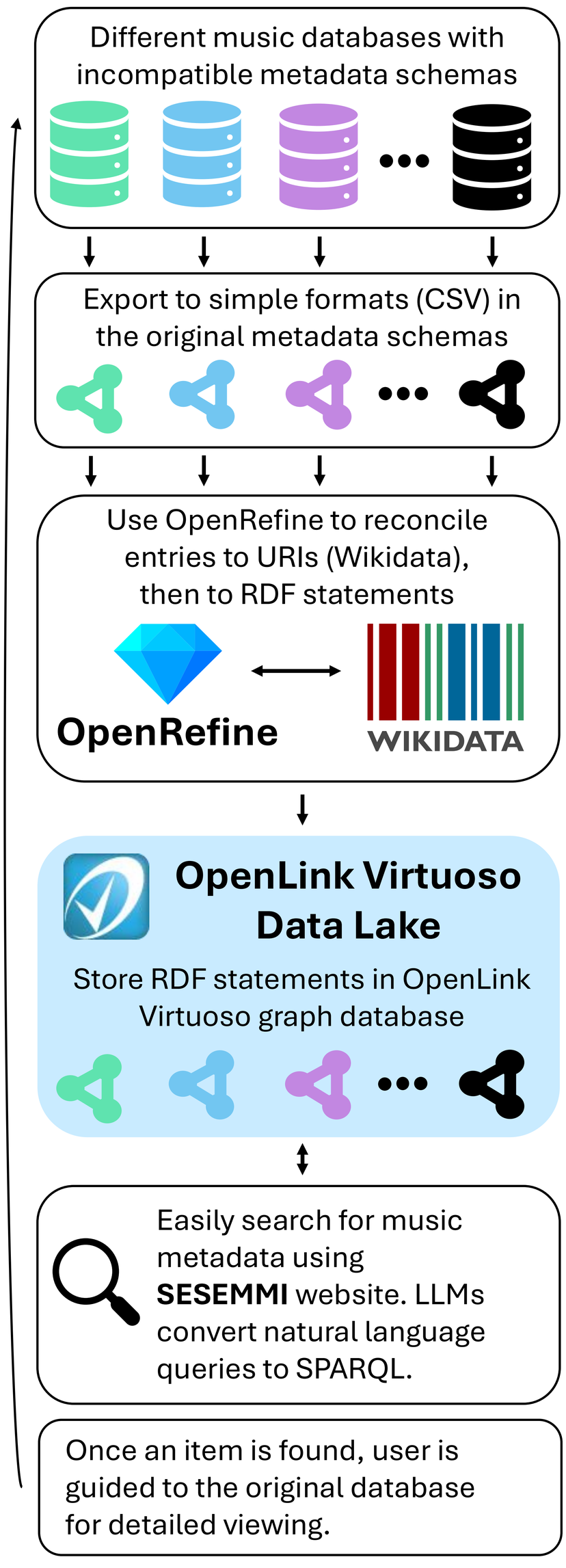
**Denotes equal contribution*

DDMAL Distributed Digital Music Archives & Libraries Lab
Social Sciences and Humanities Research Council of Canada | Conseil de recherches en sciences humaines du Canada
McGill Schulich School of Music / École de musique Schulich
CIRMMT Centre for Interdisciplinary Research in Music Media and Technology
Fonds de recherche Société et culture Québec

Introduction

- There are over 100 music metadata databases online, making large-scale, cross-cultural, or longitudinal research time-consuming
- The LinkedMusic project aims to merge each of these in a single RDF data lake, queryable using SPARQL
- To facilitate querying for non-technical users, this study investigates the ability for LLMs to translate musical natural language queries (NLQ) into SPARQL queries

LinkedMusic Process



Methodology

- Built custom dataset of 20 NLQ/SPARQL pairs with ground truth SPARQL
- Designed general all-purpose prompt to guide the LLM to convert NLQ to SPARQL
- Five LLMs tested: Claude Sonnet 4, Gemini 2.5 Flash, Gemini 2.5 Pro, GPT-4o, OpenAI o4-mini
- One-shot and zero-shot tests
- Ontology provided in Turtle format
- Each evaluated three times in the browser

Four challenge types (five questions each)**:**

Challenge 1:

- Retrieve information that can be found on a single sub-database's website
- **Example:** Find all compositions by William Byrd in DIAMM

Challenge 2

- Retrieve information that is stored in a single sub-database but cannot be found through the website
- **Example:** Find all different time signatures for jigs in The Session

Challenge 3

- Retrieve anything that can be found on a single sub-database plus Wikidata
- **Example:** Find the average number of record labels that female singers in MusicBrainz have signed with

Challenge 4

- Retrieve any information in the entire LinkedMusic data lake and Wikidata
- **Example:** Find all works commissioned by Isabella d'Este that have a surviving manuscript and a recording made after 1980

Databases

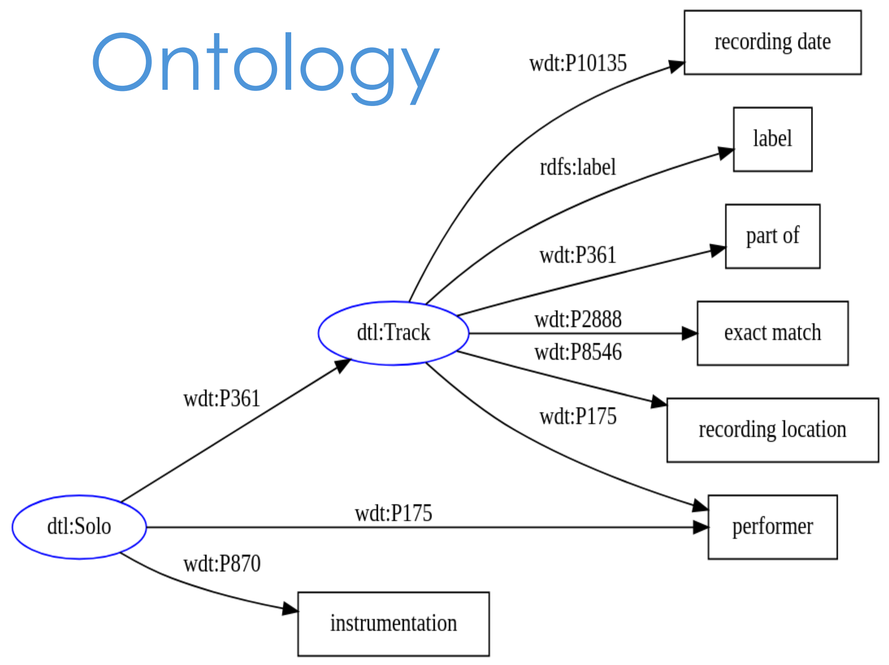
Over **352 million** RDF triples in five databases:

MusicBrainz
DIAMM
THE SESSION
The Global Jukebox
Dig That Lick 1000

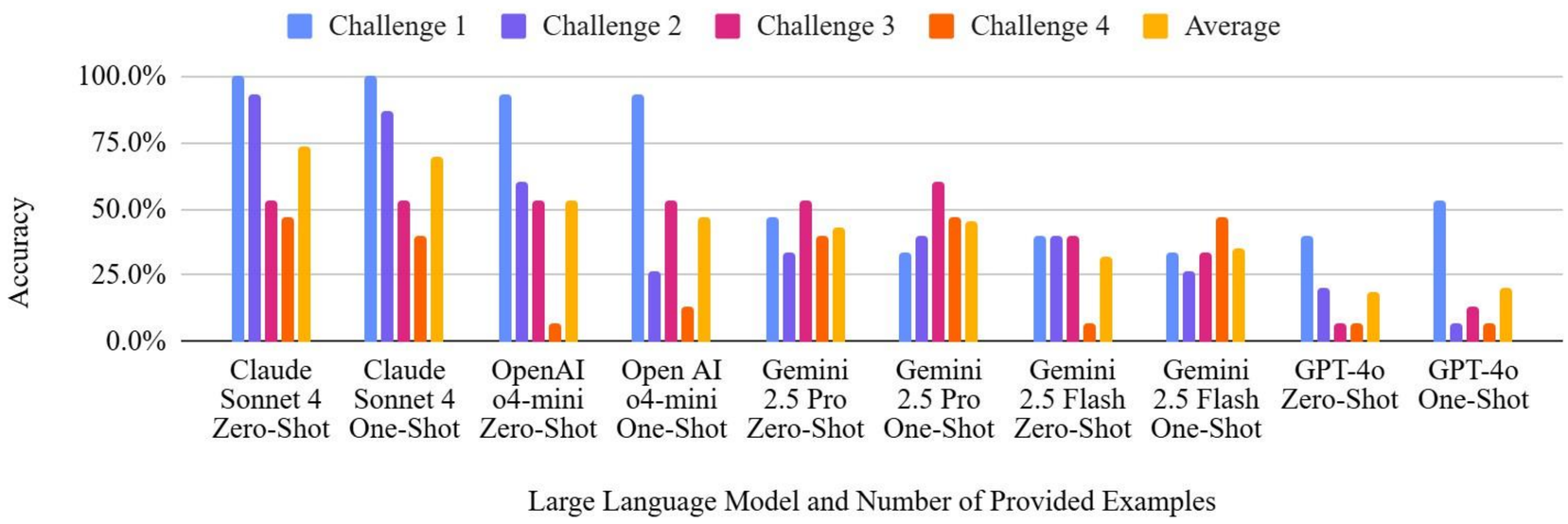
Three databases added since submission:

RISM Répertoire International des Sources Musicales
SIMSSA Database
cantus

Ontology



Results



Difficulties

- Errors traversing sub-graphs
- LLMs often misunderstood how entities were reconciled
- Limitations applying Wikidata schema to sub-databases
- Wikidata "Q" identifiers often incorrect
- Moderate variance between attempts

Conclusion

- First systematic investigation of NLQ to SPARQL in the music domain
- Performance decreases significantly with query complexity
- One-shot prompting did not consistently improve results
- Highest accuracy: Claude Sonnet 4 zero-shot (73.3% average, 100.0% for challenge 1 questions, 46.7% for challenge 4 questions)