Federated queries over heterogeneous IGT collections

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Outline

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What is IGT

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Motivation

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- From 2006 to 2010 nominalisation strategy in Ossetian spoken in Dargavs changed according to fieldworkers' memory.
- Although it was impossible to check the data and make a reliable conclusion.

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- Not all the data was gathered well
- Careful checking require going through a lot of data, often in different formats, etc.

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$$\text{gathering} \rightarrow \text{filtering} \rightarrow \text{using}$$

Challenges (IGT as data)

- No fixed set of layers
- Alternative analyses
- Multiple different (partly incompatible) formats

$\Rightarrow$ Leads to separate silos of data

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  - And on support of off-the-shelf tools

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There is a technology that provides most of the requirements out of the box

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1. Uniform Resource Identifiers (URIs) should be used to name and identify individual things.
2. HTTP URIs should be used to allow these things to be looked up, interpreted, and subsequently "dereferenced".
3. Useful information about what a name identifies should be provided through open standards such as RDF, SPARQL, etc.
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Basically, it entails a **highly standartised text format(s)** with a tool stack (but conceptually datasets are a multigraph)

Linked Data: Pros and cons

+ It is based on text files, so it does not depend on a platform / technological stack / etc.
+ Allows connecting datasets to each other, breaking silos and making data accessible
+ Promotes rigid vocabularies and standards making data interoperable (for the most part)
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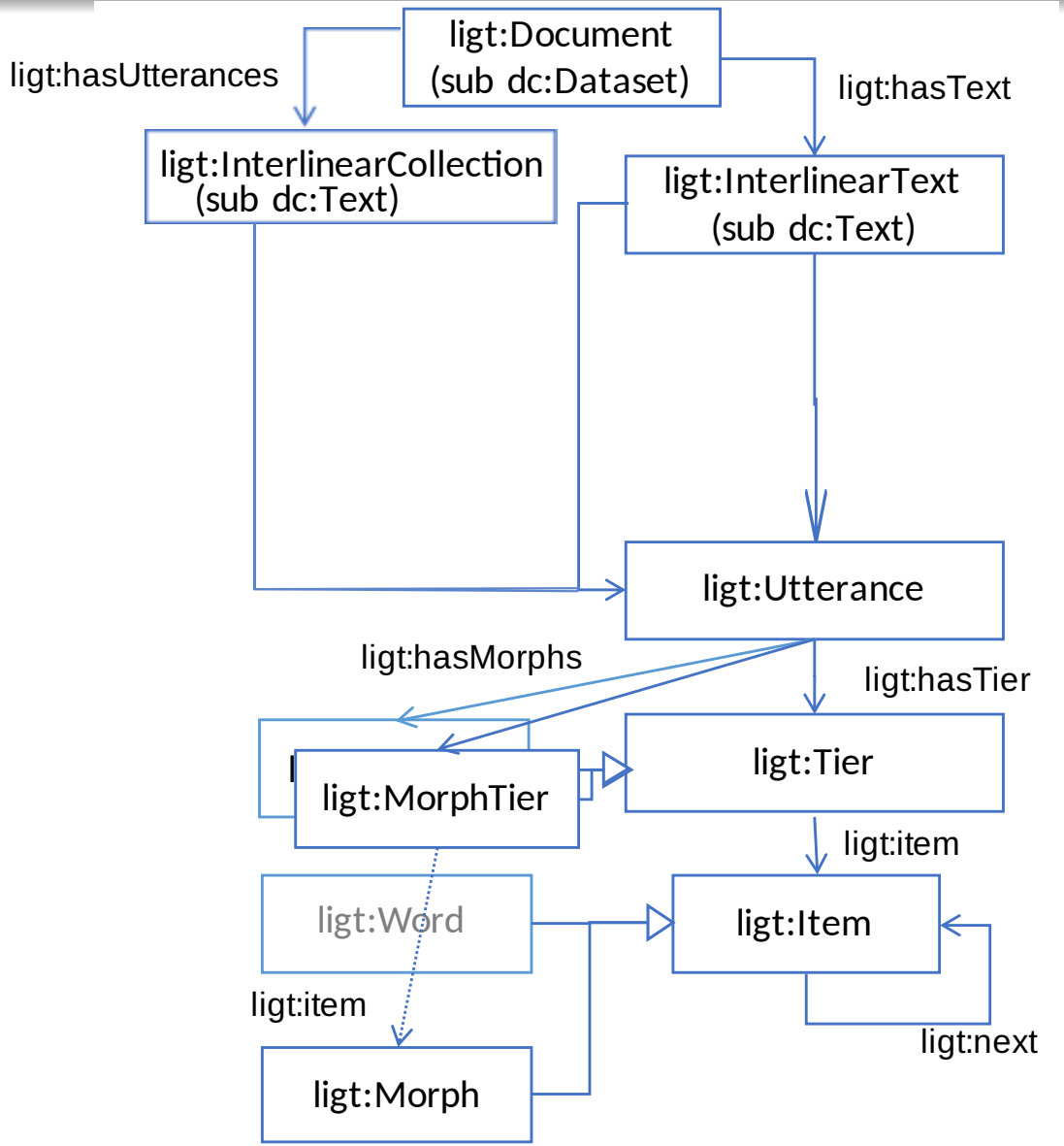
+ A lot of off-the-shelf tools allowing storing, searching, retrieving data
- Very steep learning curve, especially when things come to using the off-the-shelf tools
- Rigid vocabularies often lead to hacky modelling which decreases interoperability
- Slow for complex use-cases
- Relatively obscure which means less support

Outline

Basic idea


ligt:Document
(sub dc:Dataset)
ligt:hasUtterances
ligt:hasText
ligt:InterlinearCollection
(sub dc:Text)
ligt:InterlinearText
(sub dc:Text)
ligt:Utterance
ligt:hasMorphs
ligt:hasTier
ligt:MorphTier
ligt:Tier
ligt:item
ligt:Word
ligt:Item
ligt:item
ligt:next
ligt:Morph

Simple example

https://s.zazuko.com/qD7XtT

Simple example

```
PREFIX ligt: <http://purl.org/ligt/ligt-0.2#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
SELECT (COUNT(?lang) as ?n_lang) ?val
WHERE {
  ?morph ligt:gloss ?val ;
         rdfs:label ?label .

  BIND(LANG(?label) as ?lang)
  FILTER(?val = UCASE(?val) && ?lang != '')
} GROUP BY ?val ORDER BY DESC(?n_lang)
```

Marker	#
3SG	2650
1SG	2397
NEG	1400
2SG	1306
PST	1099

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  - Converting datasets
  - Setting up a SPARQL endpoint
  - Querying data

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  - Even providing data dumps require people to convert their data to an unfamiliar format (and be aware of it)

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$\Rightarrow$ **on-the-fly conversion** via a service

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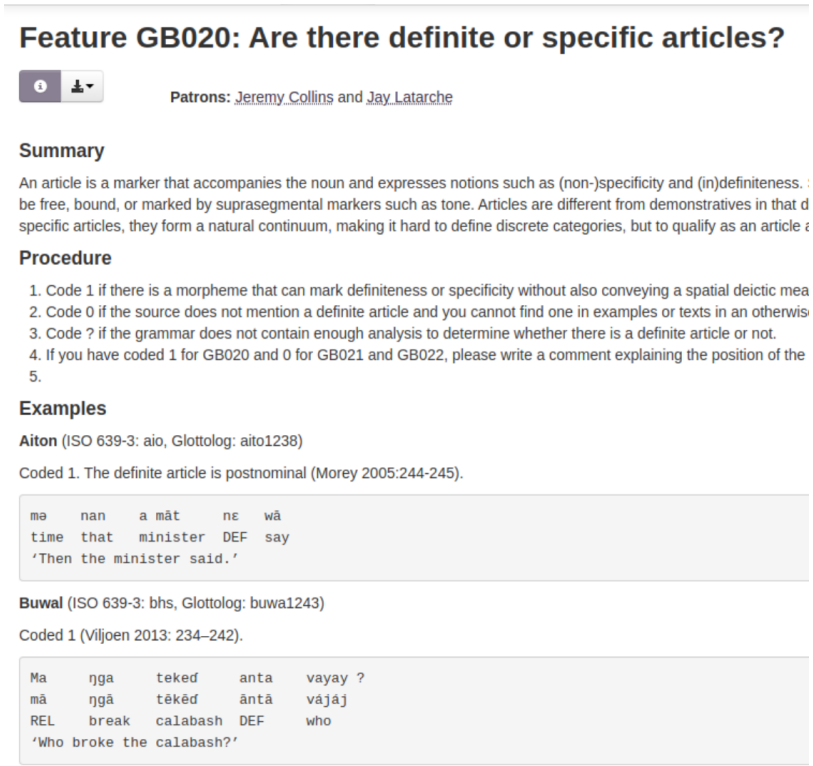
On-the-fly conversion

- Data providers do not need to know about Ligt or put effort into creating and storing additional data (let alone setting up a SPARQL endpoint)
- Ligt users do not need to worry about licensing and storing the data since potentially it is possible not to store the converted version
- It can even be done on the frontend with JS, no server required

Example: querying examples in cldf datasets

- `examples.csv` ususally have the examples available in the dataset
- *Grambank* does not have this table, but there are examples in the text:



Feature GB020: Are there definite or specific articles?

Patrons: Jeremy Collins and Jay Latarche

Summary

An article is a marker that accompanies the noun and expresses notions such as (non-)specificity and (in)definiteness.
be free, bound, or marked by suprasegmental markers such as tone. Articles are different from demonstratives in that d
specific articles, they form a natural continuum, making it hard to define discrete categories, but to qualify as an article

Procedure

1. Code 1 if there is a morpheme that can mark definiteness or specificity without also conveying a spatial deictic mea
2. Code 0 if the source does not mention a definite article and you cannot find one in examples or texts in an otherwis
3. Code ? if the grammar does not contain enough analysis to determine whether there is a definite article or not.
4. If you have coded 1 for GB020 and 0 for GB021 and GB022, please write a comment explaining the position of the
5.

Examples

Aiton (ISO 639-3: aio, Glottolog: aito1238)

Coded 1. The definite article is postnominal (Morey 2005:244-245).

```
mə    nan    a māt     nɛ   wā
time  that   minister  DEF  say
‘Then the minister said.’
```

Buwal (ISO 639-3: bhs, Glottolog: buwa1243)

Coded 1 (Viljoen 2013: 234–242).

```
Ma     ŋga     tekeɗ     anta    vayay ?
mā     ŋgā     tēkēɗ     āntā    vájáj
REL    break   calabash  DEF     who
‘Who broke the calabash?’
```

Example: extracting 1SG morphs for several unconverted datasets

```
PREFIX ligt: <http://purl.org/ligt/ligt-0.3#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>

SELECT ?gram ?lang
{
  ?s a ligt:Morph ;
     rdfs:label ?gram ;
     ligt:gloss "1SG"@en .

     BIND(LANG(?gram) AS ?lang)
} LIMIT 10

***

./comunica-sparql-file \
https://converter/cldf/https://github.com/cldf-datasets/apics/
  .../cldf/examples.csv \
https://converter/cldf-md/https://github.com/cldf-datasets/grambank/
  .../cldf/features.csv \
-f get-grams.rq
```

Example: extracting all possible causatives for each language

```
PREFIX ligt: <http://purl.org/ligt/ligt-0.3#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>

SELECT DISTINCT (group_concat(?gram; separator=" | ") as ?grams) ?morph_val ?la
{
  ?doc a ligt:Document ;
       ligt:hasUtterances/ligt:utterance/ligt:hasMorphs/ligt:item ?s .
  ?s a ligt:Morph ;
     rdfs:label ?gram ;
     ligt:gloss ?morph_val .

     BIND(LANG(?gram) AS ?lang)
     FILTER(REGEX(?morph_val, "CAUS"))
} GROUP BY ?lang ?doc ?morph_val LIMIT 100

***

./comunica-sparql-file ./apics ./grambank.ttl -f get-caus.rq
```

LLOD advantages: Mapping annotations

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- In practice, this means adding one line for each mapping:

```
<http://purl.org/olia/unimorph.owl#ABL> apics:hasValue "ABL"@en .
<http://purl.org/olia/unimorph.owl#ABS> apics:hasValue "ABS"@en .
<http://purl.org/olia/unimorph.owl#ACC> apics:hasValue "ACC"@en .
<http://purl.org/olia/unimorph.owl#ACT> apics:hasValue "ACT"@en .
<http://purl.org/olia/unimorph.owl#ADJ> apics:hasValue "ADJ"@en .
```

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<http://purl.org/olia/unimorph.owl#ACT> apics:hasValue "ACT"@en .
<http://purl.org/olia/unimorph.owl#ADJ> apics:hasValue "ADJ"@en .
```

- After this process we can operate with concepts: case, gender, aspect instead of strings

Lists of cases in different languages in APiCS

```
PREFIX ligt: <http://purl.org/ligt/ligt-0.2#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX apics: <http://purl.org/liodi/ligt/apics/>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX mmcore: <http://mmoon.org/core/>
PREFIX unimorph: <http://purl.org/olia/unimorph.owl#>

SELECT (GROUP_CONCAT(DISTINCT ?case; SEPARATOR=", ")
        AS ?cases) ?lang
WHERE {
  ?morph ligt:gloss ?case ;
         rdfs:label ?label .
  ?tag apics:hasValue ?case .
  { ?tag rdfs:subClassOf+ mmcore:Case . }
  UNION
  { ?tag rdfs:subClassOf+ unimorph:Case . }


  BIND(LANG(?label) as ?lang)
  FILTER(?lang != '')
} GROUP BY ?lang
```

Lists of cases in different languages in APiCS

Cases	Language code
LOC, COM, INS, DAT, TEMP	rop-x-krio1252
LOC, INS, ABL, BEN, ALL, ACC, GEN	mue-x-medi1245
LOC, COM, INS, MOD, ABL, ALL, DAT, ERG	gjr-x-guri1249
INS	gcf-x-guad1242
LOC, VOC, GEN	kcn-x-nubi1253
LOC, VOC, MOD	jam-x-jama1262
COM, INS, VOC	pov-x-uppe1455
LOC, VOC, MOD	srm-x-sara1340
LOC	fpe-x-fern1234
LOC, COM, INS	bah-x-baha1260
VOC	lou-x-loui1240
...	

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- Adding intermediate annotations: annotate what you found to find it easier next time
- When dealing with remote data (or converted remote data), it is possible to add and save annotations **locally**, keeping some notes, alternative annotations, etc.

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- There is a lot of potential, but one drawback is obvious: lack of user-friendly interfaces
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- Queryiing with SPARQL can be very difficult, so it needs to be hidden using a query builder
- What could be potential queries that make linguistic sense?

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? What potential linguistic use-cases this can be used for?

`https://github.com/max-ionov/ligt`