Google Summer of Code 2025

Amharic DBpedia Chapter Documentation

Contributor: Andargachew Asfaw

Mentors:

1. **Prof. Dr. Ricardo Usbeck**
2. **Meti Bayissa**
3. **Hizkiel Alemayehu**
4. **Tilahun Abedissa**

August 2025

Table of Contents

Key Terminologies

Understanding the process of creating Wikipedia templates, mapping them in DBpedia, and extracting structured data requires familiarity with several technical terms. These terminologies serve as the foundation for interpreting the workflow, challenges, and outcomes of this project. By clearly defining each term, often with a short example, we establish a common language that ensures clarity and consistency throughout the document.

Wikipedia Template

- A predefined block of wiki markup used to standardize content across articles. Often used for infoboxes (structured tables).
- Example: {{መረጃሳጥን ሰው}} (Infobox Person in Amharic).

DBpedia Mapping

- The process of linking Wikipedia templates and their parameters to DBpedia Ontology classes and properties. This ensures structured knowledge extraction.
- Example: Mapping template property የትውልድ ቀን (Date of Birth) → dbo:birthDate.

Ontology Class

- A high-level category in the DBpedia ontology that describes a type of entity.
- Example: Person, Place, dbo:Book.

Ontology Property

- Attributes or relationships that belong to ontology classes. Properties define details of entities.
- Example: dbo:birthDate → date of birth of a dbo:Person.

DBpedia Extraction Framework (DEF)

- A software framework used to extract structured RDF data from Wikipedia dumps using mappings and ontology.
- Example: Running - ../run extraction extraction.am.properties → generates .ttl RDF files.

Wikipedia Dump

- A snapshot of Wikipedia's database content (XML or SQL files) that is used as the data source for extraction.
- Example: amwiki-20250820-pages-articles.xml.bz2.

RDF (Resource Description Framework)

- A standard model for representing structured data on the web as triples (subject–predicate–object).
- Example: :Ethiopia dbo:capital :Addis_Ababa.

SPARQL

- A query language for retrieving and manipulating RDF data.
- Example: SELECT ?capital WHERE { :Ethiopia dbo:capital ?capital }

Mapping Statistics

- Reports generated to measure coverage of templates, properties, and their occurrences in DBpedia mappings.
- Example: 84 Amharic templates mapped → 100% template coverage.

Ignore List

- A predefined file that specifies templates and properties to be excluded from mapping statistics because they are not relevant or semantically useful.
- Example: የ 2010 እ .ኤ.አ . ፊፋ የ ዓለም ዋንጫ ምድብ ኤ.

Redirect Template

- A template that points to another template, used to unify different names for the same concept.
- Example: {{Infobox}} → redirects to {{መረጃሳጥን}}.

Backward Compatibility

- The practice of maintaining older English or variant templates to ensure that existing Wikipedia pages remain correctly mapped even if newer Amharic templates exist.
- Example: Both Infobox Person and መረጃሳጥን ሰውexist, but ideally the English one will later be phased out.

1. Introduction

1.1. Purpose of this document

The purpose of this document is to provide a comprehensive guide for creating, mapping, and extracting structured data from Amharic Wikipedia using the DBpedia Extraction Framework. It is designed as a resource for contributors, mentors, and researchers who want to understand the end-to-end process—from building Wikipedia templates and mappings to generating statistics, running extractions, and querying the resulting knowledge graph.

This document also highlights the challenges encountered during the implementation, the solutions applied, and recommendations for improving the coverage and quality of Amharic DBpedia. By documenting the workflow in detail, it ensures that others can reproduce the process, contribute effectively, and extend the work.

1.2. Overview of the Amharic DBpedia Initiative

DBpedia is a community-driven project that extracts structured knowledge from Wikipedia and makes it available on the Semantic Web. It transforms unstructured content, such as infoboxes and templates, into machine-readable RDF triples that can be queried using SPARQL.

The Amharic DBpedia initiative aims to extend this effort to Amharic Wikipedia, enabling knowledge in one of Africa's most widely spoken languages to be represented in linked data form. This will enhance accessibility, allow integration with other datasets, and support applications such as search engines, digital libraries, and AI systems.

Key objectives of the initiative include:

- Creating and standardizing Amharic Wikipedia templates for structured content.
- Mapping templates and properties to the DBpedia ontology.
- Running the extraction framework to generate RDF data.
- Providing statistics and quality assessments to track progress.

- Establishing query endpoints for accessing Amharic DBpedia.

Through this effort, Amharic DBpedia contributes to the global vision of Linked Open Data while promoting the representation of African languages and knowledge in the digital knowledge ecosystem.

2. Wikipedia Templates and Page Creation

Wikipedia templates and pages form the foundation of DBpedia mappings. Templates (such as infoboxes) provide structured information, while pages use these templates to present data about specific entities. Before creating templates or pages, contributors must have a Wikipedia account.

2.1. Creating a Wikipedia Account

To contribute to Wikipedia—whether by editing pages, creating new templates, or adding structured content—you must first create a Wikipedia account. This account ensures that your edits are properly attributed and gives you access to advanced features, including template creation.

Steps to create a Wikipedia account:

1. Go to Wikipedia's Account Creation Page
2. Select your preferred language edition (e.g., Amharic Wikipedia at https://am.wikipedia.org).
3. Click Create account at the top-right corner.
4. Fill in the required details:
   - ✓ **Username**: Choose a unique identifier.
   - ✓ **Password**: Create a secure password.
   - ✓ **Email address** (optional, but recommended for password recovery and notifications).
5. Complete the CAPTCHA verification and click Create your account.

Once your account is created and verified, you can log in and start contributing to Wikipedia.

2.2. Creating Templates in Wikipedia

Templates are reusable structures in Wikipedia, most commonly used for infoboxes. They help standardize the presentation of information across multiple pages (e.g., books, people, countries).

To create a new template:

1. Log in to your Wikipedia account.
2. Navigate to the template creation page:

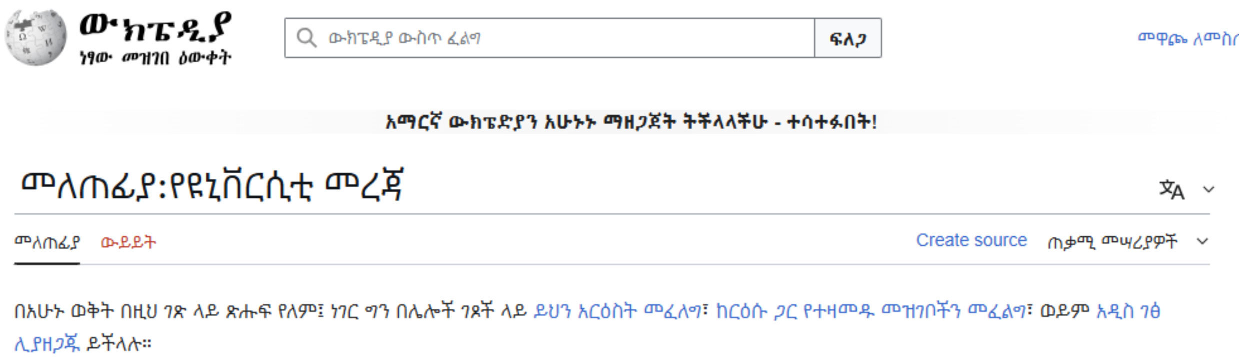
   https://[language].wikipedia.org/wiki/Template:YourTemplateName

   ✓ Replace [language] with the language code (e.g., am for Amharic).

   ✓ Replace YourTemplateName with the desired name.

   Example:

   https://am.wikipedia.org/wiki/መለጠፊያ: የዩኒቨርሲቲ_መረጃ
3. If the template does not exist, you'll see a blank editor.



አማርኛ ውክፔድያን አሁኑኑ ማዘጋጀት ትችላላችሁ - ተሳተፉበት!

መለጠፊያ:የዩኒቨርሲቲ መረጃ

በአሁኑ ወቅት በዚህ ገጽ ላይ ጽሑፍ የለም፤ ነገር ግን በሌሎች ገጾች ላይ ይህን አርዕስት መፈለግ፣ ከርዕሱ ጋር የተዛመዱ መዝገቦችን መፈለግ፣ ወይም አዲስ ገፅ ሊያዘጋጁ ይችላሉ።

4. Add template code using wikitext markup. For example, a simple infobox template might look like this:

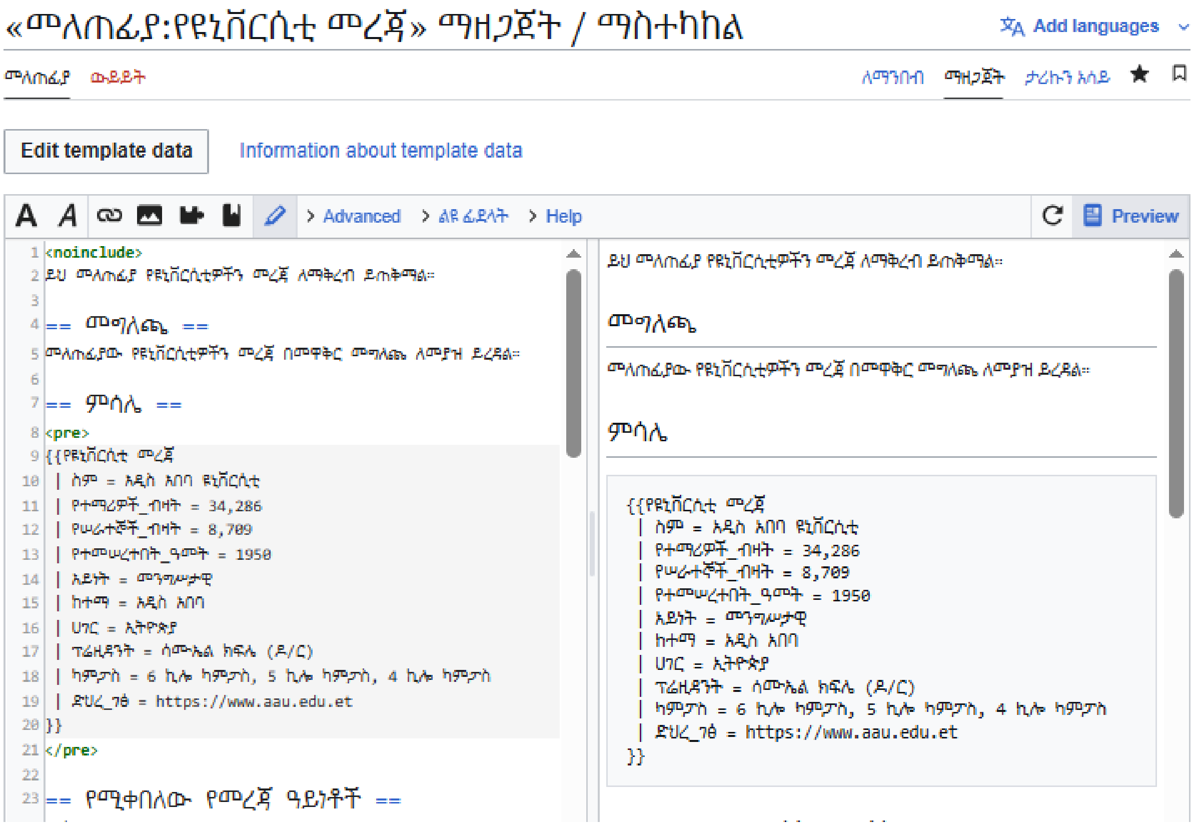
```
<noinclude>
ይህ መለጠፊያ የዩኒቨርሲቲዎችን መረጃ ለማቅረብ ይጠቅማል።

== መግለጫ ==
መለጠፊያው የዩኒቨርሲቲዎችን መረጃ በመዋቅር መግለጫ ለመያዝ ይረዳል።
```

```
== ምሳሌ ==
<pre>
{{የዩኒቨርሲቲ መረጃ
 | ስም = አዲስ አበባ ዩኒቨርሲቲ
 | የተማሪዎች_ብዛት = 48,000
 | የሠራተኞች_ብዛት = 5,000
 | የተመሠረተበት_ዓመት = 1950
 | አይነት = ህዝባዊ
 | ከተማ = አዲስ አበባ
 | ሀገር = ኢትዮጵያ
 | ፕሬዚዳንት = ፕሮፌሰር ታደሰ መሀመድ
 | ካምፓስ = ማዕከላዊ ካምፓስ
 | ድህረ_ገፅ = https://www.aau.edu.et
}}
</pre>

== የሚቀበለው የመረጃ ዓይነቶች ==
* ስም
* የተማሪዎች_ብዛት
* የሠራተኞች_ብዛት
* የተመሠረተበት_ዓመት
* አይነት
* ከተማ
* ሀገር
* ፕሬዚዳንት
* ካምፓስ
* ድህረ_ገፅ
</noinclude>

{| class="wikitable" style="float:right; width: 45%; font-size: 90%;"
|+ style="background:#d9edf7; font-weight:bold; text-align:center;" | የዩኒቨርሲቲ መረጃ
! መረጃ !! አካል
|-
! ስም
| {{{ስም|}}}
|-
! የተማሪዎች ብዛት
| {{{የተማሪዎች_ብዛት|}}}
|-
! የሠራተኞች ብዛት
| {{{የሠራተኞች_ብዛት|}}}
|-
! የተመሠረተበት ዓመት
| {{{የተመሠረተበት_ዓመት|}}}
|-
! አይነት
| {{{አይነት|}}}
|-
! ከተማ
| {{{ከተማ|}}}
|-
! ሀገር
| {{{ሀገር|}}}
|-
! ፕሬዚዳንት
| {{{ፕሬዚዳንት|}}}
|-
! ካምፓስ
| {{{ካምፓስ|}}}
|-
! ድህረ_ገፅ
| {{{ድህረ_ገፅ|}}}
|}
```



```
<noinclude>
ይህ መለጠፊያ የዩኒቨርሲቲዎችን መረጃ ለማቅረብ ይጠቅማል።

== መግለጫ ==
መለጠፊያው የዩኒቨርሲቲዎችን መረጃ በመዋቅር መግለጫ ለመያዝ ይረዳል።

== ምሳሌ ==
<pre>
{{የዩኒቨርሲቲ መረጃ
 | ስም = አዲስ አበባ ዩኒቨርሲቲ
 | የተማሪዎች_ብዛት = 34,286
 | የሠራተኞች_ብዛት = 8,709
 | የተመሠረተበት_ዓመት = 1950
 | አይነት = መንግሥታዊ
 | ከተማ = አዲስ አበባ
 | ሀገር = ኢትዮጵያ
 | ፕሬዚዳንት = ሳሙኤል ክፍሌ (ዶ/ር)
 | ካምፓስ = 6 ኪሎ ካምፓስ, 5 ኪሎ ካምፓስ, 4 ኪሎ ካምፓስ
 | ድህረ_ገፅ = https://www.aau.edu.et
}}
</pre>

== የሚቀበለው የመረጃ ዓይነቶች ==
```

ይህ መለጠፊያ የዩኒቨርሲቲዎችን መረጃ ለማቅረብ ይጠቅማል።

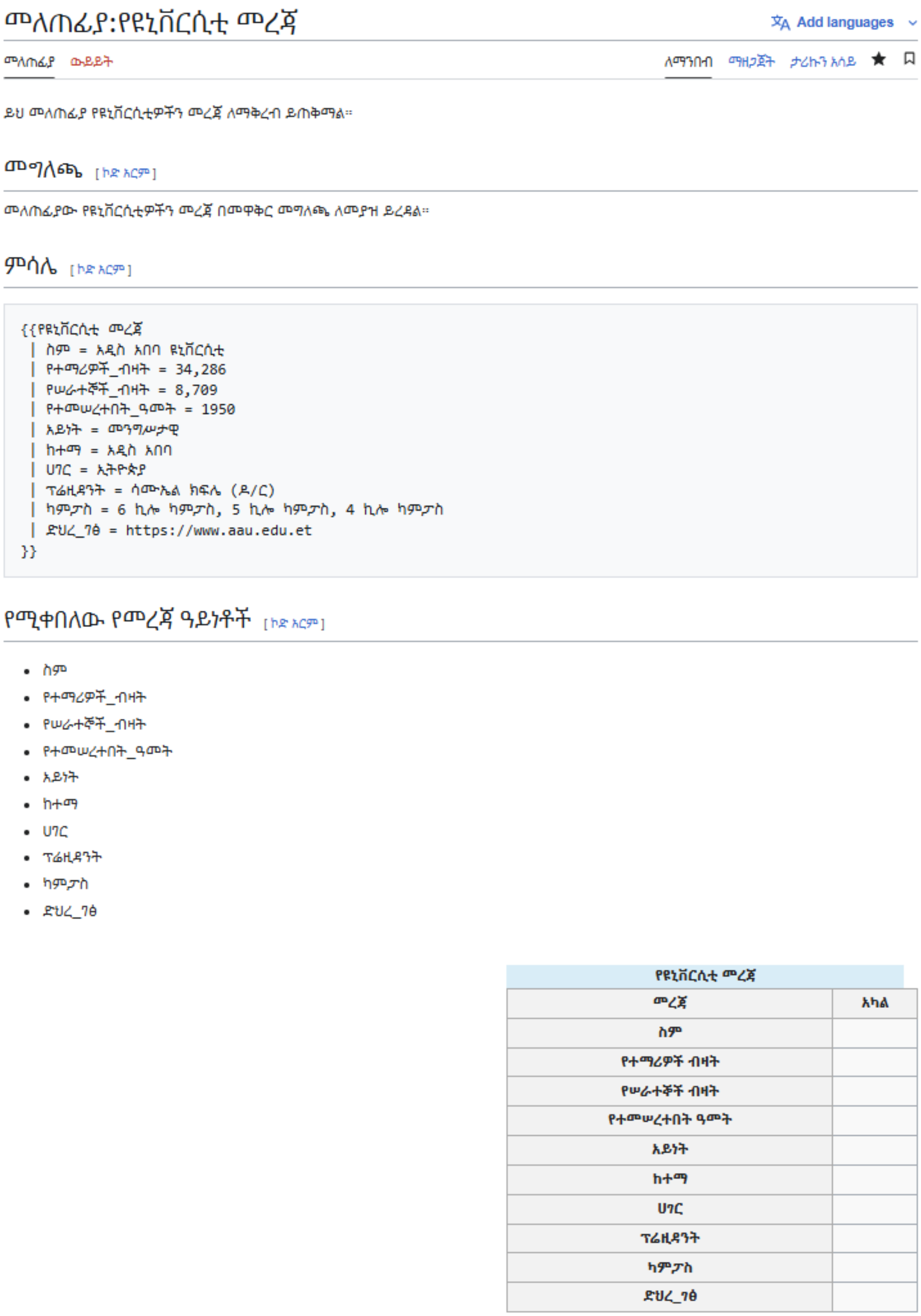
መግለጫ

መለጠፊያው የዩኒቨርሲቲዎችን መረጃ በመዋቅር መግለጫ ለመያዝ ይረዳል።

ምሳሌ

```
{{የዩኒቨርሲቲ መረጃ
 | ስም = አዲስ አበባ ዩኒቨርሲቲ
 | የተማሪዎች_ብዛት = 34,286
 | የሠራተኞች_ብዛት = 8,709
 | የተመሠረተበት_ዓመት = 1950
 | አይነት = መንግሥታዊ
 | ከተማ = አዲስ አበባ
 | ሀገር = ኢትዮጵያ
 | ፕሬዚዳንት = ሳሙኤል ክፍሌ (ዶ/ር)
 | ካምፓስ = 6 ኪሎ ካምፓስ, 5 ኪሎ ካምፓስ, 4 ኪሎ ካምፓስ
 | ድህረ_ገፅ = https://www.aau.edu.et
}}
```

5. Add a short edit summary (e.g., “University template created”) and click Publish changes.



መለጠፊያ:የዩኒቨርሲቲ መረጃ

ይህ መለጠፊያ የዩኒቨርሲቲዎችን መረጃ ለማቅረብ ይጠቅማል።

መግለጫ

መለጠፊያው የዩኒቨርሲቲዎችን መረጃ በመዋቅር መግለጫ ለመያዝ ይረዳል።

ምሳሌ

```
{{የዩኒቨርሲቲ መረጃ
 | ስም = አዲስ አበባ ዩኒቨርሲቲ
 | የተማሪዎች_ብዛት = 34,286
 | የሠራተኞች_ብዛት = 8,709
 | የተመሠረተበት_ዓመት = 1950
 | አይነት = መንግሥታዊ
 | ከተማ = አዲስ አበባ
 | ሀገር = ኢትዮጵያ
 | ፕሬዚዳንት = ሳሙኤል ክፍሌ (ዶ/ር)
 | ካምፓስ = 6 ኪሎ ካምፓስ, 5 ኪሎ ካምፓስ, 4 ኪሎ ካምፓስ
 | ድህረ_ገፅ = https://www.aau.edu.et
}}
```

የሚቀበለው የመረጃ ዓይነቶች

- ስም
- የተማሪዎች_ብዛት
- የሠራተኞች_ብዛት
- የተመሠረተበት_ዓመት
- አይነት
- ከተማ
- ሀገር
- ፕሬዚዳንት
- ካምፓስ
- ድህረ_ገፅ

የዩኒቨርሲቲ መረጃ

መረጃ	አካል
ስም	
የተማሪዎች ብዛት	
የሠራተኞች ብዛት	
የተመሠረተበት ዓመት	
አይነት	
ከተማ	
ሀገር	
ፕሬዚዳንት	
ካምፓስ	
ድህረ_ገፅ	

2.3. Creating Wikipedia Pages with Templates

Once a template is ready, you can use it inside a Wikipedia page to provide structured information.

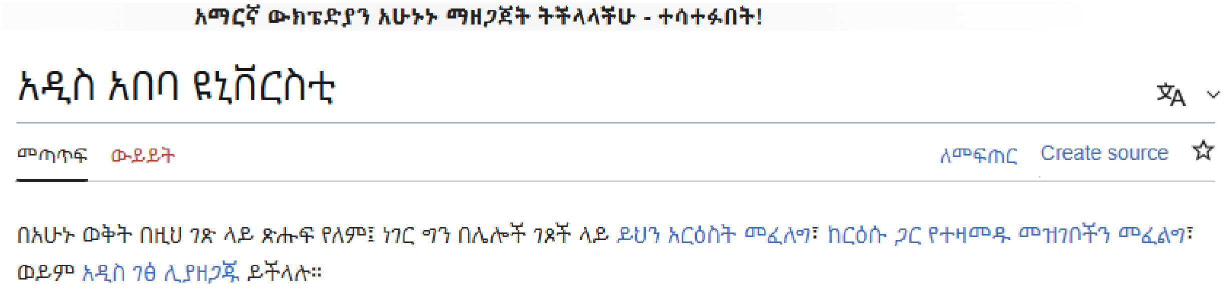
Steps to create a page with a template:

1. Log in to your Wikipedia account.
2. In your browser, navigate to:

   https://am.wikipedia.org/wiki/ አዲስ_አበባ_ዩኒቨርስቲ

   (Replace with the desired page title in Amharic).

3. If the page doesn't exist, you'll see a message indicating the page can be created. Click the Create button.



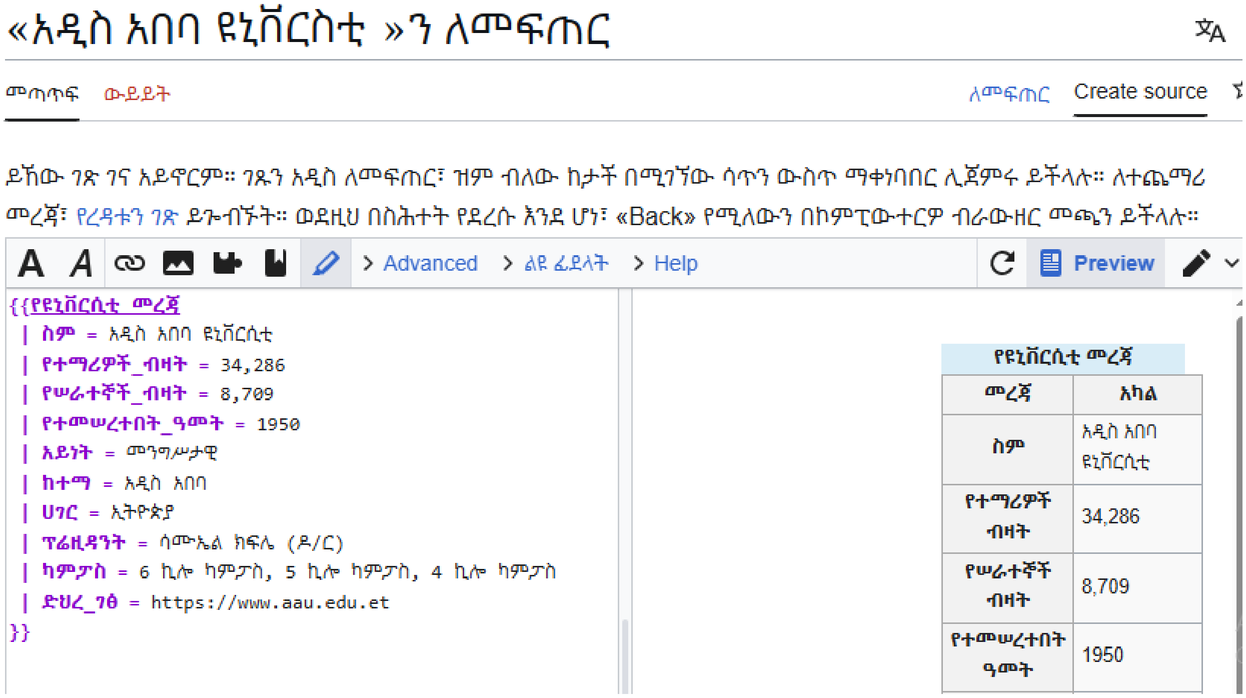
አማርኛ ውክፔድያን አሁኑኑ ማዘጋጀት ትችላላችሁ - ተሳተፉበት!

አዲስ አበባ ዩኒቨርስቲ

በአሁኑ ወቅት በዚህ ገጽ ላይ ጽሑፍ የለም፤ ነገር ግን በሌሎች ገጾች ላይ ይህን አርዕስት መፈለግ፣ ከርዕሱ ጋር የተዛመዱ መዝገቦችን መፈልግ፣ ወይም አዲስ ገፅ ሊያዘጋጁ ይችላሉ።

4. In the editor, include the template with its parameters. Example:

```
{{የዩኒቨርሲቲ መረጃ
| ስም = አዲስ አበባ ዩኒቨርሲቲ
| የተማሪዎች_ብዛት = 34,286
| የሠራተኞች_ብዛት = 8,709
| የተመሠረተበት_ዓመት = 1950
| አይነት = መንግሥታዊ
| ከተማ = አዲስ አበባ
| ሀገር = ኢትዮጵያ
| ፕሬዚዳንት = ሳሙኤል ክፍሌ (ዶ/ር)
| ካምፓስ = 6 ኪሎ ካምፓስ, 5 ኪሎ ካምፓስ, 4 ኪሎ ካምፓስ
| ድህረ_ገፅ = https://www.aau.edu.et
}}
```



«አዲስ አበባ ዩኒቨርስቲ »ን ለመፍጠር

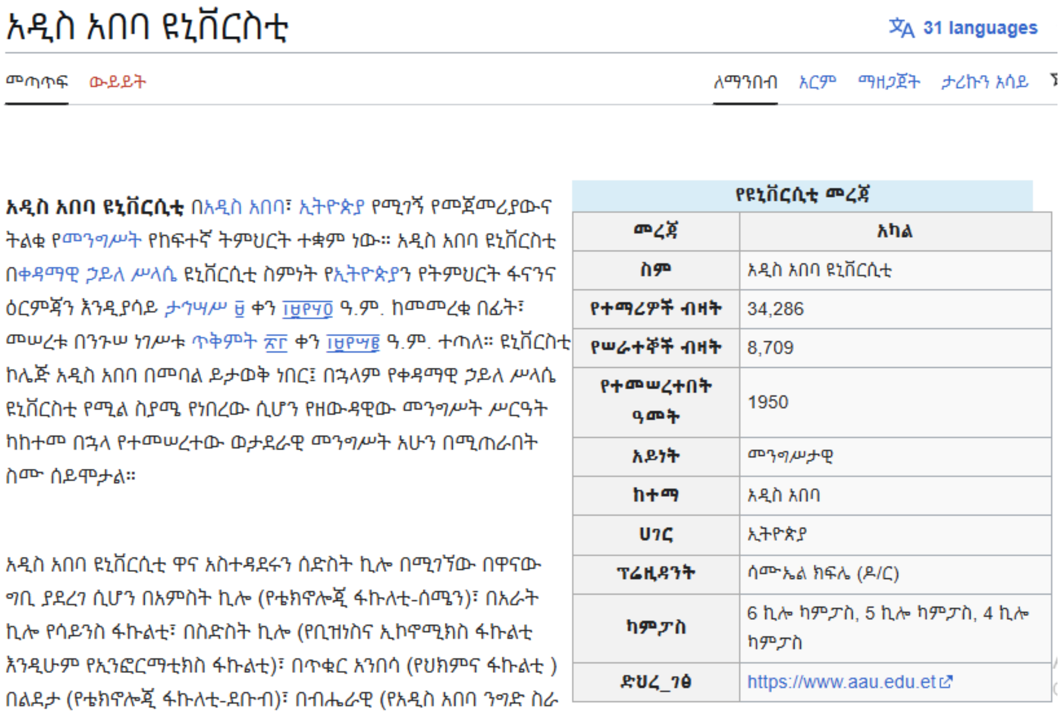
ይኸው ገጽ ገና አይኖርም። ገጹን አዲስ ለመፍጠር፣ ዝም ብለው ከታች በሚገኘው ሳጥን ውስጥ ማቀነባበር ሊጀምሩ ይችላሉ። ለተጨማሪ መረጃ፣ የረዳቱን ገጽ ይጐብኙት። ወደዚህ በስሕተት የደረሱ እንደ ሆነ፣ «Back» የሚለውን በኮምፒውተርዎ ብራውዘር መጫን ይችላሉ።

```
{{የዩኒቨርሲቲ_መረጃ
 | ስም = አዲስ አበባ ዩኒቨርሲቲ
 | የተማሪዎች_ብዛት = 34,286
 | የሠራተኞች_ብዛት = 8,709
 | የተመሠረተበት_ዓመት = 1950
 | አይነት = መንግሥታዊ
 | ከተማ = አዲስ አበባ
 | ሀገር = ኢትዮጵያ
 | ፕሬዚዳንት = ሳሙኤል ክፍሌ (ዶ/ር)
 | ካምፓስ = 6 ኪሎ ካምፓስ, 5 ኪሎ ካምፓስ, 4 ኪሎ ካምፓስ
 | ድህረ_ገፅ = https://www.aau.edu.et
}}
```

የዩኒቨርሲቲ መረጃ	
መረጃ	እካል
ስም	አዲስ አበባ ዩኒቨርሲቲ
የተማሪዎች ብዛት	34,286
የሠራተኞች ብዛት	8,709
የተመሠረተበት ዓመት	1950

Below the template, you can add descriptive text to expand the article.

5. Save the page with a short edit summary.



አዲስ አበባ ዩኒቨርስቲ

አዲስ አበባ ዩኒቨርሲቲ በአዲስ አበባ፣ ኢትዮጵያ የሚገኝ የመጀመሪያውና ትልቁ የመንግሥት የከፍተኛ ትምህርት ተቋም ነው። አዲስ አበባ ዩኒቨርስቲ በቀዳማዊ ኃይለ ሥላሴ ዩኒቨርሲቲ ስምነት የኢትዮጵያን የትምህርት ፋናንና ዕርምጃን እንዲያሳይ ታኅሣሥ ፱ ቀን ፲፱፻፵፫ ዓ.ም. ከመመረቁ በፊት፣ መሠረቱ በንጉሠ ነገሥቱ ጥቅምት ፳፫ ቀን ፲፱፻፶፬ ዓ.ም. ተጣለ። ዩኒቨርስቲ ኮሌጅ አዲስ አበባ በመባል ይታወቅ ነበር፤ በኋላም የቀዳማዊ ኃይለ ሥላሴ ዩኒቨርስቲ የሚል ስያሜ የነበረው ሲሆን የዘውዳዊው መንግሥት ሥርዓት ካከተመ በኋላ የተመሠረተው ወታደራዊ መንግሥት አሁን በሚጠራበት ስሙ ሰይሞታል።

አዲስ አበባ ዩኒቨርሲቲ ዋና አስተዳደሩን ስድስት ኪሎ በሚገኘው በዋናው ግቢ ያደረገ ሲሆን በአምስት ኪሎ (የቴክኖሎጂ ፋኩለቲ-ሰሜን)፣ በአራት ኪሎ የሳይንስ ፋኩልቲ፣ በስድስት ኪሎ (የቢዝነስና ኢኮኖሚክስ ፋኩልቲ እንዲሁም የኢንፎርማቲክስ ፋኩልቲ)፣ በጥቁር አንበሳ (የህክምና ፋኩልቲ) በልደታ (የቴክኖሎጂ ፋኩለቲ-ደቡብ)፣ በብሔራዊ (የአዲስ አበባ ንግድ ስራ

የዩኒቨርሲቲ መረጃ	
መረጃ	እካል
ስም	አዲስ አበባ ዩኒቨርሲቲ
የተማሪዎች ብዛት	34,286
የሠራተኞች ብዛት	8,709
የተመሠረተበት ዓመት	1950
አይነት	መንግሥታዊ
ከተማ	አዲስ አበባ
ሀገር	ኢትዮጵያ
ፕሬዚዳንት	ሳሙኤል ክፍሌ (ዶ/ር)
ካምፓስ	6 ኪሎ ካምፓስ, 5 ኪሎ ካምፓስ, 4 ኪሎ ካምፓስ
ድህረ_ገፅ	https://www.aau.edu.et

2.4. Best Practices for Templates and Pages

- Use Amharic names consistently for templates and properties.
- Avoid mixing English and Amharic properties.
- Provide clear and simple parameters (e.g., ስም, ደራሲ, ቋንቋ).
- Add categories for better discoverability.
- Always preview before publishing.

2.5. Summary of Created Templates and Pages

During the project, several Wikipedia templates and pages were created or updated to support structured knowledge representation in Amharic Wikipedia. These efforts form the foundation for DBpedia mappings.

The table below provides a summary of the work completed:

Category	Count	Remark
New Template Created	23	**Total: 23 templates** Expected to update the existing templates in the future
Updated Templates	0	
New Pages Created	11	**Total: 24 pages**
Updated Pages	13	

The complete list of created and updated templates is provided in **Appendix A**, while the list of created and updated Wikipedia pages is included in **Appendix B**. These appendices include both the names and direct links to each resource for easy verification and further exploration.

3. DBpedia Mapping

DBpedia mapping is the process of linking Wikipedia templates and their parameters to the DBpedia ontology. This step transforms unstructured information stored in Wikipedia infoboxes into structured RDF data that can be queried, integrated, and reused in different applications. Without proper mappings, the extraction process cannot correctly interpret templates or assign values to the appropriate ontology classes and properties.

Mappings are essential because they:

- Define the semantics of templates and parameters.
- Ensure that extracted data aligns with the DBpedia ontology.
- Enable cross-language integration, where data from Amharic Wikipedia can be linked with English or other DBpedia editions.
- Support the generation of statistics to measure coverage and quality.

3.1. Creating a DBpedia Account

To contribute mappings, you first need an account on the DBpedia Mapping Wiki.

Steps to create an account:

1. Visit https://mappings.dbpedia.org
2. Click on Request Account (usually found at the top-right).
3. Provide a username, password, and a short description of your intended contributions.
4. Once approved by the DBpedia community, log in with your credentials.

This account will allow you to create and edit mappings directly in the DBpedia Mapping Wiki.

3.2. Creating a Mapping

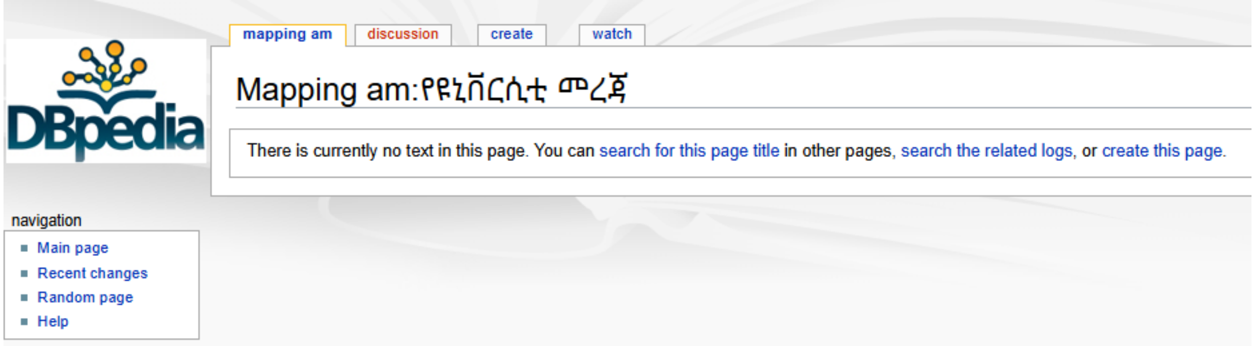
Mappings in DBpedia are written in a structured wiki format that links template properties to ontology properties.

Steps to create a mapping:

1. Log in to DBpedia Mapping Wiki
2. Navigate to the page of the template you want to map. Example:

   https://mappings.dbpedia.org/index.php/Mapping_am: የዩኒቨርሲቲ_መረጃ

(for the Amharic University template).

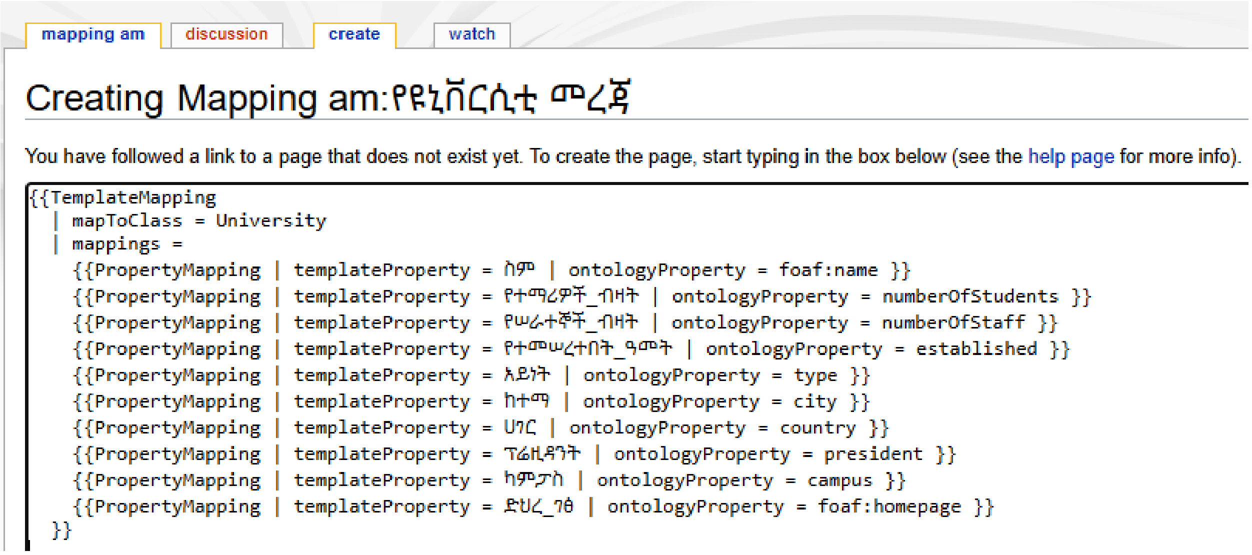


Mapping am:የዩኒቨርሲቲ መረጃ

There is currently no text in this page. You can search for this page title in other pages, search the related logs, or create this page.

3. Click Edit and add the mapping definition using TemplateMapping. Example:

```
{{TemplateMapping
  | mapToClass = University
  | mappings =
   {{PropertyMapping | templateProperty = ስም | ontologyProperty = foaf:name }}
   {{PropertyMapping | templateProperty = የተማሪዎች_ብዛት | ontologyProperty = numberOfStudents }}
   {{PropertyMapping | templateProperty = የሠራተኞች_ብዛት | ontologyProperty = numberOfStaff }}
   {{PropertyMapping | templateProperty = የተመሠረተበት_ዓመት | ontologyProperty = established }}
   {{PropertyMapping | templateProperty = አይነት | ontologyProperty = type }}
   {{PropertyMapping | templateProperty = ከተማ | ontologyProperty = city }}
   {{PropertyMapping | templateProperty = ሀገር | ontologyProperty = country }}
   {{PropertyMapping | templateProperty = ፕሬዚዳንት | ontologyProperty = president }}
   {{PropertyMapping | templateProperty = ካምፓስ | ontologyProperty = campus }}
   {{PropertyMapping | templateProperty = ድህረ_ገፅ | ontologyProperty = foaf:homepage }}
 }}
```



Creating Mapping am:የዩኒቨርሲቲ መረጃ

You have followed a link to a page that does not exist yet. To create the page, start typing in the box below (see the help page for more info).

```
{{TemplateMapping
  | mapToClass = University
  | mappings =
    {{PropertyMapping | templateProperty = ስም | ontologyProperty = foaf:name }}
    {{PropertyMapping | templateProperty = የተማሪዎች_ብዛት | ontologyProperty = numberOfStudents }}
    {{PropertyMapping | templateProperty = የሠራተኞች_ብዛት | ontologyProperty = numberOfStaff }}
    {{PropertyMapping | templateProperty = የተመሠረተበት_ዓመት | ontologyProperty = established }}
    {{PropertyMapping | templateProperty = አይነት | ontologyProperty = type }}
    {{PropertyMapping | templateProperty = ከተማ | ontologyProperty = city }}
    {{PropertyMapping | templateProperty = ሀገር | ontologyProperty = country }}
    {{PropertyMapping | templateProperty = ፕሬዚዳንት | ontologyProperty = president }}
    {{PropertyMapping | templateProperty = ካምፓስ | ontologyProperty = campus }}
    {{PropertyMapping | templateProperty = ድህረ_ገፅ | ontologyProperty = foaf:homepage }}
  }}
```

4. Save your changes with a meaningful summary.
5. The mapping will now be available for extraction when running the DBpedia Extraction Framework.

3.3. Ontology Classes and Properties

The DBpedia ontology is a structured vocabulary of classes (types of things) and properties (attributes of things). For example:

- **Class**: Book, Person, Album, City
- **Property**: title, author, birthDate, population

Why they matter

- If a template is not mapped to a valid ontology class, extraction cannot categorize the entity.
- If template parameters are not mapped to valid ontology properties, the extracted values will be ignored.
- Any typo or mismatch (e.g., mapping to a property that does not exist in the ontology) will result in missing data.

Thus, a careful review of the DBpedia ontology class (https://mappings.dbpedia.org/index.php?title=Special:AllPages&namespace=200) and Dbpedia ontology properties (https://mappings.dbpedia.org/index.php?title=Special:AllPages&namespace=200) are required before defining mappings.

3.4. Best Practices for Mapping

- Always check whether the ontology class/property already exists before creating new mappings.
- Use Amharic template properties consistently but map them to standard ontology terms.
- Keep mappings simple and test them locally using the DBpedia Extraction Framework.
- Provide comments in mappings for clarity (e.g., # maps ደራሲ to author).
- Regularly review and update mappings as Wikipedia templates evolve.

3.5. Summary of Created Mapping

The mapping activity for Amharic DBpedia has shown significant progress compared to the previous status.

- **Previous Coverage: 17 mapped templates.**
- **Current Coverage: 97 mapped templates.**

From these:

- **65 Templates** are in Amharic and actively aligned with pages in Amharic Wikipedia.
- **24 Templates** are in English. These were added primarily to ensure backward compatibility with existing Wikipedia pages that rely on English-based infoboxes. While this maintains the link between DBpedia mappings and the pages, these templates will require future work to translate into Amharic both in Wikipedia and in DBpedia mappings.
- **8 Templates** are redirects to other templates. These are counted in the total but do not represent unique templates.

- A small number of the mapped templates currently do not have related Wikipedia pages, which explains why they are not counted in the mapping statistics report. These templates are retained to support potential future use.

Key Improvements

- Expanded from **17 → 97 mapped templates**, representing more than a **5× increase in coverage**.
- Substantial growth in Amharic-native template support, strengthening local knowledge representation.
- Maintained compatibility with English templates to preserve continuity, with translation work identified as a next step.

The detailed breakdown of created and updated templates and their links is provided in **Appendix C**.

4. DBpedia Extraction Framework

The DBpedia Extraction Framework is the software used to extract structured data (RDF triples) from Wikipedia. It processes infobox templates, categories, and links, and transforms them into machine-readable datasets aligned with the DBpedia ontology.

Mappings created in the DBpedia Mapping Wiki (see Section 3) are central to this process: they guide the framework in interpreting template properties and converting them into ontology classes and properties. Without these mappings, extraction either fails or produces incomplete results.

The framework is written in Scala and requires supporting tools such as Java, Maven, and Git. It allows you to:

- Download and parse Wikipedia dumps.
- Apply mappings to extract RDF triples.

- Generate datasets such as redirects, labels, categories, and infobox properties.
- Run local extractions for testing new mappings before contributing to DBpedia Live.

4.1. Prerequisites

Before installing the framework, ensure the following are available on your system:

1. **Java Development Kit (JDK 8):** Required to compile and run the framework.

Step I: Download JDK 8

```
cd ~
wget https://github.com/adoptium/temurin8-binaries/releases/download/jdk8u402-b06/OpenJDK8U-jdk_x64_linux_hotspot_8u402b06.tar.gz
```

Step II: Extract and rename for easier use

```
tar -xzf OpenJDK8U-jdk_x64_linux_hotspot_8u402b06.tar.gz
mv jdk8u402-b06 jdk8
```

Step III: Set Environment Variables: Open or create .bashrc in your home directory:

```
touch ~/.bashrc
nano ~/.bashrc
```

Add the following lines at the end:

```
export JAVA_HOME=$HOME/jdk8
export PATH=$JAVA_HOME/bin:$PATH
```

Step IV: Apply changes:

```
source ~/.bashrc
```

Step V: Verify Java Installation

```
java -version
```

Expected output:

```
openjdk version "1.8.0_402"
```

2. **Apache Maven (3.6+):** Used for building the framework.

Step I: Download Maven

```
cd ~
wget https://dlcdn.apache.org/maven/maven-3/3.9.6/binaries/apache-maven-3.9.6-bin.tar.gz
```

Step II: Extract and move for easy use

```
tar -xvzf apache-maven-3.9.6-bin.tar.gz
sudo mv apache-maven-3.9.6 /opt/maven
```

Step III: Set Environment Variables - Add these lines to the end of .bashrc:

```
export M2_HOME=/opt/maven
export PATH=$M2_HOME/bin:$PATH
```

Step IV: Apply changes:

```
source ~/.bashrc
```

Step V: Verify Maven Installation

```
mvn -version
```

Expected output:

```
Apache Maven 3.9.6
```

3. **Git**: Used to clone and update the framework's source code.

Step I: Update Package List

```
sudo apt update
```

Step II: Install Git

```
sudo apt install git -y
```

Step III: Verify Git Installation

```
git --version
```

Expected output:

```
git version 2.34.1
```

Step IV: Configure Git - Set your username and email for commits:

```
git config --global user.name "Your Name"
git config --global user.email "your.email@example.com"
```

Step V: Check configuration:

```
git config --list
```

4. **Wikipedia Dumps**: For your target language (e.g., Amharic). Dumps can be downloaded from: https://dumps.wikimedia.org/

Notes:

- Ensure wget is installed; otherwise, use sudo apt install wget -y.
- Always `source ~/.bashrc` after editing to apply changes immediately.

4.2. Installation

1. Clone the Extraction Framework

```
cd ~
git clone https://github.com/dbpedia/extraction-framework.git
cd extraction-framework
```

2. Build the Project with Maven

```
mvn clean install -DskipTests
```

This step compiles the framework and prepares the scripts for extraction. It will take a few minutes. If all goes well, you'll see BUILD SUCCESS.

4.3. Preparing the Dumps

Before running the DBpedia extraction, you need to prepare the Wikipedia dump file. It's important to maintain a proper folder structure to keep everything organized and ensure the extraction framework works correctly.

Step 1: Create the Folder Structure

You can create the dump folder anywhere, but for this project, we'll create it in the home directory following this structure:

```
/home/your_user_name/dumps/language/languagewiki/date/
```

For example, for Amharic Wikipedia (language code am) with a dump date of 2025-08-20:

```
cd ~
mkdir -p dumps/am/amwiki/20250820
```

Note: Using -p with mkdir ensures that all intermediate directories are created automatically if they don't exist.

Step 2: Move into the Dump Folder

```
cd dumps/am/amwiki/20250820
```

Step 3: Download the Dump File

```
wget https://dumps.wikimedia.org/amwiki/20250820/amwiki-20250820-
pages-articles.xml.bz2
```

Step 4: Mark the Dump as Complete

Some extraction scripts require a marker file to know that the dump has been fully downloaded. You can create it manually:

```
touch amwiki-20250820-download-complete
```

Important: Make sure that the date in the folder name matches the date in the dump filename. For example, if the dump file is amwiki-20250820-pages-articles.xml.bz2, the folder should be 20250820.

Step 5: Verify

Your folder should now contain:

- amwiki-20250820-pages-articles.xml.bz2
- amwiki-20250601-download-complete

Note: It's a good idea to keep multiple dump folders organized by date. This helps if you need to re-run the extraction for different snapshots of Wikipedia.

4.4. Configuration

Once the prerequisites and installation are complete, the next step is to configure the DBpedia Extraction Framework. Configuration is crucial because it tells the framework where to find the ontology, mappings, and Wikipedia dumps for the target language (e.g., Amharic). A correct setup ensures that the extraction process produces accurate RDF data aligned with the DBpedia ontology.

There are three main parts to the configuration: updating ontology and mappings, editing the global configuration file (universal.properties), and creating a language-specific extraction file (e.g., extraction.am.properties).

4.4.1. **DBpedia Ontology** (Optional if already up-to-date)

The ontology defines the structure of DBpedia's knowledge graph. If you want to use the latest ontology, download it directly into the framework:

```
cd ~/extraction-framework/core
../run download-ontology
```

This will update the ontology.xml file in the framework's resources directory.

4.4.2. **DBpedia Mappings** (Optional if already up-to-date)

Mappings link Wikipedia templates and parameters to ontology classes and properties. To ensure your extraction uses the latest mappings (including for Amharic):

```
cd ~/extraction-framework/core
../run download-mappings
```

4.4.3. **Universal Configuration File**

Next, configure the global properties by editing universal.properties:

```
cd ~/extraction-framework/core/src/main/resources
nano universal.properties
```

Update the following key settings (adjusting paths to your environment):

```
# Wikipedia dump directory (should remain fixed per release cycle)
base-dir=/home/your_user_name/dumps/am
# Log directory to store extraction logs
log-dir=/home/your_user_name/logs
# Default Wikipedia dump file (pages and revisions)
source=pages-articles.xml.bz2
```

```
# Ontology and mappings location
ontology=../ontology.xml
mappings=../mappings
```

4.4.4. Language-Specific Extraction File

Each language requires its own extraction configuration file. For Amharic, create one by copying from an existing template:

```
cd ~/extraction-framework/dump
cp extraction.mappings.properties extraction.am.properties
nano extraction.am.properties
```

Update the file as follows:

```
# List of languages separated by commas
languages=am
# Default extractor list for all languages
extractors=.ArticleCategoriesExtractor,.ArticlePageExtractor,.ArticleTemplatesExtractor,.CategoryLabelExtractor,.ExternalLinksExtractor,.GeoExtractor,.InfoboxExtractor,.InterLanguageLinksExtractor,.LabelExtractor,.PageIdExtractor,.PageLinksExtractor,.RedirectExtractor,.RevisionIdExtractor,.ProvenanceExtractor,.SkosCategoriesExtractor,.WikiPageLengthExtractor,.WikiPageOutDegreeExtractor
# Language-specific extractors for Amharic
extractors.am=.MappingExtractor,.DisambiguationExtractor,.HomepageExtractor,.TopicalConceptsExtractor,.ImageExtractorNew,.CommonsResourceExtractor,.RedirectExtractor,.ArticleTemplatesExtractor,.LabelExtractor,.TemplateParameterExtractor,.InfoboxExtractor
```

4.4.5. Apply Configuration Changes

After updating configuration files, recompile the framework so the changes take effect:

```
cd ~/extraction-framework
mvn clean install
```

This ensures all modules are rebuilt with the new settings.

4.5. Running the Extraction

Run extraction with the provided scripts:

```
../run extraction  extraction.am.properties
```

The output will include RDF datasets under the target directory, organized by language.

4.6. Key Notes on Mapping Usage

- Extraction depends on mappings defined in the Mapping Wiki.
- If a template property is not mapped to an ontology property, its values will not appear in the extracted data.
- Ensure mappings are valid and test locally before submitting updates.
- For missing ontology terms, either extend the ontology (with community discussion) or reuse existing properties.

5. Mapping Statistics Generation

Mapping statistics are essential for evaluating the quality and completeness of DBpedia mappings. They provide insights into how many templates and properties are mapped, how frequently they appear in Wikipedia pages, and where inconsistencies or gaps exist. By generating these statistics locally, we can continuously monitor progress, identify problematic mappings, and validate the effectiveness of recent updates to the Amharic DBpedia project.

The process requires preparing dump files, configuring the DBpedia Extraction Framework's server module, and running the statistics generation tool. The resulting reports not only quantify coverage but also highlight mismatches, missing ontology links, and unused templates or properties.

5.1. Prerequisites

Before starting, ensure you have the following:

- Java Development Kit (JDK 8+)
- Apache Maven
- DBpedia Extraction Framework cloned locally

```
cd ~
git clone https://github.com/dbpedia/extraction-framework.git
cd extraction-framework
```

- Extracted files:
    - article-templates.ttl.bz2
    - redirects.ttl.bz2
    - template-parameters.ttl.bz2
    - infobox-test.ttl.bz2 (later, we use infobox-properties.ttl.bz2)
- Mapping file (e.g., mapping_am.xml) placed under ../mappings.

5.2. Project Setup

Navigate to the server module:

```
cd ~/extraction-framework/server
```

Configure Properties

Edit server.default.properties with the following key settings:

```
base-dir=.
statisticsDir=src/main/statistics
languages=am,ro
mappings=../mappings
ontology=../ontology.xml2
```

Edit pom.xml with the following key settings:

```
<launcher>
    <id>stats</id>
    ...
    <args>
      <arg>/home/user_name/dumps/am</arg><!-- Language: am -->
      <arg>extraction-framework/server/src/main/statistics</arg>
      <arg>.bz2</arg>
      <arg>true</arg>
```

```
     <arg>am,ro</arg>
   </args>
</launcher>
```

Ensure your dump directory contains:

- amwiki-*-redirects.ttl.bz2
- amwiki-*-article-templates.ttl.bz2
- amwiki-*-template-parameters.ttl.bz2
- amwiki-*-infobox-test.ttl.bz2 (later, we use amwiki-*-infobox-properties.ttl.bz2)

5.3. Running Statistics Generation

5.3.1. Generate Statistics

From inside the server directory:

```
../run stats
```

This will:

- Parse the dump files
- Analyze templates and properties
- Generate stats in: extraction-framework/server/src/main/statistics/mappingstats_am.txt

5.3.2. Run the Server

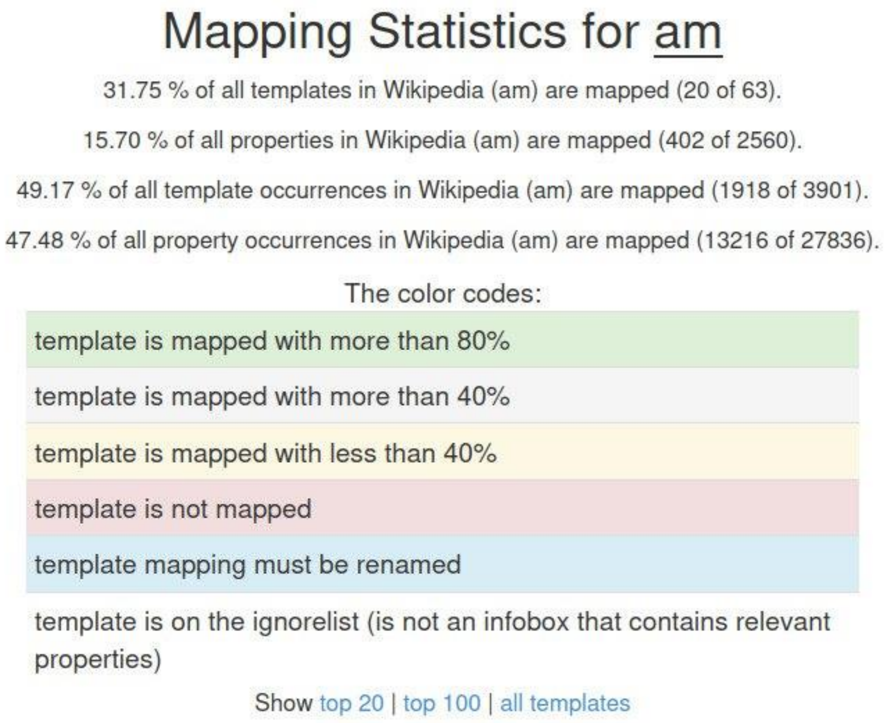
Optionally, you can view results via the web interface:

```
../run server
```

Then open: http://localhost:9999/server

5.4. Old Statistics Report (Amharic)

Before generating new statistics, the server was run to analyze the existing Amharic DBpedia mappings.



Mapping Statistics for am

31.75 % of all templates in Wikipedia (am) are mapped (20 of 63).

15.70 % of all properties in Wikipedia (am) are mapped (402 of 2560).

49.17 % of all template occurrences in Wikipedia (am) are mapped (1918 of 3901).

47.48 % of all property occurrences in Wikipedia (am) are mapped (13216 of 27836).

The color codes:

template is mapped with more than 80%

template is mapped with more than 40%

template is mapped with less than 40%

template is not mapped

template mapping must be renamed

template is on the ignorelist (is not an infobox that contains relevant properties)

Show top 20 | top 100 | all templates

Summary of Mapping Coverage

Metric	Count	Total	Percentage
Mapped Templates	20	63	31.75%
Mapped Template Occurrences	1918	3901	49.17%
Mapped Properties	402	2560	15.70%
Mapped Property Occurrences	13216	27836	47.48%

Observations

- Templates: Only 31.75% are mapped, but high-frequency templates are prioritized.
- Properties: Only 15.7% mapped, but nearly half of property occurrences are covered.

This suggests progress in coverage but limited breadth.

5.5. Issues Identified

5.5.1. Templates Mapped to Wrong Ontology Class

- **Problem**: Some templates are marked "mapped" in mapping_am.xml but use an incorrect ontology class
- **Example**: እግር ኳስ ግጥሚያ with unknown ontology class SoccerMatch

5.5.2. Template Name Mismatches

Statistics Report name	Actual Template name in Wikipedia	DBpedia Mapping name
መረጃ ሳጥን ተራራ	መረጃሳጥን ተራራ	መረጃሳጥን ተራራ
ካውንቲ መረጃ	መረጃሳጥን ካውንቲ መረጃ	መረጃሳጥን ካውንቲ መረጃ
የሙዚቀኛ መረጃ	መረጃሳጥን የሙዚቀኛ መረጃ	መረጃሳጥን የሙዚቀኛ መረጃ
የቋንቋ መረጃ	መረጃሳጥን የቋንቋ መረጃ	መረጃሳጥን የቋንቋ መረጃ
የአልበም መረጃ	መረጃሳጥን የአልበም መረጃ	መረጃሳጥን የአልበም መረጃ
ስቴት	መረጃሳጥን የአሜሪካ ስቴት	መረጃሳጥን የአሜሪካ ስቴት
Infobox Mountain	መረጃሳጥን ተራራ	?
Infobox river	መረጃሳጥን የወንዝ መረጃ	መረጃሳጥን የወንዝ መረጃ

5.5.3. Templates without Any Mapped Properties

- Some templates have been mapped but with no actual properties defined.
- These mappings are ineffective.
- Examples: Infobox, Infobox person, Infobox disease

5.5.4. Templates in English without Proper Translation

- Successsion box
- Infobox
- Taxobox
- Navbox
- Infobox diseases
- Panorama
- Infobox dog breed
- Infobox የሚስጥ ስም
- Wayback

- S-ttl
- Phoenician glyph
- Click-inline
- Football kit
- Columns
- POTD commons

5.5.5. Broken Template Detail Pages

- Example: Location map+ — clicking on the template detail leads to an error page.

5.5.6. Duplicate Templates in Different Languages

Amharic Template	English Equivalent
መረጃሳጥን ሰው	Infobox person

5.5.7. Templates with Only One or No Attributes

- These templates carry little semantic value.
- Example: ባንዲራ

5.5.8. Amharic Templates Not Mapped Yet but Require Property Fixing

Template name	Issue
አሞሌ ቻርት	Properties are not in Amharic
የቀድሞ ቦታ መረጃ	Mixed English/Amharic properties
እንጀራ ቻርት	Properties not mapped
ሳጥን ራስጌ	Properties are not in Amharic
ክፈፍ	
ያዳምጡ	Mixed English/Amharic properties
የጠፈር መንኮራኩር	

5.5.9. Templates with Amharic Names but No Valid Properties

These are likely campaign-specific or navigation templates, not infoboxes.

- የ2010 እ.ኤ.አ. ፊፋ የዓለም ዋንጫ ምድብ ኤ
- የ2010 እ.ኤ.አ. ፊፋ የዓለም ዋንጫ ምድብ ሲ
- የ2010 እ.ኤ.አ. ፊፋ የዓለም ዋንጫ ምድብ ኢ
- የ2010 እ.ኤ.አ. ፊፋ የዓለም ዋንጫ ምድብ ኤች
- የ2010 እ.ኤ.አ. ፊፋ የዓለም ዋንጫ ምድብ ኤፍ
- የ2010 እ.ኤ.አ. ፊፋ የዓለም ዋንጫ ምድብ ዲ
- የ2010 እ.ኤ.አ. ፊፋ የዓለም ዋንጫ ምድብ ጂ
- የ2010 እ.ኤ.አ. ፊፋ የዓለም ዋንጫ ምድብ ቢ

5.6. Actions Taken

To address the issues:

5.6.1. Ontology Class Corrections

- Updated invalid ontology classes with correct DBpedia ontology terms.
- Example: SoccerMatch → SoccerTournament.

5.6.2. Template Renaming and Alignment

- Fixed mismatched names between DBpedia mappings and Wikipedia templates.
- **Examples**:
    - መረጃሳጥን ተራራ → መረጃ ሳጥን ተራራ
    - መረጃሳጥን ካውንቲ መረጃ → ካውንቲ መረጃ
    - መረጃሳጥን የሙዚቀኛ መረጃ → የሙዚቀኛ መረጃ

5.6.3. New Template Mappings

- Created new mappings for missing templates:

    - Infobox Mountain
    - Infobox River (መረጃሳጥን የወንዝ መረጃ)

5.6.4. Filling Empty Properties

- Retrieved property lists and mapped:
    - Infobox → Case ontology class
    - Taxobox → Case ontology class
    - Navbox → Case ontology class
    - Infobox disease → Disease ontology class

5.6.5. Mapping Non-Amharic Templates

- Assigned ontology classes:
    - Wayback → TimePeriod
    - S-ttl → Monarch
    - Phoenician glyph → Language
    - Click-inline → Image
    - Football Kit → SportFacility

5.6.6. Handling Mixed Properties (Amharic + English)

- Mapped templates while planning to translate properties later.
- **Examples**:
    - አሞሌ ቻርት → ChartsPlacements
    - እንጀራ ቻርት → ChartsPlacements
    - የቀድሞ ቦታ መረጃ → Place

5.7. Technical Challenges and Fixes

5.7.1. Problem Encountered

While generating statistics, the template count consistently returned **zero**. Templates were being detected, but their associated properties were not. As a result, all templates were ignored in the statistics output.

After debugging, I identified that the issue was caused by reliance on infobox_test.ttl. This file did not properly support the current dumps.

5.7.2. Fix Implemented

The solution was to switch from infobox_test.ttl to infobox_properties.ttl, which contains the required property mappings. This required modifications in the following classes:

5.7.2.1. CreateMappingStats.scala

[https://github.com/contact-andy/extraction-framework/blob/main/server/src/main/scala/org/dbpedia/extraction/server/stats/CreateMappingStats.scala]

- Added logic to load infobox-properties.ttl:

```
val infoboxProperties =
inputFile(DBpediaDatasets.InfoboxProperties)
```

- Passed infoboxProperties as an argument when calling the MappingStatsBuilder.

5.7.2.2. MappingStatsBuilder.scala

[https://github.com/contact-andy/extraction-framework/blob/main/server/src/main/scala/org/dbpedia/extraction/server/stats/MappingStatsBuilder.scala]

Updated Functions:

I. **buildStats**
   - Added new parameter: infoboxPropertiesFile: File
   - Created pageToTemplate map:

```
   val pageToTemplate = mutable.Map[String, Seq[String]]()
```

   - Updated countTemplates to accept pageToTemplate.
   - **Fallback: if template count is zero, call new method countPropertiesFromInfoboxProps.**

II. **countTemplates**

- Added parameter pageToTemplate.
- Once a template is found, store page title with template name:

```
pageToTemplate.put(pageTitle,
(pageToTemplate.getOrElse(pageTitle, Seq()) :+
templateName).distinct)
```

III. stripUri

- Expanded to handle both resource and property URIs.

Newly Added Functions:

I. normalizePropertyName

- Normalizes property names by removing underscores and spaces for consistent comparison.

II. countPropertiesFromInfoboxProps

- Counts properties using infobox-properties.ttl.
- Parameters:

```
countPropertiesFromInfoboxProps(
     file: File,
     resultMap: mutable.Map[String, TemplateStatsBuilder],
      redirects: mutable.Map[String, String],
     pageToTemplate: mutable.Map[String, Seq[String]]
```

5.7.3. Outcome

After implementing the above changes:

- Mapping statistics successfully generated.
- Templates and properties were correctly counted.
- Results confirmed that infobox_properties.ttl is more reliable for current dumps.

5.8. Ignore List in Mapping Statistics

The ignore list is a configuration file that defines templates and properties which should not be counted in the mapping statistics report. Its purpose is to:

- Exclude navigation templates (e.g., Navbox, Succession box) that are not true infoboxes.
- Filter out layout/formatting templates (e.g., Columns, Football kit, Click-inline) that do not carry semantic data.
- Remove campaign-specific or empty templates that add noise but no knowledge.
- Prevent false inflation of mapping coverage by ignoring non-relevant entities.

5.8.1. Current Content of Ignore List

The ignore list currently contains:

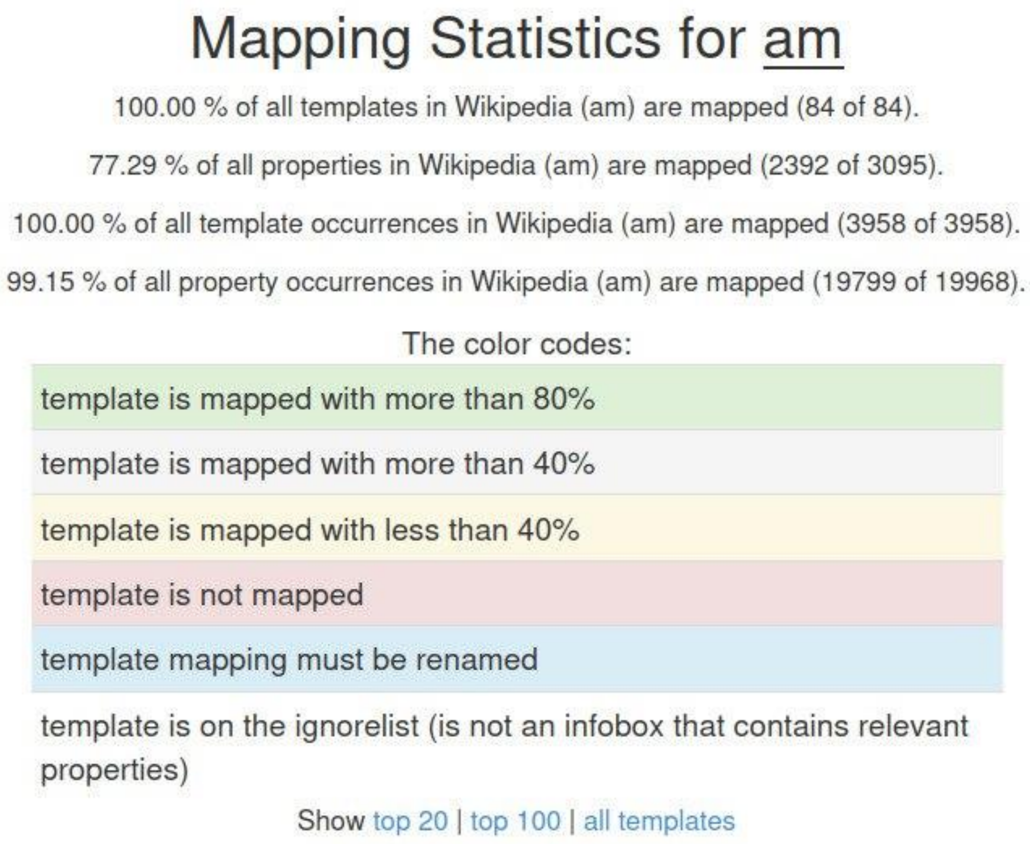
- Non-infobox templates:
  - የ2010 እ.ኤ.አ. ፊፋ የዓለም ዋንጫ ምድብ ኤ
  - የ 2010 እ .ኤ.አ . ፊፋ የ ዓለምዋን ጫምድብ ሲ
  - የ 2010 እ .ኤ.አ . ፊፋ የ ዓለምዋን ጫምድብ ኢ
  - የ 2010 እ .ኤ.አ . ፊፋ የ ዓለምዋን ጫምድብ ኤች
  - የ 2010 እ .ኤ.አ . ፊፋ የ ዓለምዋን ጫምድብ ኤፍ
  - የ 2010 እ .ኤ.አ . ፊፋ የ ዓለምዋን ጫምድብ ዲ
  - የ 2010 እ .ኤ.አ . ፊፋ የ ዓለምዋን ጫምድብ ጂ
  - የ 2010 እ .ኤ.አ . ፊፋ የ ዓለምዋን ጫምድብ ቢ
- Invalid / broken templates: Location map+.

5.8.2. Benefits of Using Ignore List

- Ensures mapping statistics focus on true knowledge templates.
- Produces more accurate mapping coverage percentages.
- Helps contributors identify real gaps (e.g., infoboxes with semantic data missing properties).

5.9. Current Amharic Mapping Statistics Report

After applying fixes (ontology corrections, new mappings, and the ignore list), the updated statistics report shows the following:



Mapping Statistics for am

100.00 % of all templates in Wikipedia (am) are mapped (84 of 84).

77.29 % of all properties in Wikipedia (am) are mapped (2392 of 3095).

100.00 % of all template occurrences in Wikipedia (am) are mapped (3958 of 3958).

99.15 % of all property occurrences in Wikipedia (am) are mapped (19799 of 19968).

The color codes:

template is mapped with more than 80%

template is mapped with more than 40%

template is mapped with less than 40%

template is not mapped

template mapping must be renamed

template is on the ignorelist (is not an infobox that contains relevant properties)

Show top 20 | top 100 | all templates

Summary of Mapping Coverage

Metric	Count	Total	Percentage	Notes
Mapped Templates	84	84	100%	Achieved full coverage (previously 31.75%)
Mapped Template Occurrences	3958	3958	100%	All templates aligned and fully mapped
Mapped Properties	2392	3095	77.29%	Significant increase from 15.70%
Mapped Property Occurrences	19799	19968	99.15%	Major improvement due to property fixes and normalization

Observations

The updated mapping statistics show significant progress compared to the previous report.

- Mapped Templates: All 84 templates have now been mapped, achieving 100% coverage, up from 31.75% in the earlier stage. This reflects a complete alignment of templates with DBpedia mappings.
- Mapped Template Occurrences: Every occurrence (3,958 out of 3,958) is now mapped, marking 100% coverage. This demonstrates that all existing templates in Wikipedia have been successfully connected to DBpedia, eliminating earlier gaps.
- Mapped Properties: A total of 2,392 properties are mapped out of 3,095, reaching 77.29% coverage, a substantial increase from the earlier 15.70%. This indicates strong progress but also highlights remaining work in mapping less frequently used or complex properties.
- Mapped Property Occurrences: Out of 19,968 occurrences, 19,799 (99.15%) are now mapped. This near-complete coverage shows that property fixes, normalization, and alignment strategies have been highly effective.

Overall, the improvements demonstrate both breadth and depth: all templates are now covered, template occurrences are fully aligned, and property coverage has improved substantially. However, further effort is still needed to achieve full coverage of properties, especially for rarely used or inconsistent ones.

6. Querying the Data

Once RDF data is extracted from Wikipedia using the DBpedia Extraction Framework, the next step is to make it accessible for querying. This is typically done using SPARQL (SPARQL Protocol and RDF Query Language), which allows users to retrieve and manipulate RDF datasets.

To query the extracted data locally, we can use Apache Jena Fuseki, a lightweight and powerful SPARQL server. Fuseki enables you to load RDF files, run SPARQL queries through a web-based interface, and integrate the data into other applications.

6.1. Why Apache Jena Fuseki?

- Provides a local SPARQL endpoint for experimentation.
- Supports both in-memory and persistent storage datasets.
- Lightweight, fast, and easy to install.
- Works well for testing DBpedia mappings and extractions before deployment.

6.2. Installation and Setup

Step 1: Install Java (OpenJDK 11 or newer)

Fuseki requires Java 11+. If you are still running Java 8 (used for the Extraction Framework), upgrade or install a newer version alongside it.

```
sudo apt update
cd ~
wget https://github.com/adoptium/temurin17-
binaries/releases/download/jdk-17.0.11+9/OpenJDK17U-
jdk_x64_linux_hotspot_17.0.11_9.tar.gz
tar -xzf OpenJDK17U-jdk_x64_linux_hotspot_17.0.11_9.tar.gz
mv jdk-17.0.11+9 jdk17
```

Update your environment variables:

```
nano ~/.bashrc
```

Comment out the old Java 8 configuration and add:

```
# export JAVA_HOME=~/jdk8
# export PATH=$JAVA_HOME/bin:$PATH
export JAVA_HOME=~/jdk17
export PATH=$JAVA_HOME/bin:$PATH
```

Apply the changes:

```
source ~/.bashrc
java -version   # should display Java 17
```

Step 2: Download Apache Jena Fuseki

Download the latest release from Apache:

```
wget https://dlcdn.apache.org/jena/binaries/apache-jena-fuseki-5.4.0.tar.gz
```

Step 3: Extract and Move Fuseki

```
tar -xvzf apache-jena-fuseki-5.4.0.tar.gz
sudo mv apache-jena-fuseki-5.4.0 /opt/fuseki-server
```

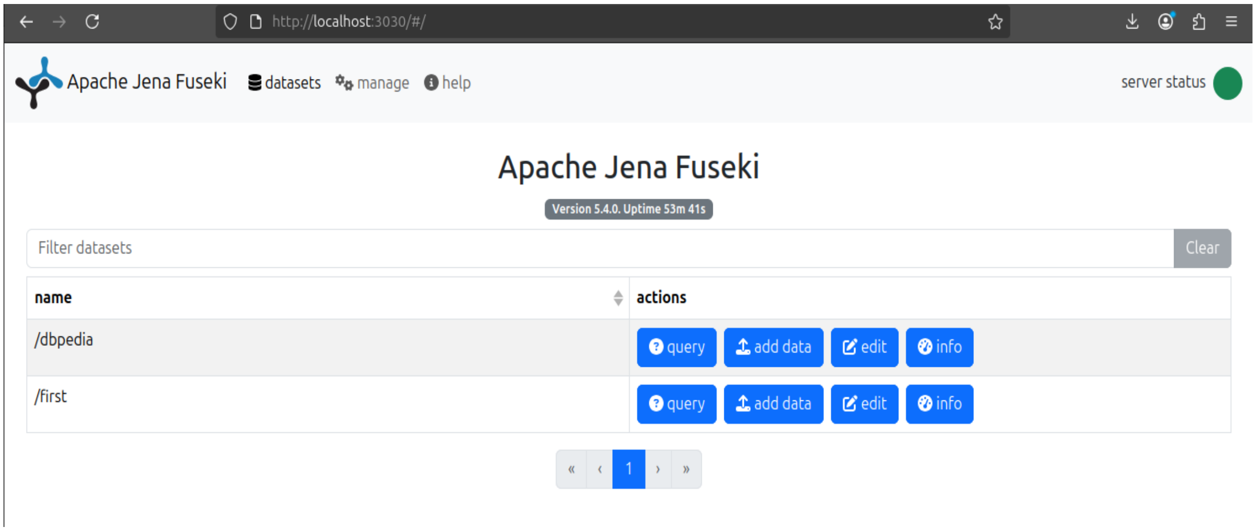
Step 4: Run Fuseki

Navigate to the Fuseki directory and start the server:

```
cd /opt/fuseki-server/
./fuseki-server
```

By default, Fuseki runs at:

```
http://localhost:3030/
```



Apache Jena Fuseki

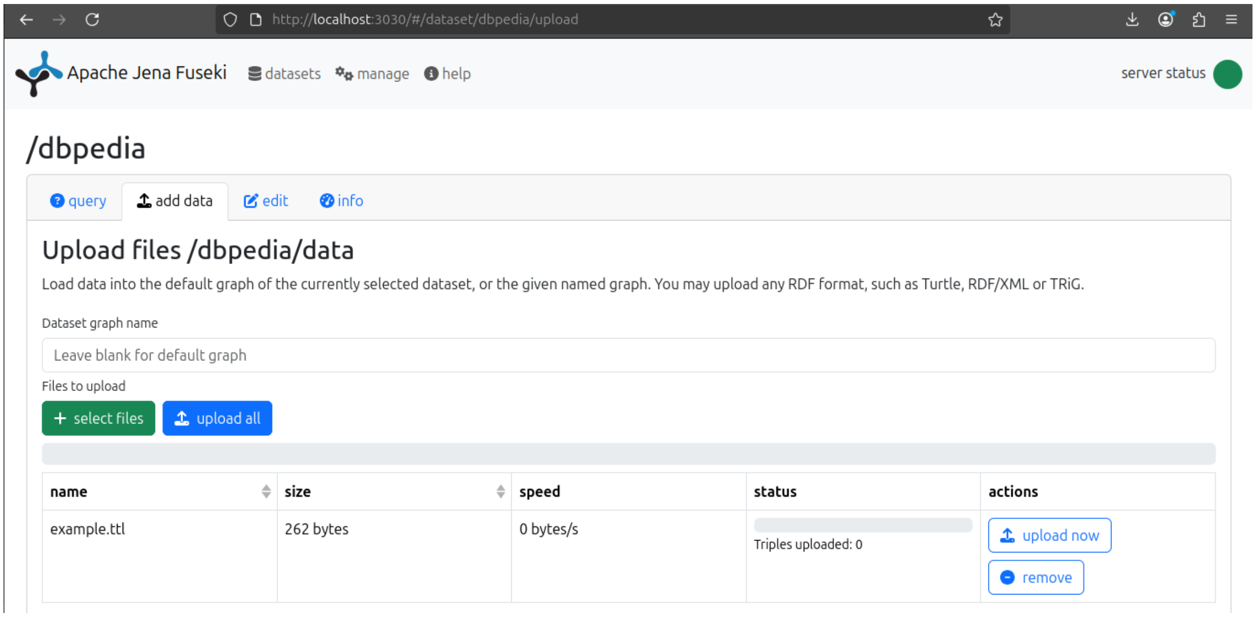
Version 5.4.0. Uptime 53m 41s

name	actions
/dbpedia	query add data edit info
/first	query add data edit info

6.3. Loading RDF Data into Fuseki

1. Open your browser and go to http://localhost:3030/
2. Click “Manage Datasets”.
3. Create a new dataset (choose between persistent or in-memory).
4. Upload your extracted RDF files (e.g., mappingbased-properties_lang.ttl.bz2).

5. Open the SPARQL editor and start querying.



http://localhost:3030/#/dataset/dbpedia/upload

Apache Jena Fuseki · datasets · manage · help · server status

/dbpedia

query · add data · edit · info

Upload files /dbpedia/data

Load data into the default graph of the currently selected dataset, or the given named graph. You may upload any RDF format, such as Turtle, RDF/XML or TRiG.

Dataset graph name

Leave blank for default graph

Files to upload

+ select files · upload all

name	size	speed	status	actions
example.ttl	262 bytes	0 bytes/s	Triples uploaded: 0	upload now remove

6.4. Example Queries

Here are a few examples of SPARQL queries you can try after uploading your data:

Retrieve all classes used in the dataset:

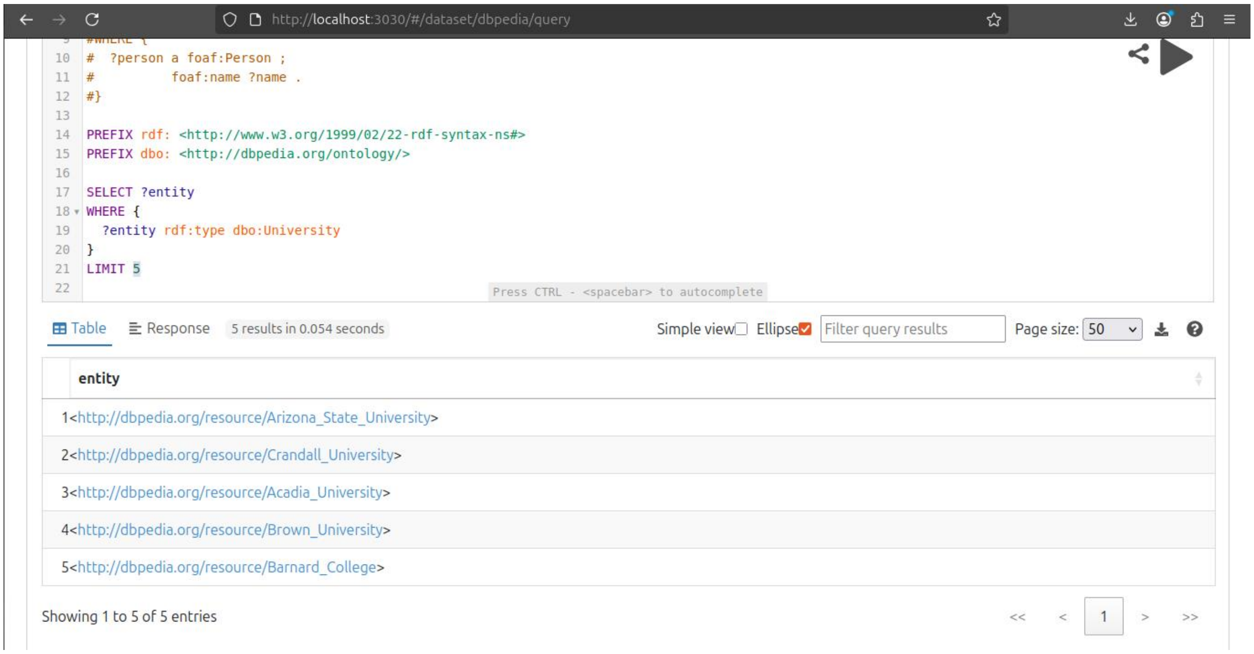
```
SELECT DISTINCT ?class WHERE { ?s a ?class }
LIMIT 50
```

Get all properties of a specific resource:

```
SELECT ?property ?value WHERE {
    <http://am.dbpedia.org/resource/አበበ_ታሪክ> ?property ?value
}
```

Count all mapped entities:

```
SELECT (COUNT(?s) AS ?entityCount) WHERE { ?s a ?type }
```

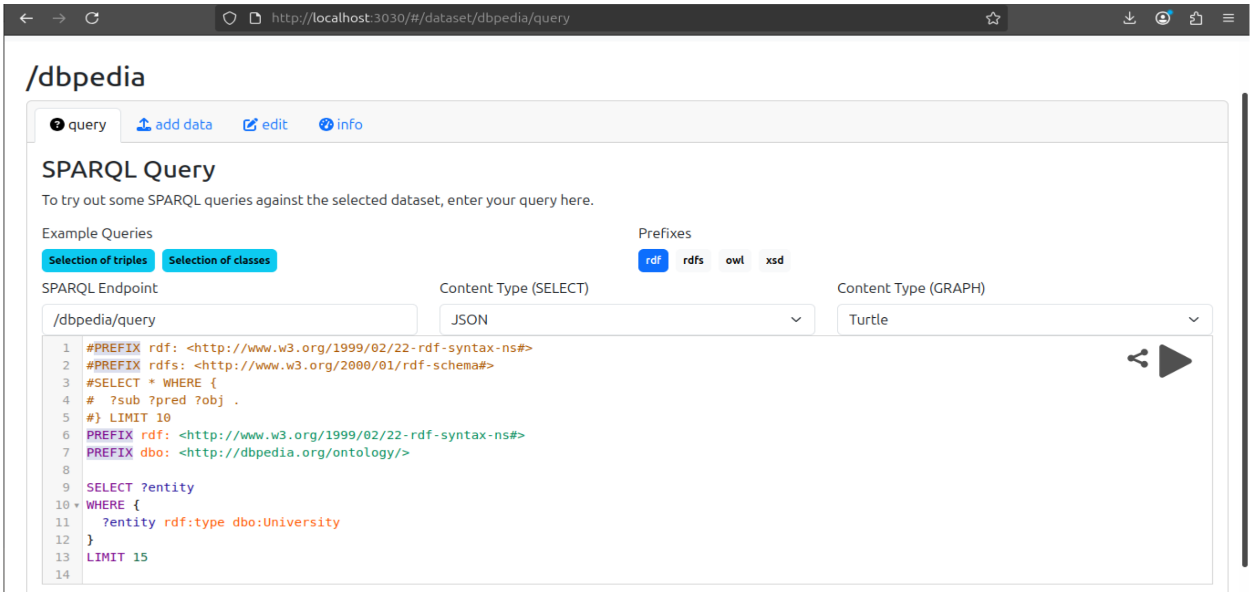

http://localhost:3030/#/dataset/dbpedia/query
Press CTRL - <spacebar> to autocomplete
Table
Response
5 results in 0.054 seconds
Simple view □ Ellipse ☑
Filter query results
Page size: 50
Showing 1 to 5 of 5 entries
<< < 1 > >>

```
#WHERE {
#  ?person a foaf:Person ;
#          foaf:name ?name .
#}

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX dbo: <http://dbpedia.org/ontology/>

SELECT ?entity
WHERE {
  ?entity rdf:type dbo:University
}
LIMIT 5
```

	entity
1	<http://dbpedia.org/resource/Arizona_State_University>
2	<http://dbpedia.org/resource/Crandall_University>
3	<http://dbpedia.org/resource/Acadia_University>
4	<http://dbpedia.org/resource/Brown_University>
5	<http://dbpedia.org/resource/Barnard_College>



SPARQL Query

To try out some SPARQL queries against the selected dataset, enter your query here.

SPARQL Endpoint: /dbpedia/query

Content Type (SELECT): JSON

Content Type (GRAPH): Turtle

```
#PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
#PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
#SELECT * WHERE {
#  ?sub ?pred ?obj .
#} LIMIT 10
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX dbo: <http://dbpedia.org/ontology/>

SELECT ?entity
WHERE {
  ?entity rdf:type dbo:University
}
LIMIT 15

```

6.5. Notes and Recommendations

- Use persistent datasets if you want your uploaded data to remain after restarting Fuseki.
- For large RDF files, it is more efficient to preload the data using the command line rather than the web UI.
- If you plan to expose your endpoint publicly, configure authentication and security.

7. Amharic DBpedia Template Mapping Automation

The process of mapping Wikipedia templates into DBpedia is often repetitive and labor-intensive. Each template, along with its attributes, needs to be identified, documented, and transformed into a structured mapping format. As the number of templates grows, manually repeating these steps becomes inefficient, time-consuming, and prone to inconsistencies. Automation is therefore essential to accelerate the mapping workflow, ensure consistency across templates, and support large-scale extraction efforts.

7.1. Why Automation?

The process of creating Wikipedia templates and their corresponding DBpedia mappings is often repetitive, time-consuming, and error-prone if done manually. Each template contains multiple attributes (properties), which must be identified, mapped to DBpedia ontology, and kept consistent across different languages. Automating this process helps to:

- Save time and effort by avoiding repetitive manual mapping.
- Ensure consistency in attribute translation and ontology alignment.
- Reduce errors when dealing with large numbers of templates.
- Scale efficiently to support new templates, properties, and languages.
- Enable reproducibility so that other contributors can repeat the process with the same steps.

7.2. Objectives of Automation

The main objectives of automation in the Amharic DBpedia extraction are:

- Automatically extract attributes (properties) from Wikipedia infobox templates.
- Translate these attributes into Amharic using machine translation (e.g., NLLB or Gemini API).
- Generate DBpedia-compliant mapping files with minimal manual intervention.
- Build a pipeline that can be reused for future templates and extended to other Ethiopian languages.

7.3. Prerequisites

Before running the automated extraction pipeline, the following are required:

- **Technical Setup:**
  - Python environment with required libraries (requests, json, re, transformers if using NLLB).
  - Access to a translation API (e.g., Google Gemini, NLLB, or another free LLM).
  - DBpedia Extraction Framework installed and configured.
- **Knowledge Requirements:**
  - Familiarity with Wikipedia template syntax.
  - Understanding of DBpedia ontology classes and properties.
  - Basic knowledge of RDF and SPARQL.

7.4. Steps Followed

The automation process we followed can be summarized as:

1. **Template Retrieval**
   - Fetch Wikipedia templates (e.g., Infobox company, Infobox book) using the Wikipedia API.
   - Example API request: https://en.wikipedia.org/w/api.php?action=query&prop=revisions&rvprop=content&titles=Template:Infobox_company&format=json
2. **Attribute Extraction**
   - Parse the raw wikitext and extract attribute names.
   - Example result (from Infobox company):

```
{
  "Template": "Infobox company",
  "Attributes": ["name", "type", "industry", "founded", "founder", "headquarters"]
}
```

3. **Automatic Translation**

- Send extracted attributes to a translation model (e.g., NLLB or Gemini) for English → Amharic translation.
- Example:

. . .

4. **Mapping Generation**

- Use translated attributes to generate DBpedia mapping files (mapping_am.xml).
- Align translated attributes with DBpedia ontology properties.

. . .

5. **Testing & Validation**

- Run DBpedia extraction with the new mappings.
- Query extracted RDF data via SPARQL to ensure correctness.

. . .

8. Challenges Encountered

In addition to technical hurdles, several organizational and documentation-related challenges were identified during the project:

i. **Environment and Compatibility Issues**

- DBpedia Extraction Framework required Java 8, leading to compatibility issues with newer Java versions.
- Maven build errors were difficult to diagnose due to outdated or mismatched dependencies.
- Virtual environment setup for Java 8 repeatedly failed, delaying server-based deployment.

ii. **Configuration and Setup Problems**

- Missing or unclear custom configuration files in the extraction framework caused repeated failures.

- Virtuoso installation was blocked by system-level restrictions, limiting local SPARQL testing.

iii. **Access and Infrastructure Limitations**

- DBpedia Mappings Wiki account access remained inactive for several weeks, delaying direct contributions.
- The main server outages prevented extraction and testing.
- The AAU backup server was unavailable due to technical issues.
- A local OS crash required complete reinstallation and rebuilding of the environment.

iv. **Documentation and Knowledge Gaps**

- Lack of organized, step-by-step documentation forced frequent searches across different sites (GitHub issues, mailing lists, outdated tutorials).
- This slowed progress and created confusion about best practices.
- The absence of consolidated Amharic-specific guidance further complicated setup and mapping.

v. **Mapping and Data Quality Issues**

- Many Amharic templates lacked valid or consistent properties, while others used mixed English/Amharic parameters.
- Some templates had no real usage in Wikipedia, so they did not appear in statistics.
- Duplicates existed across languages (e.g., Infobox vs. መረጃሳጥን), creating semantic alignment problems.
- Outdated or broken templates (e.g., missing detail pages) made mapping incomplete.

vi. **Statistics and Extraction Bottlenecks**

- Mapping statistics generation repeatedly failed, producing incomplete or empty results.
- Reliance on infobox-test.ttl was a bottleneck for property counting.
- New mappings did not appear immediately due to dump refresh delays.
- Automation and Translation Barriers
- Lack of a reliable translation tool for property names slowed normalization.

9. Solutions and Fixes

To overcome the above challenges, a series of targeted solutions were applied:

i. **Environment Fixes**
   - Created an isolated Java 8 environment to resolve compatibility issues.
   - Fixed Maven build errors by updating pom.xml and aligning plugin versions.
   - Documented a reproducible environment rebuild process after the OS crash.

ii. **Configuration Improvements**
   - Adapted example config files for Amharic and validated them through trial runs.
   - Used Apache Jena Fuseki as an alternative to Virtuoso for SPARQL testing.

iii. **Access and Infrastructure Workarounds**
   - Continued mapping work locally while waiting for DBpedia Mappings Wiki access, later synchronizing changes.
   - Performed local extractions during the main server outages.

iv. **Documentation Improvements**
   - Created a step-by-step project documentation consolidating environment setup, extraction, mapping, and statistics generation.
   - This documentation now serves as a single reference guide for future contributors, reducing the learning curve.

v. **Mapping Enhancements**
   - Normalized property names (Amharic vs. English) and ensured consistent ontology mappings.
   - Kept English template names for backward compatibility but flagged them for future translation.
   - Merged or redirected duplicate templates, ensuring semantic consistency.

vi. **Statistics Fixes**
   - Replaced infobox-test.ttl with infobox-properties.ttl, which proved more reliable for property counting.

- Debugged and modified CreateMappingStats.scala and MappingStatsBuilder.scala to accept the new file.
- Validated statistics by cross-checking against actual Wikipedia usage.

vii. **Automation and Translation Solutions**

- Developed scripted workflows for mapping validation and stats generation.
- Implemented property normalization functions to unify naming conventions.
- Documented the need for a property translation tool as a future enhancement.

10. Recommendations and Next Steps

Based on the progress achieved and the challenges faced during this project, the following recommendations and next steps are proposed to ensure the long-term sustainability and improvement of the Amharic DBpedia initiative:

10.1. Improve Mapping Quality

- Continue reviewing existing mappings to correct ontology misalignments and incomplete property definitions.
- Translate English template and property names into Amharic, while keeping backward compatibility to avoid breaking existing links.
- Standardize naming conventions (e.g., all infobox templates consistently using መረጃሳጥን).

10.2. Strengthen Extraction and Statistics

- Automate the statistics generation process using infobox-properties.ttl to replace the outdated infobox-test.ttl.
- Periodically regenerate statistics to measure ongoing mapping coverage.
- Maintain an ignore list for templates that are non-semantic or irrelevant.

10.3. Improve Documentation and Resources

- Consolidate the fragmented documentation of DBpedia extraction, mapping, and querying into a unified guide (this project contributes toward that).
- Provide localized Amharic documentation for community members with less technical background.

10.4. Community Involvement

- Engage Amharic Wikipedia editors to encourage the use of mapped templates in actual pages.
- Organize workshops or tutorials for the local community on how to create, map, and maintain templates.

10.5. Infrastructure and Technical Improvements

- Establish a dedicated server to run the Extraction Framework and view outputs efficiently. Running extractions on personal machines often leads to long delays and resource limitations.
- Consider lightweight triple store alternatives (e.g., Apache Jena Fuseki, Blazegraph) for testing RDF data locally, especially when Virtuoso setup is not practical.

10.6. Next Steps

- Translate and harmonize the remaining English-only templates.
- Update mappings regularly in sync with Amharic Wikipedia growth.
- Begin pilot applications that consume the extracted RDF data

11. Conclusions

This project has demonstrated the feasibility and importance of extending DBpedia to support the Amharic language. Significant progress was achieved in mapping Amharic Wikipedia templates and properties, improving from only 17 mapped templates at the beginning to 97 fully mapped templates, achieving 100% template coverage.

The property mapping coverage also improved substantially - from 15.70% to 77.29%, while property occurrences reached 99.15% coverage. These results highlight the effectiveness of template alignment, ontology corrections, and property normalization.

Despite these achievements, challenges such as outdated extraction scripts, documentation gaps, and community engagement remain. Solutions implemented during this project, such as switching to infobox-properties.ttl for statistics, resolving template mismatches, and documenting the process - have laid the foundation for future progress.

In conclusion, this work not only improves structured knowledge extraction from Amharic Wikipedia but also sets a framework for sustainability and expansion. With continued community collaboration, infrastructure improvements, and integration into the global DBpedia ecosystem, Amharic DBpedia can become a valuable resource for education, research, and semantic web applications.

Appendix A: Newly Added Wikipedia Templates

No.	Template Name	Type	Status	Link
1	መረጃሳጥን መጽሐፍ	Book	Created	https://am.wikipedia.org/wiki/መለጠፊያ:መረጃሳጥን_መጽሐፍ
2	መረጃሳጥን ኦሎምፒክ	Olympics	Created	https://am.wikipedia.org/wiki/መለጠፊያ:መረጃሳጥን_ኦሎምፒክ
3	መረጃሳጥን የምሁራን መረጃ	Academic	Created	https://am.wikipedia.org/wiki/መለጠፊያ:መረጃሳጥን_የምሁራን_መረጃ
4	መረጃሳጥን አየር መንገድ	Airline	Created	https://am.wikipedia.org/wiki/መለጠፊያ:መረጃሳጥን_አየር_መንገድ
5	መረጃሳጥን ሼፍ	Chef	Created	https://am.wikipedia.org/wiki/መለጠፊያ: መረጃሳጥን_ሼፍ
6	የአምባሳደር መረጃ	Ambassador	Created	https://am.wikipedia.org/wiki/መለጠፊያ: የአምባሳደር_መረጃ
7	የድልድይ መረጃ	Bridge	Created	https://am.wikipedia.org/wiki/መለጠፊያ: የድልድይ_መረጃ
8	የፕሬዚዳንት መረጃ	President	Created	https://am.wikipedia.org/wiki/መለጠፊያ: የፕሬዚዳንት_መረጃ
9	የፍልስፍና ባለሙያ መረጃ	Philosopher	Created	https://am.wikipedia.org/wiki/መለጠፊያ: የፍልስፍና_ባለሙያ_መረጃ
10	የሐይቅ መረጃ	Lake	Created	https://am.wikipedia.org/wiki/መለጠፊያ: የሐይቅ_መረጃ
11	የከተማ አስተዳዳሪ መረጃ	Mayor	Created	https://am.wikipedia.org/wiki/መለጠፊያ: የከተማ_አስተዳዳሪ_መረጃ
12	የአህጉር መረጃ	Continent	Created	https://am.wikipedia.org/wiki/መለጠፊያ: የአህጉር_መረጃ
13	የባንክ መረጃ	Bank	Created	https://am.wikipedia.org/wiki/መለጠፊያ: የባንክ_መረጃ
14	የንግድ ሰዎች መረጃ	Business Person	Created	https://am.wikipedia.org/wiki/መለጠፊያ: የንግድ_ሰዎች_መረጃ
15	የበሽታ መረጃ	Disease	Created	https://am.wikipedia.org/wiki/መለጠፊያ: የበሽታ_መረጃ
16	የኮሜዲያን መረጃ	Comedian	Created	https://am.wikipedia.org/wiki/መለጠፊያ: የኮሜዲያን_መረጃ
17	የዩኒቨርሲቲ መረጃ	University	Created	https://am.wikipedia.org/wiki/መለጠፊያ: የዩኒቨርሲቲ_መረጃ
18	የህክምና ተቋም መረጃ	Hospital	Created	https://am.wikipedia.org/wiki/መለጠፊያ: የህክምና_ተቋም_መረጃ
19	የሆቴል መረጃ	Hotel	Created	https://am.wikipedia.org/wiki/መለጠፊያ: የሆቴል_መረጃ
20	የመስጊድ መረጃ	Mosque	Created	https://am.wikipedia.org/wiki/መ

				ለጠፊያ: የመስጊድ_መረጃ
21	የሙዚየም መረጃ	Museum	Created	**https://am.wikipedia.org/wiki/መ**ለጠፊያ: የሙዚየም_መረጃ
22	የቤተ ክርስቲያን መረጃ	Church	Created	**https://am.wikipedia.org/wiki/መ**ለጠፊያ: የቤተ_ክርስቲያን_መረጃ
23	የብሔራዊ መዝሙር መረጃ	National Anthem	Created	**https://am.wikipedia.org/wiki/መ**ለጠፊያ: የብሔራዊ_መዝሙር_መረጃ

Appendix B: Newly Added and Updated Wikipedia Pages

No.	Page Title	Type	Status	Link
1	ፍቅር እስከ መቃብር	መረጃሳጥን_መጽሐፍ	Updated	https://am.wikipedia.org/wiki/ፍቅር_እስከ_መቃብር
2	የኢትዮጵያ አየር መንገድ	መረጃሳጥን_አየር_መንገድ	Updated	https://am.wikipedia.org/wiki/የኢትዮጵያ_አየር_መንገድ
3	ሶቅራጠስ	የፍልስፍና_ባለሙያ_መረጃ	Updated	https://am.wikipedia.org/wiki/ሶቅራጠስ
4	አዲስ አበባ ዩኒቨርስቲ	የዩኒቨርሲቲ_መረጃ	Updated	https://am.wikipedia.org/wiki/አዲስ_አበባ_ዩኒቨርስቲ
5	ከንቲባ ገብሩ	የከተማ_አስተዳዳሪ_መረጃ	Updated	https://am.wikipedia.org/wiki/ከንቲባ_ገብሩ
6	አፍሪቃ	የአህጉር_መረጃ	Updated	https://am.wikipedia.org/wiki/አፍሪቃ
7	የኢትዮጵያ ህዝብ መዝሙር	የብሔራዊ_መዝሙር_መረጃ	Updated	https://am.wikipedia.org/wiki/የኢትዮጵያ_ህዝብ_መዝሙር
8	መሀመድ ሁሴን አሊ አላሙዲ	የንግድ_ሰዎች_መረጃ	Updated	https://am.wikipedia.org/wiki/መሀመድ_ሁሴን_አሊ_አላሙዲ
9	የኢትዮጵያ ብሐራዊ ሙዚዮም	የሙዚየም_መረጃ	Updated	https://am.wikipedia.org/wiki/የኢትዮጵያ_ብሐራዊ_ሙዚዮም
10	ጣና ሐይቅ	የሐይቅ_መረጃ	Updated	https://am.wikipedia.org/wiki/የሐይቅ_መረጃ
11	ሚኒሊክ ሆስፒታል	የህክምና_ተቋም_መረጃ	Updated	https://am.wikipedia.org/wiki/ሚኒሊክ_ሆስፒታል
12	አባይ ወንዝ (ናይል)	መረጃሳጥን_የወንዝ_መረጃ	Updated	https://am.wikipedia.org/wiki/አባይ_ወንዝ_(ናይል)
13	ባራክ ኦባማ	የፕሬዚዳንት_መረጃ	Updated	https://am.wikipedia.org/wiki/ባራክ_ኦባማ
14	ሲድኒ ኦሊምፒክ 2000	መረጃሳጥን_ኦሎምፒክ	New Page	https://am.wikipedia.org/wiki/መረጃሳጥን_ኦሎምፒክ
15	በየነ ጴጥሮስ	መረጃሳጥን_የምሁራን_መረጃ	New Page	https://am.wikipedia.org/wiki/በየነ_ጴጥሮስ
16	ማርከስ ሳሙኤልሰን	መረጃሳጥን_ሼፍ	New Page	https://am.wikipedia.org/wiki/ማርከስ_ሳሙኤልሰን
17	አዲሱ የአባይ ድልድይ	የድልድይ_መረጃ	New Page	https://am.wikipedia.org/wiki/አዲሱ_የአባይ_ድልድይ
18	የያስተሰርያል አልበም የዘፈኖች ዝርዝር	የዘፈኖች_ዝርዝር	New Page	https://am.wikipedia.org/wiki/የያስተሰርያል_አልበም_የዘፈኖች_ዝርዝር
19	አለባቸው ተካ	የኮሜዲያን_መረጃ	New Page	https://am.wikipedia.org/wiki/አለባቸው_ተካ

20	ልዑል ራስ እምሩ ኃይለ ሥላሴ	የአምባሳደር_መረጃ	New Page	https://am.wikipedia.org/wiki/ልዑል_ራስ_እምሩ_ኃይለ_ሥላሴ
21	መናገሻ_ገነተ_ጽጌ_ቅዱስ_ጊዮርጊስ_ቤተ_ክርስቲያን	የቤተ_ክርስቲያን_መረጃ	New Page	https://am.wikipedia.org/wiki/መናገሻ_ገነተ_ጽጌ_ቅዱስ_ጊዮርጊስ_ቤተ_ክርስቲያን
22	ወባ	የበሽታ_መረጃ	New Page	https://am.wikipedia.org/wiki/ወባ
23	አንዋር_መስጂድ	የመስጊድ_መረጃ	New Page	https://am.wikipedia.org/wiki/አንዋር_መስጂድ
24	ሐርመኒ_ሆቴል	የሆቴል_መረጃ	New Page	https://am.wikipedia.org/wiki/ሐርመኒ_ሆቴል

Appendix C: Detailed Mapping Contributions

No.	Template Name	Type	Link
1	Citation	Type	https://mappings.dbpedia.org/index.php/Mapping_am: Citation
2	Cite_book	Book	https://mappings.dbpedia.org/index.php/Mapping_am: Cite_book
3	Cite_journal	Media	https://mappings.dbpedia.org/index.php/Mapping_am: Cite_journal
4	Cite_web	Document	https://mappings.dbpedia.org/index.php/Mapping_am: Cite_web
5	Click-inline	Image	https://mappings.dbpedia.org/index.php/Mapping_am: Click-inline
6	Col-begin	Type	https://mappings.dbpedia.org/index.php/Mapping_am: Col-begin
7	Flag	Flag	https://mappings.dbpedia.org/index.php/Mapping_am: Flag
8	Football_kit	SportFacility	https://mappings.dbpedia.org/index.php/Mapping_am: Football_kit
9	Infobox_Mountain	Mountain	https://mappings.dbpedia.org/index.php/Mapping_am: Infobox_Mountain
10	Infobox_caste	EthnicGroup	https://mappings.dbpedia.org/index.php/Mapping_am: Infobox_caste
11	Infobox_disease	Diseases	https://mappings.dbpedia.org/index.php/Mapping_am: Infobox_disease
12	Infobox_dog_breed	Species	https://mappings.dbpedia.org/index.php/Mapping_am: Infobox_dog_breed
13	Infobox_person	Person	https://mappings.dbpedia.org/index.php/Mapping_am: Infobox_person
14	Infobox_river	River	https://mappings.dbpedia.org/index.php/Mapping_am: Infobox_river
15	Infobox_የሚስጥ_ስም	Name	https://mappings.dbpedia.org/index.php/Mapping_am: Infobox_የሚስጥ_ስም
16	Navbox	Case	https://mappings.dbpedia.org/index.php/Mapping_am: Navbox
17	POTD_commons	Media	https://mappings.dbpedia.org/index.php/Mapping_am: POTD_commons
18	Panorama	Image	https://mappings.dbpedia.org/index.php/Mapping_am: Panorama
19	Phoenician_glyph	Language	https://mappings.dbpedia.org/index.php/Mapping_am: Phoenician_glyph
20	Refn	Identifier	https://mappings.dbpedia.org/index.php/Mapping_am: Refn
21	S-ttl	Monarch	https://mappings.dbpedia.org/index.php/Mapping_am: S-ttl
22	Succession_box	Family	https://mappings.dbpedia.org/index.php/Mapping_am: Succession_box

23	Taxobox	Case	**https://mappings.dbpedia.org/index.php/Mapping_am: Taxobox**
24	Wayback	TimePeriod	**https://mappings.dbpedia.org/index.php/Mapping_am:** Wayback
25	መረጃሳጥን	Case	**https://mappings.dbpedia.org/index.php/Mapping_am: መረጃሳጥን**
26	መረጃሳጥን_መጽሐፍ	Book	**https://mappings.dbpedia.org/index.php/Mapping_am:** መረጃሳጥን_መጽሐፍ
27	መረጃሳጥን_ሼፍ	Chef	**https://mappings.dbpedia.org/index.php/Mapping_am: መረጃሳጥን_ሼፍ**
28	መረጃሳጥን_አየር_መንገድ	Airline	**https://mappings.dbpedia.org/index.php/Mapping_am: መረጃሳጥን_አየር_መንገድ**
29	መረጃሳጥን_ኦሎምፒክ	Olympics	**https://mappings.dbpedia.org/index.php/Mapping_am: መረጃሳጥን_ኦሎምፒክ**
30	መረጃሳጥን_የምሁራን_መረጃ	Academic	**https://mappings.dbpedia.org/index.php/Mapping_am: መረጃሳጥን_የምሁራን_መረጃ**
31	ምርጥ_ምስል	Image	**https://mappings.dbpedia.org/index.php/Mapping_am: ምርጥ_ምስል**
32	ሳጥን_ራስጌ	Case	**https://mappings.dbpedia.org/index.php/Mapping_am: ሳጥን_ራስጌ**
33	ባንክ_መረጃ	Bank	**https://mappings.dbpedia.org/index.php/Mapping_am: ባንክ_መረጃ**
34	ባንዲራ	Flag	**https://mappings.dbpedia.org/index.php/Mapping_am: ባንዲራ**
35	አለት_ፍልፍል	ReligiousBuilding	**https://mappings.dbpedia.org/index.php/Mapping_am: መረጃሳጥን_አለት_ፍልፍል**
36	አሞሌ_ቻርት	ChartsPlacements	**https://mappings.dbpedia.org/index.php/Mapping_am: አሞሌ_ቻርት**
37	እንጀራ_ቻርት	ChartsPlacements	**https://mappings.dbpedia.org/index.php/Mapping_am: እንጀራ_ቻርት**
38	እግር_ኳስ_ግጥሚያ	SoccerTournament	**https://mappings.dbpedia.org/index.php/Mapping_am: እግር_ኳስ_ግጥሚያ**
39	ክፈፍ	Document	**https://mappings.dbpedia.org/index.php/Mapping_am: ክፈፍ**
40	ዋቢ_ይፈልጋል	Reference	**https://mappings.dbpedia.org/index.php/Mapping_am: ዋቢ_ይፈልጋል**
41	የህክምና_ተቋም_መረጃ	Hospital	**https://mappings.dbpedia.org/index.php/Mapping_am: የህክምና_ተቋም_መረጃ**
42	የሆቴል_መረጃ	Hotel	**https://mappings.dbpedia.org/index.php/Mapping_am: የሆቴል_መረጃ**
43	የሐይቅ_መረጃ	Lake	**https://mappings.dbpedia.org/index.php/Mapping_am: የሐይቅ_መረጃ**
44	የመስጊድ_መረጃ	Mosque	**https://mappings.dbpedia.org/index.php/Mapping_am: የመስጊድ_መረጃ**
45	የሙዚየም_መረጃ	Museum	**https://mappings.dbpedia.org/index.ph**

			p/Mapping_am: የሙዚየም_መረጃ
46	የሰንደቅ_ዓላማ_መረጃ	Flag	https://mappings.dbpedia.org/index.php/Mapping_am: የሰንደቅ_ዓላማ_መረጃ
47	የቀለም_መረጃ	Colour	https://mappings.dbpedia.org/index.php/Mapping_am: የቀለም_መረጃ
48	የቀድሞ_ቦታ_መረጃ	Place	https://mappings.dbpedia.org/index.php/Mapping_am: የቀድሞ_ቦታ_መረጃ
49	የበሽታ_መረጃ	Disease	https://mappings.dbpedia.org/index.php/Mapping_am: የበሽታ_መረጃ
50	ባንክ_መረጃ	Bank	https://mappings.dbpedia.org/index.php/Mapping_am: ባንክ_መረጃ
51	የቤተ_ክርስቲያን_መረጃ	Church	https://mappings.dbpedia.org/index.php/Mapping_am: የቤተ_ክርስቲያን_መረጃ
52	የብሔራዊ_መዝሙር_መረጃ	NationalAnthem	https://mappings.dbpedia.org/index.php/Mapping_am: የብሔራዊ_መዝሙር_መረጃ
53	የብሔር_መረጃ	EthnicGroup	https://mappings.dbpedia.org/index.php/Mapping_am: የብሔር_መረጃ
54	የንግድ_ሰዎች_መረጃ	BusinessPerson	https://mappings.dbpedia.org/index.php/Mapping_am: የንግድ_ሰዎች_መረጃ
55	የአህጉር_መረጃ	Continent	https://mappings.dbpedia.org/index.php/Mapping_am: የአህጉር_መረጃ
56	የአምባሳደር_መረጃ	Ambassador	https://mappings.dbpedia.org/index.php/Mapping_am: የአምባሳደር_መረጃ
57	የእግር_ኳስ_ሰው_መረጃ	SoccerPlayer	https://mappings.dbpedia.org/index.php/Mapping_am: የእግር_ኳስ_ሰው_መረጃ
58	የእግር_ኳስ_ቡድን_አባላት_ጀምር	TeamMember	https://mappings.dbpedia.org/index.php/Mapping_am: የእግር_ኳስ_ቡድን_አባላት_ጀምር
59	የእግር_ኳስ_ቡድን_አባል	SoccerPlayer	https://mappings.dbpedia.org/index.php/Mapping_am: የእግር_ኳስ_ቡድን_አባል
60	የእግር_ኳስ_ውድድር_መረጃ	SportsEvent	https://mappings.dbpedia.org/index.php/Mapping_am: የእግር_ኳስ_ውድድር_መረጃ
61	የከተማ_አስተዳዳሪ_መረጃ	Mayor	https://mappings.dbpedia.org/index.php/Mapping_am: የከተማ_አስተዳዳሪ_መረጃ
62	የኮሜዲያን_መረጃ	Comedian	https://mappings.dbpedia.org/index.php/Mapping_am: የኮሜዲያን_መረጃ
63	የዘፈን_መረጃ	MusicalWork	https://mappings.dbpedia.org/index.php/Mapping_am: የዘፈን_መረጃ
64	የዩኒቨርሲቲ_መረጃ	University	https://mappings.dbpedia.org/index.php/Mapping_am: የዩኒቨርሲቲ_መረጃ
65	የድልድይ_መረጃ	Bridge	https://mappings.dbpedia.org/index.php/Mapping_am: የድልድይ_መረጃ
66	የጠፈር_መንኮራኩር	StarCluster	https://mappings.dbpedia.org/index.php/Mapping_am: የጠፈር_መንኮራኩር

67	የጦር_መሳሪያ	Weapon	**https://mappings.dbpedia.org/index.php/Mapping_am: የጦር_መሳሪያ**
68	የጦርነት_መረጃ	MilitaryConflict	**https://mappings.dbpedia.org/index.php/Mapping_am: የጦርነት_መረጃ**
69	የፍልስፍና_ባለሙያ_መረጃ	Philosopher	**https://mappings.dbpedia.org/index.php/Mapping_am: የፍልስፍና_ባለሙያ_መረጃ**
70	የፕሬዚዳንት_መረጃ	President	**https://mappings.dbpedia.org/index.php/Mapping_am: የፕሬዚዳንት_መረጃ**
71	ዩኔስኮ_ዓለም_አቀፍ_ቅርስ	WorldHeritage Site	**https://mappings.dbpedia.org/index.php/Mapping_am: ዩኔስኮ_ዓለም_አቀፍ_ቅርስ**
72	ያዳምጡ	Media	**https://mappings.dbpedia.org/index.php/Mapping_am: ያዳምጡ**