X2R Documentation

Release 1.0

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Contents

CHAPTER 1

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Version 3, 29 June 2007

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1.2 Convensions

1.2.1 Coding Style

This project follows the Python official coding style PSR.

Here are some examples for developers' reference.

- Class names MUST be declared in StudlyCaps.

  For example:

```
<?php
    class  HtmlHelper
    class  XmlParser
    class  Model
```

- Class constants MUST be declared in all upper case with underscore separators. For example:

  For example:

```
<?php
namespace Vendor\Model;

class Foo
{
    const VERSION = '1.0';
    const DATE_APPROVED = '2012-06-01';
}
```

- Method names MUST be declared in camelCase.

  For example:

```
<?php
        connect();
        getData();
        buildSomeWidget();
        jImport();
        jDoSomething();
```

Namespaces and classes MUST follow an "autoloading" PSR: [PSR-0,PSR-4]. This means each class is in a file by itself, and is in a namespace of at least one level: a top-level vendor name.

*. Class names MUST be declared in StudlyCaps. Code written for PHP 5.3 and after MUST use formal namespaces.

For example:

```
<?php
// PHP 5.3 and later:
namespace Vendor\Model;

class Foo
{
}
```

- Code written for 5.2.x and before SHOULD use the pseudo-namespacing convention of **Vendor_** prefixes on class names.

  For example:

```php
 <?php
// PHP 5.2.x and earlier:
class Vendor_Model_Foo
{
}
```

1.2.2 Versioning

The versioning follows Semantic Versioning 2.0.

Here quote the summary of Semantic Version below:

Given a version number MAJOR.MINOR.PATCH, increment the:

> MAJOR version when you make incompatible API changes, MINOR version when you add functionality in a backwards-compatible manner, and PATCH version when you make backwards-compatible bug fixes.

Additional labels for pre-release and build metadata are available as extensions to the MAJOR.MINOR.PATCH format.

1.2.3 Documentation

For documentation, this project uses Sphinx, which is a Python documentation generator. The syntax used in Sphinx is reStructuredText.

Here is a full code comment example quoted from **'Documenting Your Project Using Sphinx'_**.

CHAPTER 2

Introduction

X2R is a tool for helping developers to translate existing data in a variety of formats into linked-data compatible formats. The **X**, **2** and **R** in its name stand for existing data in a variety formats, to (the homonym of two) and linked-data compatible formats (i.e., RDF/XML), respectively.

The motivation is to ease the transformation of data into linked-data and thus lower the entry barrier of generating linked-data. Using X2R, more developers can easily translate existing data on-demands, and creating linked-data incrementally.

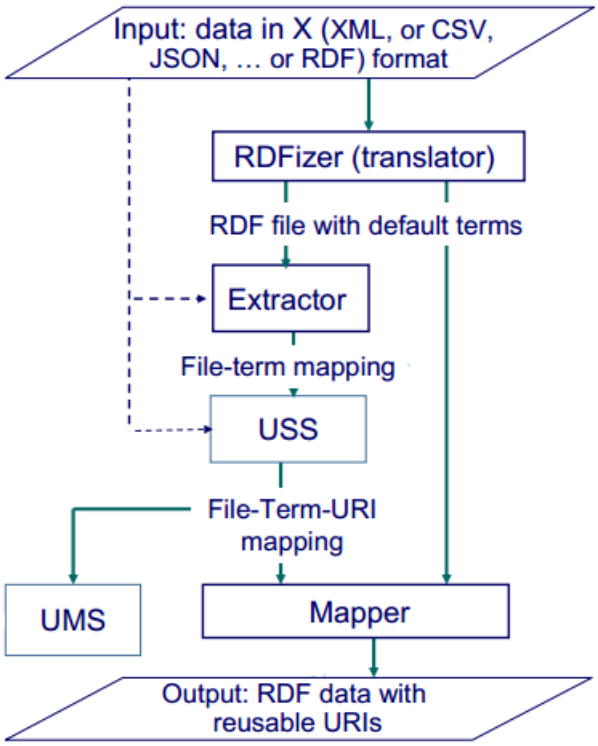

Fig. 2.1: The dataflow of X2R converter.

X2R is comprised of four components: Extractor, USS, UMS and Mapper. Figure above shows the dataflow of these four components and existing RDFizer(translators). For a given raw data input in X (XML, CSV, JSON ...etc.) format,

existing RDFizers can translated it into RDF serialization formats, such as Turtle, N-Triples, JSON-LD or RDF/XML. Using existing URIs to describe legacy data can make the data more reachable for people who nevigate popular linked data dataset or try to find data through linked data aggregators or linked data search engines. However, existing translators usually mint new URIs and lack the supports for reusing URIs. X2R bridges this gap by supporting URI finding and URI replacing functionalities to help linked data contributors in replacing URIs minted by translators with reusable URIs found in popular endpoints.

2.1 Audiences

Targeted users of X2R include people who develop linked-data applications and need to transform their legacy data into linked data. They can use the X2R GUI (Graphic User Interface) or batch-mode CLI (Command Line Interface). Developers who are experienced in PHP. If they feel current X2R's functionalities are sufficient, and want to build linked-data applications based on X2R. They can use X2R through API functions of the tool.

People who are experienced in PHP and linked data and find that current X2R utilities are insufficient, they can extend the X2R framework based on the hooks provided by X2R.

The index of this document can be found in genindex. The search page, search, can be used to search within this document.

CHAPTER 3

User Guide

This part of the document focuses on how to set up an environment for X2R and all its components: Extractor, Mapper and USS. A quickstart is then presented to give an overview of X2R and its components.

3.1 Installation

Three steps are needed to set up an X2R server, namely installing PHP, installing Composer and installing dependent packages. The detail instructions are listed as follows.

3.1.1 Install PHP

X2R is written in PHP. Before using X2R, the PHP should be installed.

To install PHP, an official manual is available in http://php.net/manual/en/install.php.

- Installation on Unix systems
- Installation on Mac OS X
- Installation on Windows systems
- Installation on Cloud Computing platforms

3.1.2 Install Composer

The dependency of X2R is managed by 'composer,' a PHP package management tool. Before trying X2R, get and install composer from https://getcomposer.org/.

Run this in your terminal to get the latest Composer version:

```
$ curl -sS https://getcomposer.org/installer | php
```

Or if you don't have curl:

```
$ php -r "readfile('https://getcomposer.org/installer');" | php
```

3.1.3 Install Dependent Packages

Installing X2R is simple with composer. Just use this command:

```
$ php composer.phar install
```

If you did a global install of composer, run instead:

```
$ composer install
```

3.2 Quickstart

Here is a simple usage scenario for grasping the whole picture of X2R by example. It assumes you already have X2R installed. If you do not, head over to the *Installation* section.

<Example>

X2R aims to improve the quality of RDF produced by typical format translators by replacing temporary or invalid URIs with valid and representive URIs.

CHAPTER 4

Components

4.1 Extractor

Extractor is a tool that extracts URIs from a given RDF file, and then turns these URIs into query terms. The purpose of Extractor is to find URI that cannot be reached in the given RDF. These URIs are usually generated by typical format translators and violate linked data design rules proposed by Tim Berners-Lee, i.e., they cannot be looked up in the Web. By generating query terms for them, other X2R tools, USS and UMS, can help in finding or minting better URIs.

RDF is comprised of three types of nodes: URI references, blank nodes or literals.

4.1.1 Input/Output

Input: RDFGraph

Output: *X2R data exchange format*

Components of X2R share a common data exchange format: *X2R data exchange format*. The output of Extractor is in the foramt of X2R data exchange format. The detail spec. of this exchange format is described below. Note that the "replacedURI" name/value pair is intentionally left blank in the context of Extractor (the potential replacedURI is obtained in the context of USS, and is applied in the context of Mapper).

```
{ "metadata": [],
  "mapping":
    [
        {
         "status": value of status,
         "originalURI": value of original URI,
         "replacedURI": value of updated URI,
         "term": value of term
         }
    ]
 }
```

name	value range/format
status	Range: {"N/A", "200", "303", "error"}
originalURI	A URI that can be found in input file and is valid
replacedURI	A valid URI
term	A string

Major components

RDFGraph

Accept *one element of ["json", "ntriples", "turtle", "rdfxml", "n3", "rdfa", "guess"]* and *string in a RDF serialization format*

Extractor accepts RDF in the data structure of RDFGraph. RDFGraph is the internal data structure used to abstract RDF attributes and operations. Using RDFGraph also make Extractor independent from the diversity of RDF serialization formats. Currently RDFGraph accepts a subset of RDF serialization formats. To initialize a RDFGraph object, user should specify the input format in terms of "value" listed in the Table below. If users have no idea of what the format of input is, they can use the "guess" value to ask Extractor to recognize the input's format for them (if it is one of the supported format list).

value	name	reference
json	RDF/JSON	http://n2.talis.com/wiki/RDF_JSON_Specification
ntriples	N-Triples	http://www.w3.org/TR/n-triples/
turtle	Turtle	http://www.dajobe.org/2004/01/turtle
rdfxml	RDF/XML	http://www.w3.org/TR/rdf-syntax-grammar
n3	N3	http://www.w3.org/2000/10/swap/grammar/n3
rdfa	RDFa	http://www.w3.org/TR/rdfa-core/
guess		If user don't know the format

Tokenizer is a major component of extractor. It aims to tokenize the tail of extracted URIs into word chuncks that can then be used as query terms to find better URIs.

In X2R Extractor, a tokenizer should implement two methods, tokenizeArr(array $arr) and tokenizeStr($str).

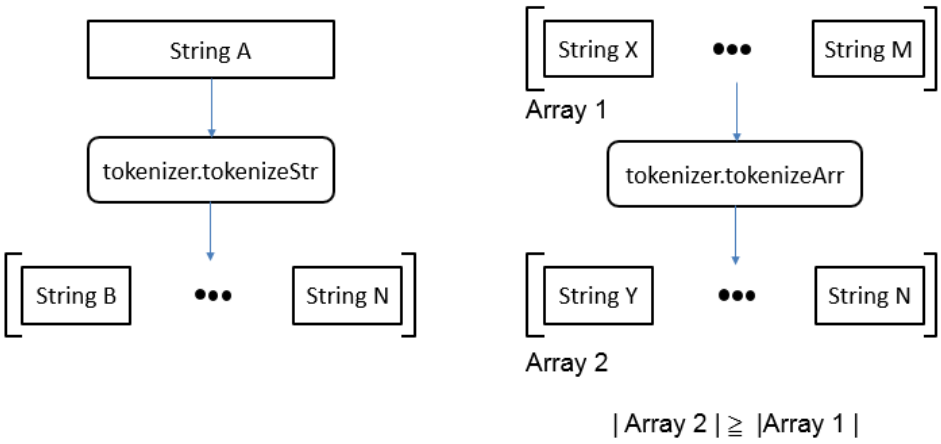

Fig. 4.1: Tokenizers can be composited as a composited tokenizer that accepts string and tokenized it into an array of sub-strings.

X2R currently support two tokenizers, delimited-based tokenizer and cased-based tokenizer.

Web API Definition

`POST /extractor{?excludedNamespaces, checkUrisStatus, rdfContent}`

Query Parameters

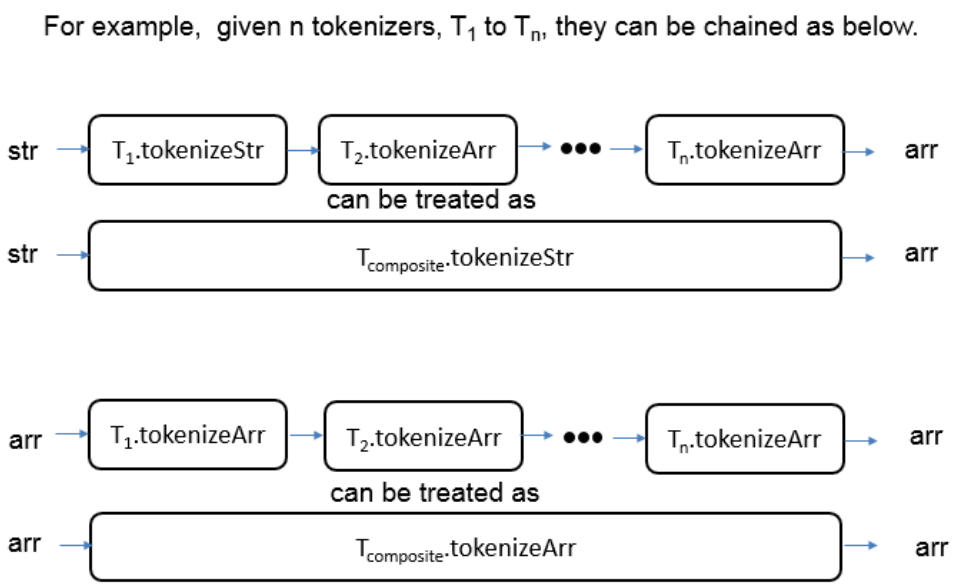

Fig. 4.2: Tokenizer can also composited to form a composited tokenizer that accepts an array of sub-strings to an array of sub-strings with longer length, if there are any sub-string can be further tokenized.

- **`excludedNamespaces`** – *(optional)* This specifies a list of namespaces to be skipped. That is, if a found URI belonged to this list, the URI will not be processed anymore.
- **`checkUrisStatus`** – *(required)* This determines if *extractor* checks the status codes of found URIs.
- **`rdfContent`** – *(required)* This specifies the content of RDF to be processed.

Response Headers

- Content-Type – application/json

Status Codes

- 200 OK – no error
- 404 Not Found – exception

Response Format Detail

Content-Type: application/json

Response template:

```
{"metadata": [],
 "mapping":
             [{"status": "",
               "originalURI": "",
               "replacedURI": "",
               "term": "",
               "lineNumbers": ""
              }
```

```
            ]
}
```

Mapping entry:

```
[{"status": "",
  "originalURI": "",
  "replacedURI": "",
  "term": ""
 }
]
```

Examples

Here provides three examples of requesting Extractor Web service. Example 1 is a request without excludeNamespaces. In that case, Extractor will return all URIs found in given rdfContent with their corresponding terms. Example 2 illustrates the case of using excludeNamespaces to ignore URIs that are belonged to trustable namespaces, such as "http://www.w3c.org". Example 3 demos the usage of checkUrisStatus. Depending on the value of checkUrisStatus, "on" will let Extractor test the connection to extracted URI and get the response's status code. In the context of X2R, only two codes, "200" and "303", are valid. For status code other than 200 and 303, Extractor returns "error". The connection test will cause additional delay to Extractor services. For users who need instant response, setting checkUrisStatus as "off" can save waiting time.

Example 1 request:

```
POST /extractor?rdfContent=input_value HTTP/1.1
```

***input_value*:**

```
<?xml version="1.0" encoding="UTF-8"?>
    <rdf:RDF
        xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
        xmlns:geo="http://www.w3.org/2003/01/geo/wgs84_pos#"
        xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
        xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#">

<rdf:Description rdf:about="http://127.0.0.1/DaTongSportsCenter">
    <rdf:type rdf:resource="http://www.w3.org/2003/01/geo/wgs84_pos#SpatialThing"/>
    <updatedAt xmlns="http://openisdm.iis.sinica.edu.tw/VR/"
        rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2013-07-31T03:23:47Z</upda
    <geo:long>121.516</geo:long>
    <hasTelephone xmlns="http://openisdm.iis.sinica.edu.tw/VR/">2592-0055</hasTelephone>
    <hasName xmlns="http://openisdm.iis.sinica.edu.tw/VR/">Da Tong Sports Center</hasName>
    <geo:location>No.51, Dalong St., Datong Dist., Taipei City 103, Taiwan (R.O.C.)</geo:lo
    <usedFor xmlns="http://openisdm.iis.sinica.edu.tw/VR/">Sport</usedFor>
    <createdAt xmlns="http://openisdm.iis.sinica.edu.tw/VR/"
        rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2012-11-28T09:05:13Z</crea
    <geo:lat>25.0648</geo:lat>
</rdf:Description>

<rdf:Description rdf:about="http://127.0.0.1/ShilinSportsCenter">
  <rdf:type rdf:resource="http://www.w3.org/2003/01/geo/wgs84_pos#SpatialThing"/>
  <updatedAt xmlns="http://openisdm.iis.sinica.edu.tw/VR/"
      rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2013-07-31T03:23:47Z</updated
  <geo:long>121.521</geo:long>
  <hasTelephone xmlns="http://openisdm.iis.sinica.edu.tw/VR/">2880-6066</hasTelephone>
```

```
        <hasName xmlns="http://openisdm.iis.sinica.edu.tw/VR/">Shilin Sports Center</hasName>
        <geo:location>No.1, Shishang Rd., Shilin Dist., Taipei City 111, Taiwan (R.O.C.)</geo:loca
        <usedFor xmlns="http://openisdm.iis.sinica.edu.tw/VR/">Sport</usedFor>
        <createdAt xmlns="http://openisdm.iis.sinica.edu.tw/VR/"
            rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2012-11-28T09:05:13Z</created
        <geo:lat>25.0897</geo:lat>
      </rdf:Description>

     </rdf:RDF>
```

Example 1 response:

```
HTTP/1.1 200 OK
Vary: Accept
Content-Type: application/json

{
"metadata":[
],
"mapping":[
{
"status":"N/A",
"originalURI":"http://127.0.0.1/DaTongSportsCenter",
"replacedURI":"",
"term":" Da Tong Sports Center "
},
{
"status":"N/A",
"originalURI":"http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
"replacedURI":"",
"term":" 22 rdf syntax ns type "
},
{
"status":"N/A",
"originalURI":"http://openisdm.iis.sinica.edu.tw/VR/updatedAt",
"replacedURI":"",
"term":" updated At "
},
{
"status":"N/A",
"originalURI":"http://www.w3.org/2003/01/geo/wgs84_pos#long",
"replacedURI":"",
"term":" wgs84 pos long "
},
{
"status":"N/A",
"originalURI":"http://openisdm.iis.sinica.edu.tw/VR/hasTelephone",
"replacedURI":"",
"term":" has Telephone "
},
{
"status":"N/A",
"originalURI":"http://openisdm.iis.sinica.edu.tw/VR/hasName",
"replacedURI":"",
"term":" has Name "
},
{
"status":"N/A",
"originalURI":"http://www.w3.org/2003/01/geo/wgs84_pos#location",
```

```
"replacedURI":"",
"term":" wgs84 pos location "
},
{
"status":"N/A",
"originalURI":"http://openisdm.iis.sinica.edu.tw/VR/usedFor",
"replacedURI":"",
"term":" used For "
},
{
"status":"N/A",
"originalURI":"http://openisdm.iis.sinica.edu.tw/VR/createdAt",
"replacedURI":"",
"term":" created At "
},
{
"status":"N/A",
"originalURI":"http://www.w3.org/2003/01/geo/wgs84_pos#lat",
"replacedURI":"",
"term":" wgs84 pos lat "
},
{
"status":"N/A",
"originalURI":"http://127.0.0.1/ShilinSportsCenter",
"replacedURI":"",
"term":" Shilin Sports Center "
}
]
}
```


Example 2 request:

```
POST /extractor?excludedNamespaces[]&rdfContent=input_value HTTP/1.1
```

excludedNamespaces[]

```
excludedNamespaces[]=www.w3.org&excludedNamespaces[]=openisdm.iis.sinica.edu.tw
```

input_value is the same as Example 1's erquest.

Example 2 response:


```
HTTP/1.1 200 OK
Vary: Accept
Content-Type: application/json

{
"metadata":[
],
"mapping":[
{
"status":"N/A",
"originalURI":"http://127.0.0.1/DaTongSportsCenter",
"replacedURI":"",
"term":" Da Tong Sports Center "
},
{
"status":"N/A",
"originalURI":"http://127.0.0.1/ShilinSportsCenter",
"replacedURI":"",
```

```
"term":" Shilin Sports Center "
}
]
}
```

Example 3 request:

```
POST /extractor?excludedNamespaces[]&rdfContent=input_value&checkUrisStatus=on HTTP/1.1
```

excludedNamespaces[] is the same as Example 2's request.

input_value is the same as Example 1's request.

Example 3 response:

```
HTTP/1.1 200 OK
Vary: Accept
Content-Type: application/json

{
"metadata":[
],
"mapping":[
{
"status":"error",
"originalURI":"http://127.0.0.1/DaTongSportsCenter",
"replacedURI":"",
"term":" Da Tong Sports Center "
},
{
"status":"error",
"originalURI":"http://127.0.0.1/ShilinSportsCenter",
"replacedURI":"",
"term":" Shilin Sports Center "
}
]
}
```

4.2 Mapper

Mapper is a tool for systematically replacing URIs within a given RDF. When you have the mapping from original URIs to new URIs, Mapper can replace the URIs based on the mapping automatically.

4.2.1 Input/Output

Input: *X2R data exchange format* and *string in a RDF serialization format*

Components of X2R share a common data exchange format: *X2R data exchange format*. The output of Extractor is in the foramt of X2R data exchange format. The detail spec. of this exchange format is described below.

```
{ "metadata": [],
  "mapping":
    [
        {
         "status": status value,
         "originalURI": original URI value,
```

```
        "replacedURI": updated URI value,
        "term": term value
        }
    ]
}
```

Output: string in a RDF serialization format

Mapper allow user to specify the updated RDF in the format of a subset of RDF serialization formats listed in the Table below.

value	name	reference
json	RDF/JSON	http://n2.talis.com/wiki/RDF_JSON_Specification
ntriples	N-Triples	http://www.w3.org/TR/n-triples/
turtle	Turtle	http://www.dajobe.org/2004/01/turtle
rdfxml	RDF/XML	http://www.w3.org/TR/rdf-syntax-grammar
n3	N3	http://www.w3.org/2000/10/swap/grammar/n3
rdfa	RDFa	http://www.w3.org/TR/rdfa-core/

Web API Definition

POST /mapper{?rdfContent, mapping, format}

Query Parameters

- **rdfContent** – (required) This specifies the content of RDF to be processed.
- **mapping** – (required) This specifies the information needed for *mapper* to update the URIs found in rdfContent.
- **format** – (optional) This specifies the format of output.

Response Headers

- Content-Type – application/rdf+xml

Status Codes

- 200 OK – no error
- 404 Not Found – exception

Example

Example request:

```
POST /mapper?rdfContent=input_value&mapping=mapping_value&format=rdfxml HTTP/1.1
```

***input_value*:**

```
<?xml version="1.0" encoding="UTF-8"?>
    <rdf:RDF
        xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
        xmlns:geo="http://www.w3.org/2003/01/geo/wgs84_pos#"
        xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
        xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#">

<rdf:Description rdf:about="http://127.0.0.1/DaTongSportsCenter">
    <rdf:type rdf:resource="http://www.w3.org/2003/01/geo/wgs84_pos#SpatialThing"/>
```

```
                <updatedAt xmlns="http://openisdm.iis.sinica.edu.tw/VR/"
                    rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2013-07-31T03:23:47Z</
                <geo:long>121.516</geo:long>
                <hasTelephone xmlns="http://openisdm.iis.sinica.edu.tw/VR/">2592-0055</hasTelephone
                <hasName xmlns="http://openisdm.iis.sinica.edu.tw/VR/">Da Tong Sports Center</hasNa
                <geo:location>No.51, Dalong St., Datong Dist., Taipei City 103, Taiwan (R.O.C.)</ge
                <usedFor xmlns="http://openisdm.iis.sinica.edu.tw/VR/">Sport</usedFor>
                <createdAt xmlns="http://openisdm.iis.sinica.edu.tw/VR/"
                    rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2012-11-28T09:05:13Z</
                <geo:lat>25.0648</geo:lat>
             </rdf:Description>

            <rdf:Description rdf:about="http://127.0.0.1/ShilinSportsCenter">
              <rdf:type rdf:resource="http://www.w3.org/2003/01/geo/wgs84_pos#SpatialThing"/>
              <updatedAt xmlns="http://openisdm.iis.sinica.edu.tw/VR/"
                  rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2013-07-31T03:23:47Z</upd
              <geo:long>121.521</geo:long>
              <hasTelephone xmlns="http://openisdm.iis.sinica.edu.tw/VR/">2880-6066</hasTelephone>
              <hasName xmlns="http://openisdm.iis.sinica.edu.tw/VR/">Shilin Sports Center</hasName>
              <geo:location>No.1, Shishang Rd., Shilin Dist., Taipei City 111, Taiwan (R.O.C.)</geo:
              <usedFor xmlns="http://openisdm.iis.sinica.edu.tw/VR/">Sport</usedFor>
              <createdAt xmlns="http://openisdm.iis.sinica.edu.tw/VR/"
                  rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2012-11-28T09:05:13Z</cre
              <geo:lat>25.0897</geo:lat>
            </rdf:Description>

             </rdf:RDF>
```

***mapping_value*:**

```
            { "metadata": [],
              "mapping":
                [
                    {
                     "status": "N/A",
                     "originalURI": "http://127.0.0.1/DaTongSportsCenter",
                     "replacedURI": "http://openisdm.iis.sinica.edu.tw/VR/DaTongSportsCenter",
                     "term": "Datong Sports Center"
                     },
                     {
                     "status": "N/A",
                     "originalURI": "http://127.0.0.1/ShilinSportsCenterr",
                     "replacedURI": "http://openisdm.iis.sinica.edu.tw/VR/ShilinSportsCenter",
                     "term": "Shilin Sports Center"
                     }
                ]
             }
```

Example response:

```
 HTTP/1.1 200 OK
 Vary: Accept
 Content-Type: application/rdf+xml

<?xml version="1.0" encoding="UTF-8"?>
    <rdf:RDF
        xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
        xmlns:geo="http://www.w3.org/2003/01/geo/wgs84_pos#"
```

```
            xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
            xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#">

    <rdf:Description rdf:about="http://openisdm.iis.sinica.edu.tw/VR/DatongSportsCenter">
       <rdf:type rdf:resource="http://www.w3.org/2003/01/geo/wgs84_pos#SpatialThing"/>
       <updatedAt xmlns="http://openisdm.iis.sinica.edu.tw/VR/"
           rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2013-07-31T03:23:47Z</updatedAt
       <geo:long>121.516</geo:long>
       <hasTelephone xmlns="http://openisdm.iis.sinica.edu.tw/VR/">2592-0055</hasTelephone>
       <hasName xmlns="http://openisdm.iis.sinica.edu.tw/VR/">Datong Sports Center</hasName>
       <geo:location>No.51, Dalong St., Datong Dist., Taipei City 103, Taiwan (R.O.C.)</geo:locatic
       <usedFor xmlns="http://openisdm.iis.sinica.edu.tw/VR/">Sport</usedFor>
       <createdAt xmlns="http://openisdm.iis.sinica.edu.tw/VR/"
           rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2012-11-28T09:05:13Z</createdAt
       <geo:lat>25.0648</geo:lat>
    </rdf:Description>

    <rdf:Description rdf:about="http://openisdm.iis.sinica.edu.tw/VR/ShilinSportsCenter">
      <rdf:type rdf:resource="http://www.w3.org/2003/01/geo/wgs84_pos#SpatialThing"/>
      <updatedAt xmlns="http://openisdm.iis.sinica.edu.tw/VR/"
          rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2013-07-31T03:23:47Z</updatedAt>
      <geo:long>121.521</geo:long>
      <hasTelephone xmlns="http://openisdm.iis.sinica.edu.tw/VR/">2880-6066</hasTelephone>
      <hasName xmlns="http://openisdm.iis.sinica.edu.tw/VR/">Shilin Sports Center</hasName>
      <geo:location>No.1, Shishang Rd., Shilin Dist., Taipei City 111, Taiwan (R.O.C.)</geo:locatic
      <usedFor xmlns="http://openisdm.iis.sinica.edu.tw/VR/">Sport</usedFor>
      <createdAt xmlns="http://openisdm.iis.sinica.edu.tw/VR/"
          rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2012-11-28T09:05:13Z</createdAt>
      <geo:lat>25.0897</geo:lat>
    </rdf:Description>

   </rdf:RDF>
```

4.3 URI Search Service

URI Search Service (USS) is a federated search service. The general process of USS is listed below.

1. USS accepts a set of URI search requests
2. USS refines the search requests (e.g. fixing typos or replace with a better term)
3. USS composes corresponding SPARQL for each query request
4. USS issues SPARQL queries to a set of Endpoints, which are defined in USS's configuration
5. USS integrates all results returned from Endpoints
6. USS applies filters and rankers to remove the ambiguity or promote results that are commonly used
7. USS selects one result for each request

All steps listed above should be easily replacable. These steps can also be outsourced to human instead of heuristics. In order to make USS a flexible system, we provide the system with the following useful hooks. These hooks can be replaced or extended independly. These atomic hooks can also be composited through method chaining.

In refined USS, seven **atomic hooks** can be replaced and extended, they are:

- **Query Parser** - Query Parser parses the plain text query string into set of query terms, term refinement qualifiers, result set qualifiers and corresponding integration commands.

- **Federated Search** - Federated Search is a container of implemented Endpoint instances. By containing Endpoint instances, query issued to Federated Search can be federatedly issued to all its contained Endpoint instances, and the results from contained Endpoint instances will be aggregated and returned as one result set.
- **Endpoint** (see also: *Endpoint*) - Endpoint wraps a public endpoint, such as DBpedia, and handles the errors, such as Endpoint service downtime. Endpoint accepts SQARQL query and return the result set in the standard format of Endpoint.
- **Term Refiner** - Term Refiner takes one query term as its input and produces as output a refined query term.
- **Result Ranker** - Result Ranker reorders the ranks of result set based on the heuristic that it wants to realize. In addition to an extensible set of heuristics, Result Ranker can also be a crowdsourcing task, which can be delegated to the crowd.
- **Result Filter** - Result Filter augments USS's ability in selectively reducing the size of result set of possible URIs. It filters result set by a regular expression patterns. The typical usage of Result Filter is to resolve ambiguity by excluding URIs that have the desciptions matched the defined regular expression patterns.
- **Result Integrator** - Result Integrator takes two or more result sets and integrates them as one ranked result set.
- **Result Selector** - Result Selector is an abstract class defined a common interface for the task of picking one fittest URI from a set of possible URIs returned from existing Endpoints. The task can be either automatic doned by programmed heuristics or a crowdsourcing task that can be accomplished by poping up a user interface for real human to select the fittest URI.

4.3.1 Web API Definition

GET /uss{?q, sites, output, start, num}

Query Parameters

- **q** – *(required)* Search term of interest.
- **sites** – *(required)* The sites to search term. Has default value.
- **format** – *(required)* The format of returned result.
- **start** – *(optional)* The offset to specify the index of returned result.
- **num** – *(optional)* The number of returned result. Use with start in the search query.

Response Headers

- Content-Type – application/json

Status Codes

- 200 OK – no error
- 404 Not Found – exception

Response template:

```
{
 "term":"typhoon",
 "data":[array of searched URI results]
}
```

Data entry:

```
"data": [
 {
  "dataSourceName": "http://dbpedia.org",
```

```
  "response": {
   "head": {
    "link": [],
    "vars": [
     "s",
     "o"
    ]
   },
   "results": {objects of returned URI results}
   }
}
]
```

Result entry

```
"results": {
    "distinct": false,
    "ordered": true,
    "bindings": [
     {
      "s": {
       "type": "uri",
       "value": "http://wikidata.dbpedia.org/uri_1"
      },
      "o": {
       "type": "literal",
       "xml:lang": "en",
       "value": "typhoon"
      }
     }
   ]
}
```

4.3.2 Example

Example request:

```
    GET /uss?q=typhoon&sites&output=json
```

Example response:

```
{
 "term": "typhoon",
 "data": [
 {
  "dataSourceName": "http://dbpedia.org",
  "response": {
   "head": {
    "link": [],
    "vars": [
     "s",
     "o"
    ]
   },
   "results": {
    "distinct": false,
    "ordered": true,
    "bindings": [
```

```
      {
       "s": {
        "type": "uri",
        "value": "http://wikidata.dbpedia.org/resource/Q140588"
       },
       "o": {
        "type": "literal",
        "xml:lang": "en",
        "value": "typhoon"
       }
      },
      {
       "s": {
        "type": "uri",
        "value": "http://dbpedia.org/resource/Category:Typhoon_shelters_in_Hong_Kong"
       },
       "o": {
        "type": "literal",
        "xml:lang": "en",
        "value": "Typhoon shelters in Hong Kong"
       }
      }
     ]
    }
   }
  }
 }
]
}
```


4.4 X2R User Interface

X2R is designed to be both human and machine friendly through an open API. Based on the API, the tool aims to provide two kinds of user interfaces for human users: a Web-based GUI and a command line Interface.

4.4.1 API Usage

The details of API usage can be found in next chapter.

4.4.2 User Interface

X2R 1.0 provides a JQuery-powered GUI and a command line Interface is planned to be included in version 2.0.

json	RDF/JSON	http://n2.talis.com/wiki/RDF_JSON_Specification
ntriples	N-Triples	http://www.w3.org/TR/n-triples/
turtle	Turtle	http://www.dajobe.org/2004/01/turtle
rdfxml	RDF/XML	http://www.w3.org/TR/rdf-syntax-grammar
n3	N3	http://www.w3.org/2000/10/swap/grammar/n3
rdfa	RDFa	http://www.w3.org/TR/rdfa-core/

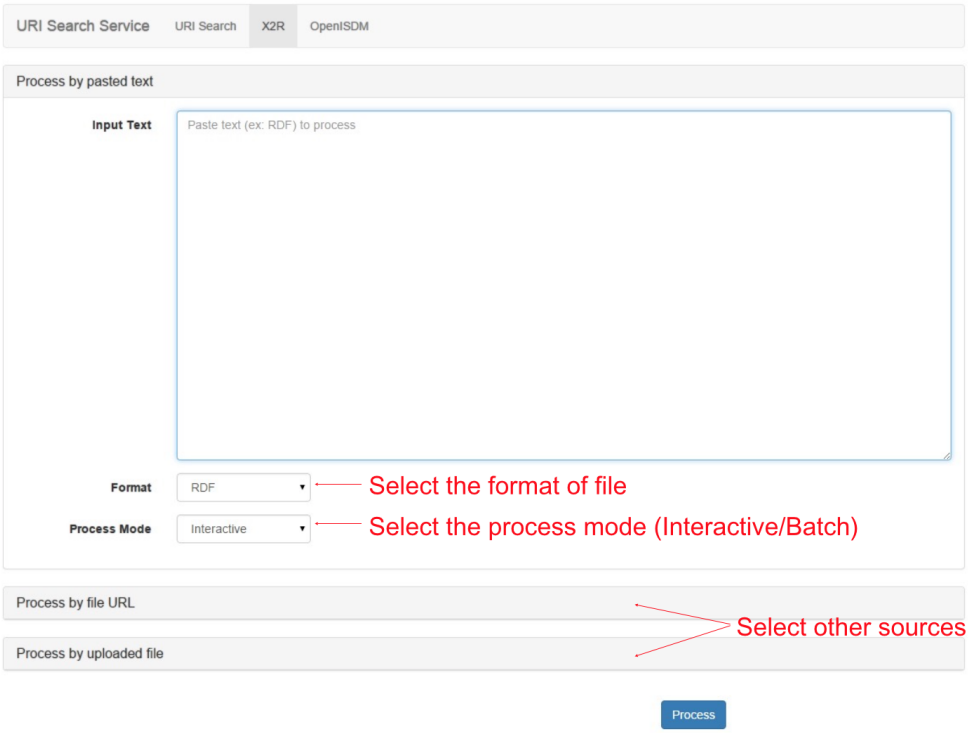

Fig. 4.3: User of X2R GUI first inputs RDF file. X2R GUI provides three input methods, input through text, input through a URL or input through a file. The default method is input through text, user can change to other two methods by clicking (marked in red words "Select other sources"). After input text, user needs to specify the RDF serialization format's type (marked in red words "Select the format of file") through a dropdown menu. There are two modes provided by X2R GUI, interactive and batch. User can specify the mode through a dropdown menu (marked in red words "Select the process mode (Interactive/Batch)"). For large RDF file, batch mode is more feasible than interactive mode, the implemented heuristics will automatically select terms, find URIs and replace URIs as an improved RDF file. For small to medium size RDF files that translated from raw data with meaningless data namings, interactive mode might be a better choice. If the user selects the batch mode, user will skip next two screenshots and follow by the forth screenshot.

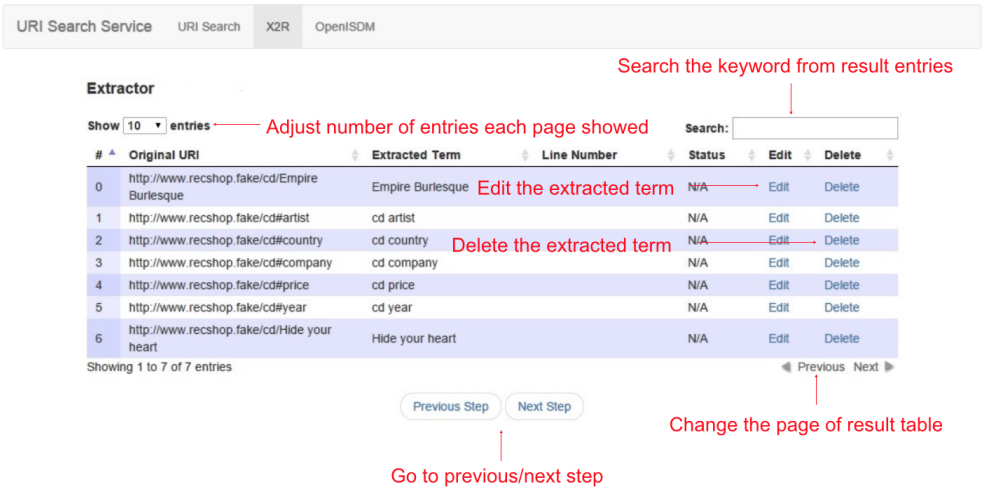

Fig. 4.4: After inputting the RDF, the control is handed over to Extractor. This screenshot depicted the GUI of Extractor. There is a table that lists the extracted URIs found in the inputted RDF with the automatically tokenized terms. If the automatically tokenized terms are not representive enougth, user can use the "edit" or "delete" buttons located in the end of each row to edit or delete the terms. GUI of Extractor provides a result size selector, and user can select the number of results showed per page.

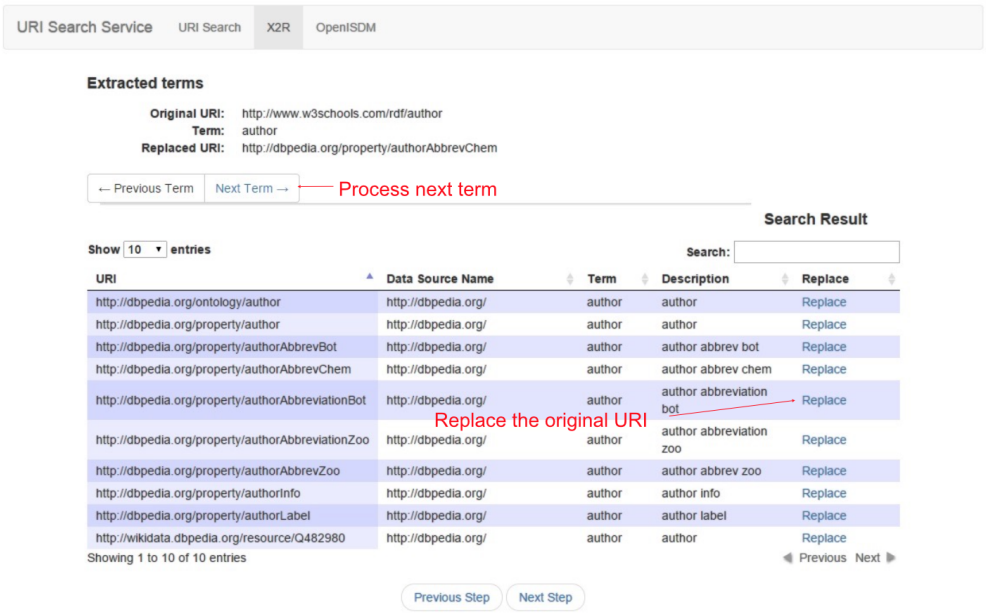

Fig. 4.5: After confirming or editing the extracted terms, X2R GUI helps user to issue the terms to endpoints supported by X2R GUI. Currently, X2R supports two endpoints, Dbpedia and LinkedGeoData. User can select one of the URI result list to replace original URI by clicking "Replace" botton. To switch to other term's URI list, user can click the "Next Term" tab to switch.

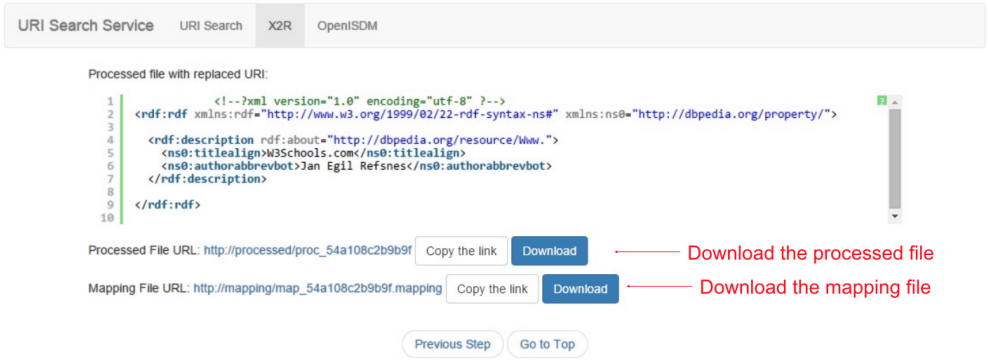

Fig. 4.6: After replacing URI interactivelly or automatically, user can select the RDF serialization format for the updated RDF. The RDF serialization formats listed below are supported X2R 1.0.

CHAPTER 5

API Usage

5.1 Extractor API Usage Scenarios

5.1.1 Operation Scenarios

Extract URIs from a Given RDF

1. Include the file **"extractor.class.php"** in your program
2. Initialize a **Extractor** instance by passing a **rdfGraph**
3. Call the method **getQueryTerms()**

Tokenize an URI into Query Terms

Extractor can help in tokenizing URI task. To tokenize a given URI, you can use the method **tokenize($str)**, where the $str is the URI that you want to tokenize.

Currently, we implements two representive tokenizers, **DelimitBasedTokenizer** and **CaseBasedTokenizer**, and the **tokenize($str)** applies these two tokenizers on the $str.

5.1.2 Configuration Scenarios

Set a RDF Parser

There are many RDF parsers available. In X2R, we allow developers to set or even introduce new RDF parsers for reasons, such as better performace or wider range of input formats.

Currently, we implement one wrapper, **Easy_Rdf_Adapter**, for EasyRdf. EasyRdf is a popular RDF parser implemented in PHP, and more information can be found in it official site.

To set **Easy_Rdf_Adapter** as the RDF parser.

1. Initialize an instance of **Easy_Rdf_Adapter**
2. Initialize a **Extractor** instance by passing the instance just initialized

Set an URI Filter

If there are some URIs that you want to ignore in the whole URI replacement process, you can use **addFilteredUri($furi)** to incrementally build the URI filter.

You can also use **getFiltedUris()** method to get the current list of URIs that are ignored.

5.2 USS API Usage Scenarios

5.2.1 Operation Scenarios

Search URIs by terms

1. Include the file **"urisearchservice.class.php"** in your program
2. Initialize a **UriSearchService** instance
3. Call the method **uriSearch** with a **query string** as the parameter. After receving all Endpoints' respones, the **result set** is returned

5.2.2 Configuration Scenarios

After initializing a **UriSearchService** instance, the default components are already set. If you want to change the default setting, you can reset the components as the guidences listed below.

The configuration methods can be chained. Here is a code example.

```
include_once (risearchservice.class.php);
$exampleUss = new UriSearchService();
//... Initialize components as $parser, $selector ...etc.
$exampleUss->setFederatedSearch($federatedSearch)
           ->setParser($parser)
           ->setProcessor($rsultProcessor)
           ->setSelector($selector);
```

Set a Parser

1. Initialize a parser
2. Assign the new parser through the method **setParser($parser)**

Set FederatedSearch

1. Initialize a federatedSearch
2. Assign the new federatedSearch through the method **setFederatedSearch($federatedSearch)**

Set a Result Processor (Filter and Ranker)

1. Initialize a rsultProcessor
2. Assign the new rsultProcessor through the method **setProcessor($rsultProcessor)**

Set a Selector

1. Initialize a selector
2. Assign the new selector through the method **setSelector($selector)**

5.3 Mapper API Usage Scenarios

5.3.1 Operation Scenarios

Replace Original URIs with Specified URIs

1. Include the file **"mapper.class.php"** in your program
2. Initialize a **Mapper** instance by passing a **rdfGraph**
3. Call the method **refactoring($refType, $change)**
4. Call the method **serialize($format)**

5.3.2 Configuration Scenarios

Change a Refactor (URI Replacement)

Change different refactors can let Mapper be able to do different refactoring on the given RDF. In order to decouple the **Mapper** from specific **Refactor**, their dependency is injected during runtime through the method **refactoring($refType, $change)**.

Currently, we only implement one type of **Refactor**, called **Rename** (defined in "refaRename.class.php"). Its corresponding change is an associative array, which saves the mapping from original URI to replaced URI. There is one example of **change** that the refactor, **Rename**, accepted.

```
$exampleChange = array('http://original.uri.1' => 'http://replaced.uri.1',
                       'http://original.uri.2' => 'http://replaced.uri.2');
```

Set a RDF Parser

There are many RDF parsers available. In X2R, we allow developers to set or even introduce new RDF parsers for reasons, such as better performace or wider range of input formats.

Currently, we implement one wrapper, **Easy_Rdf_Adapter**, for EasyRdf. EasyRdf is a popular RDF parser implemented in PHP, and more information can be found in it official site.

To set **Easy_Rdf_Adapter** as the RDF parser.

1. Initialize an instance of **Easy_Rdf_Adapter**
2. Initialize a **Mapper** instance by passing the instance just initialized

CHAPTER 6

API Reference

This part of the documentation dedicates to prople who are looking for information on a specific function, class or method.

6.1 API

6.1.1 Extractor

class `Extractor`

Extractor class implements URI extracting & analyzing process as below.

1.Load the RDF content to a rdfGraph data structure.

2.Traverse the rdfGraph to find all the URIs, and generate a filtered URI list.

3.Transform URIs to search terms.

4.Wrap search terms in JSON output.

`getQueryTerms`()

Extract terms from URIs of given RDF, and wrapp terms with their contextual information.

Returns A JSON string of terms derived from extracted URIs of a given RDF file with corresponding metadata,

including *originalURI*, *replacedURI*, *status*, *lineNumbers*.

`getFiltedUris`()

Get current URI filter list.

Returns An array of filtered URI.

`addFilteredUri`(*$furi*)

Add the given URI, $furi, to the URI filted list.

Parameters

- **`$furi`** (*string*) – The URI to be filtered

Returns Either false on failure, or the true for success.

`removeFilteredUri`(*$furi*)

Remove the given URI, $furi, from the URI filter list.

Parameters

- **$furi** (*string*) – The URI to be filtered

Returns Either false on failure, or the true for success

6.1.2 RdfGraph

class RdfGraph

RdfGraph is an abstract class for wrapping any existing RDF parsers. It provides a common X2R interface between the tool and existing RDF parsers used by the tool.

parseRdf(*$data*)

This method parses a string, $data, of RDF serialization format into X2R internal data exchange model. If the model is already existed, model pased from latest assigned $data will replace previous model.

Parameters

- **$data** (*string*) – The content of RDF file.

Returns Either false on failure, or the true for success.

serializeRdfAs(*$format*)

To serialize RDF saved in RdfGraph in the RDF serialization format specified by $format.

Parameters

- **$format** (*string*) – The file format of serialized RDF.

Returns Either false on failure, or the string representation of serialized RDF in specified format.

EasyRdfAdapter

class EasyRdfAdapter

EasyRdfAdapter class is an implemantion of RdfGraph. It provides interface methods to invoke the open source RDF parser, EasyRDF.

parseRdf(*$data*)

Parameters

- **$data** (*string*) – The content of RDF file.

Returns Either false on failure, or the true for success.

Raises ValueError Raise if the $data cannot be parsed successfully.

serializeRdfAs(*$format*)

Parameters

- **$format** (*string*) – The file format of serialized RDF.

Returns Either false on failure, or the string representation of serialized RDF in specified format.

Raises ValueError The $format is not an element of 'supported_format', which includes 'jsonld', 'rdfxml'.

6.1.3 Tokenizer

class Tokenizer

Tokenizer is an abstract class. It defines a common interface to all tokenizer. Version 1.0 Extractor has implemented two types of tokenizers: CaseBasedTokenizer and DelimitBasedTokenizer.

tokenizeString(*$str*)
tokenizeString accepts string and tokenize it based on the heuristics defined in this method. After tokenizing, the result tokens are stored in an array and return.

param string $str The string to be tokenized.

returns An array of tokenized strings.

tokenizeArrayOfStrings(*$arr*)
tokenizeArrayOfString accepts array of string and tokenize each string based on the heuristics defined in this method. After tokenizing, the result tokens are stored in an array and return.

param array $arr The array of strings to be tokenized

returns An array of tokenized strings.

arrayToString(*$arr*)
arrayToSting is an utility function for generying a query string by concatenating string in inputed array with whitespace.

param array $arr An array of strings

returns A string which is consisted of elements from given array $arr and is concatenated by whitespace.

CaseBasedTokenizer

CaseBasedTokenizer is a tokenizer that use case as the criteria to tokenize. There are several test cases listed below to help user understand how it works.

- CapitalizedWords -> capitalized words
- camelCaseWords -> camel case words
- UPPERCASElowercase -> uppercase lowercase

Note that the criteria of tokenizing uppercase and camelcase are sometime conflict. For such conflict CaseBaseTokenizer is designed to make uppercase rule precedent to camelcase rule.

For example, a string "abcDEFgh" will be tokenized as "abc", "def" and "gh" instead of "abc", "de", "fgh".

class CaseBasedTokenizer
CaseBasedTokenizer class

tokenizeString(*$str*)

Parameters

- **$str** (*string*) – The string to be tokenized.

Returns An array of tokenized strings.

tokenizeArrayOfStrings(*$arr*)

Parameters

- **$arr** (*array*) – The array of strings to be tokenized

Returns An array of tokenized strings.

DelimitBasedTokenizer

DelimitBasedTokenizer is a tokenizer that use delimits as the criteria to tokenize. There are several test cases listed below to help user understand how it works.

- lower_case_with_underscores -> lower case with underscores
- different*delimits&demo$case -> different delimits demo case

Since all tokenizers in X2R shared a common interface, they can be composed to form composited tokenizer. For example, the composited tokenizer built by composing DelimitBasedTokenizer and CaseBasedTokenizer can tokenize the complex string listed below.

- Before tokenizing: "AB/Ddf#223-oirDDD_www-Doc ddfs,sse;O-W_dd@iop^yydD!pp~qas"
- After tokenizing: "ab ddf 223 oir ddd www doc ddfs sse o w dd iop yydd pp qas"

class `DelimitBasedTokenizer`

DelimitBasedTokenizer class

`tokenizeString` (*$str*)

Parameters

- **`$str`** (*string*) – The string to be tokenized.

Returns An array of tokenized strings.

`tokenizeArrayOfStrings` (*$arr*)

Parameters

- **`$arr`** (*array*) – The array of strings to be tokenized

Returns An array of tokenized strings.

6.1.4 Refactor

class `Refactor`

Refactor is the class that reserves the flexibility for introducing new kind of RDF refactoring into this RDF analyzing and manupilation framework.

`refactoring` (*$change*)

Parameters

- **`$change`** (*int*) – The change spec. for the refacroring.

Returns Either false on failure, or the true for success.

ReplaceUri

class `ReplaceUri`

ReplaceUri is an implemetation of Refactor class. It is the default refactoring used in X2R project. The replaceUri is to replace an existing URI with a new URI.

`refactoring` (*$change*)

Parameters

- **`$change`** (*int*) – The change spec. for the refacroring.

Returns Either false on failure, or the true for success.

6.1.5 Mapper

class `Mapper`

Mapper is the class for modeling the RDF transformation (refactoring) process.

Currently, the Mapper only support one kind of transformation (refactoring) - replaceURI.

The replaceURI is to replace an existing URI with a new URI..

`Mapper`(*$graph*)
The constructor of Mapper accept a rdfGraph object that abstracts Mapper from the diversity of RDF serialization formats.

Parameters

- **`$graph`** (*rdfGraph*) – The RDF, which is holded in the rdfGraph data structure, to be refactored.

`refactoring`(*$refactorType*, *$change*)
Based on the type of refactoring ($refactorType) and the desired change ($change) to conduct the refactoring on target RDF.

Parameters

- **`$refactorType`** (*string*) – The type of rafactor.
- **`$change`** (*array*) – The month.

Returns Either false on failure, or the datetime object for method chaining.

```
//This is an example of $change
array('http://127.0.0.1/sport_center' => 'http://openisdm.iis.sinica.edu.tw/sport_center',
     'http://127.0.0.1/park' => 'http://openisdm.iis.sinica.edu.tw/park');
```

Note: Currently, only one type refactor is supported, that is, *replaceUri*. More refactors can be implemented and integrated into Mapper.

`serialize`(*$format*)
Return the RDF content in the format specified by $format.

Parameters

- **`$format`** (*string*) – The format of output file.

Returns Either false on failure, or the string of refactored RDF's content in the specified format.

6.1.6 WebUtilities

`GetParameter`(*$para*)
Get the value of HTTP GET request by parameter's name

Parameters

- **`$para`** (*string*) – The parameter's name.

Returns The value of given parameter's name.

Raises ValueError Raise if the $para cannot be found in the request.

6.1.7 USS

class `Endpoint`

Endpoint is the class for modeling the public Endpoint, such as DBpedia. (refer to *URI Search Service*)

`issueSparqlQuery` (*$sparqlQuery*, *$resultFormat*)

Parameters

- **`$sparqlQuery`** (*string*) – The SPARQL query.
- **`$resultFormat`** (*string*) – The format of returned result.

Returns The string of result in the specified format.

Raises NoResponseError Raise if the timeout is reached.

Raises ValueError Raise if the sparql is invalid.

class `SparqlQueryComposer`

SparqlQueryComposer is a class to aggregate a varity of SPARQL composition methods. Currently, only plain text terms are supported.

`term2Sparql` (*$term*)

Turn plain text terms to SPARQL query.

Parameters

- **`$term`** (*string*) – The desired query term..

Returns The SPARQL query string.

class `Dbpedia`

Dbpedia is a wrapper of Dbpedia Endpoint.

`composeQuery` (*term*, *$dataSourceName = ''*, *$limit = 10*, *$filters = array('')*)

Parameters

- **`$term`** (*string*) – The SPARQL query in plain text.
- **`$dataSourceName`** (*string*) – the name of data source
- **`$limit`** (*int*) – the max number of results
- **`$filters`** (*array*) – an array of URIs that will be ignored

`query` (*$sparqlQueryString*)

Parameters

- **`$sparqlQuery`** (*string*) – The SPARQL query.

class `LinkedGeoData`

LinkedGeoData is a wrapper of LinkedGeoData Endpoint.

`composeQuery` (*term*, *$dataSourceName = ''*, *$limit = 10*, *$filters = array('')*)

Parameters

- **`$term`** (*string*) – The SPARQL query in plain text.
- **`$dataSourceName`** (*string*) – the name of data source

- **$limit** (*int*) – the max number of results
- **$filters** (*array*) – an array of URIs that will be ignored

query(*$sparqlQueryString*)

Parameters

- **$sparqlQuery** (*string*) – The SPARQL query.

class FederatedSearch

FederatedSearch is the class provide search and operation to endpoints.

addEndpoints(*$endpointList*)

Param $endpointList: List of endpoints.

class ResultProcessor

ResultProcessor is the class for filtering or re-ranking a given result set.

addOneRefiner(*$refiner*)

Param $refiner: The name of the refiner.

addOneRanker(*$ranker*)

Param $ranker: The name of the ranker.

addConfiguration(*$config*)

Param $config: The configuration of result processor.

getConfiguration()

Returns The configuration of result processor.

process()

Returns The processed search result.

class UriSearchResults

UriSearchResults is the class for representing search results from different Endpoints with different rank scores

addOneResult(*$dataSourceName*, *$processedResult*)

Param $dataSourceName: The name of endpoint which the result search from.

Param $processedResult: The processed search result.

6.1.8 X2R

class X2R

X2R models the process of translating an imperfect RDF, especially for those with invalid URIs, to RDF with relatively higher quality.

transform(*$rdfGraph*, *$configuration*)

Parameters

- **$graph** (*rdfGraph*) – The RDF, which is holded in the rdfGraph data structure, to be refactored.
- **configuration** – to be defined.

Returns The refactored RDF.

6.1.9 Hot Spots

class `QueryRefiner`

QueryRefiner is an one-to-one adapter, which processes the raw query with the logics defined in it. A varity of refinement heuristics or methods can be introduced into X2R through extending this class.

`refine` (*$query*)

Parameters

- **`$query`** (*string*) – The query that is directly extracted and tokenized from original URI.

Returns The refined query.

class `SearchResultSelector`

SearchResultSelector is a many-to-one selector, which selects one fittest result from a given result set. A varity of fitness function can be introduced into X2R through extending this class.

`select` (*$resultSet*)

Parameters

- **`$resultSet`** (*array*) – A given result set.

Returns The fittest result.

CHAPTER 7

Hooks

Targeted Audience: **Code contributators**

This section focuses on two topics, i.e. **hook templates** and **hook instances**. The term "hook" is used to present the cookbook or guidence for extending X2R in many different aspects. Because some hooks are similar to each other, the hook templates are extracted based on the similarity among existing hooks. Extracted hook templates can be used to instainate more hook instances to cover more aspects for increasing X2R's flexability.

Hook Templates

7.1 Template: Add USS Components

7.1.1 Involved Classes

{List of involved classes with links}

7.1.2 Mechanism

1. Based on component's type, create a new class in /USS/**{component_type}/**
2. Based on the component's type, the new class should exntends corresponding parent class
3. Open ussContainer.class.php, and add the dependency by adding "incclude_once" statement in it
4. Based on component's type, find corresponding method and add the {id, class_factory} mapping to the method's switch/case block.

7.1.3 Instances

- *Add a new refiner*
- *Add a new filter*
- *Add a new ranker*
- *Add a new selector*
- hook_query_parser

Hook Instances

7.2 Add a new Endpoint

7.2.1 Involved Classes

Endpoint.class.php

7.2.2 Mechanism

1. Create a new class in /USS/endpoints
2. New class should implement two methods, *composeQuery()* and *query()*, where the composeQuery() defines how to compose a SPARQL query according to this endpoint and query() defines how to send query to this endpoint
3. The endpoint.class.php should include this new endpoint class
4. Add new case in methods composeSparqlQuery() and performQuery() of endpoint.class.php

7.2.3 Example

- *Dbpedia*
- *LinkedGeoData*

7.3 Add a new RDF refactor

7.3.1 Involved Files

Refactor.class.php

7.3.2 Mechanism

1. Create a new class in /EM/
2. The new class should exntends Refactor

7.3.3 Example

- *ReplaceUri*

7.4 Add a new selector

7.4.1 Involved Files

Resultselector.class.php, UssContainer.php

7.4.2 Mechanism

1. Create a new class in /USS/selector/
2. The new class should exntends ResultSelector, for example 'newSelector.class.php'
3. Open ussContainer.class.php, and add the dependency by adding "include_once selector/newSelector.class.php;" statement in it
4. Add a case block of the new class into getSelector() method's switch block

7.4.3 Template

Template: Add USS Components

7.5 Add a new ranker

7.5.1 Involved Files

ResultRanker.class.php, UssContainer.php

7.5.2 Mechanism

1. Create a new class in /USS/ranker/
2. The new class should exntends ResultRanker, for example 'newRanker.class.php'
3. Open ussContainer.class.php, and add the dependency by adding "include_once ranker/newRankerclass.php;" statement in it
4. Add a case block of the new class into getRanker() method's switch block

7.5.3 Template

Template: Add USS Components

7.6 Add a new refiner

7.6.1 Involved Files

QueryRefiner.class.php, UssContainer.php

7.6.2 Mechanism

1. Create a new class in /USS/refiner/
2. The new class should exntends QueryRefiner, for example 'newRefiner.class.php'
3. Open ussContainer.class.php, and add the dependency by adding "include_once refiner/newRefiner.class.php;" statement in it

4. Add a case block of the new class into getRefiner() method's switch block

7.6.3 Template

Template: Add USS Components

7.7 Add a new filter

7.7.1 Involved Classes

ResultFilter.class.php, UssContainer.php

7.7.2 Mechanism

1. Create a new class in /USS/filter/
2. The new class should exntends ResultFilter, for example 'newFilter.class.php'
3. Open ussContainer.class.php, and add the dependency by adding "include_once filter/newFilter.class.php;" statement in it
4. Add a case block of the new class into getFilter() method's switch block

7.7.3 Template

Template: Add USS Components

7.8 Add a wrapper for new RDF parser

7.8.1 Involved Classes

rdfGraph.class.php

7.8.2 Mechanism

1. Create a new class in /EM/
2. The new class should exntends rdfGraph'

7.8.3 Example

- *EasyRdfAdapter*

7.9 Add a new tokenizer

7.9.1 Involved Classes

Tokenizer.class.php

7.9.2 Mechanism

1. Create a new class in /EM/
2. The new class should exntends Tokenizer

7.9.3 Example

- *CaseBasedTokenizer*
- *DelimitBasedTokenizer*

/extractor{?excludedNamespaces, checkUrisStatus, rdfContent}

```
POST /extractor{?excludedNamespaces,
       checkUrisStatus, rdfContent}, 18
```

/mapper{?rdfContent, mapping, format}

```
POST /mapper{?rdfContent, mapping,
       format}, 24
```

/uss{?q, sites, output, start, num}

```
GET /uss{?q, sites, output, start,
       num}, 27
```

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