



SOEN 691B Semantic Computing

Winter 2013/2014

Assignment #2

Report

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Changes in assignment 1:

Few changes were made to the assignment .

Gazetteer was modified .Few changes were made to the rules in organization jape rule in order to increase the precision.

dataset of documents was changed

source of new data documents <http://www.cs.cmu.edu/afs/cs/project/theo-20/www/data/>

correlation was added for detecting the sameA relation between similar meaning words

Co-reference used ;pronomial,nominal and annies co- reference.



Schema Description:

Tool used :Protégé.

Schema is designed in owl which includes owl classes and properties.

Schema consists of main classes for entities has root class called Thing .Thing is the root class in owl.

The entities classes which come under root are UniversityPosition,OrganizationalUnit,

University Position.

University Person is the subclass of FOAF:Person .An already defined schema which provides with already defined classes and properties.

University on other hand also is the subclass of the FOAF:organization .

The schema also has two Object properties .

belongs_to:This Object property has domain and range .Domain and range are the RDFS feature added to the property

belongs_to consist of University Person as domain and University as range.

has_position:Similar to belongs_to has position also uses RDFS domain and RDFS range

has_position has University person as domain and range is university position.

In project the *newo.owl* .file is the schema which is loaded in the onamodel using default ontmodel

RDFExport:

The linking is done by reading the annotation from the annotation set and creating the

OntModel class and reading the required ont model class from the schema. Schema has been as mentioned above has already been read in the OntModel object.

```
OntModel onto = ModelFactory.createOntologyModel( OntModelSpec.OWL_MEM, null );  
onto(newo.owl)
```

The individual of each class is created and the class URI is acquired from create
Individual("",classname)

The individual is augmented with the property of type in which the class is mentioned. One more property is also added to the an Individual with FOAF.Organization as a super class and this individual's subclass of that class.

Example of the University

////

```
OntClass equipe = onto.getOntClass(prefix + "University" );
```

```
Individual m=onto.createIndividual(prefix +mName ,equipe);  
m.addProperty(RDF.type,equipe).addProperty(RDFS.subClassOf,FOAF.Organization  
) .addProperty(OWL.sameAs,DBPEDIA +mName);
```

Prefix is common url in an university is class defined in schema. The individual is added with the class as property type. plus mentioned also the subclass of the FOAF.Organization.

Exported data:

```
<rdf:Description rdf:about="http://www.semanticweb.org/anish/ontologies/2014/2/untitled-  
ontology-4#Emory_University">
```

```
<rdf:type rdf:resource="http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#University"/>
```

```
<rdfs:subClassOf rdf:resource="http://xmlns.com/foaf/0.1/Organization"/> -----
```

->subclass of organization

```
<owl:sameAs>http://dbpedia.org/resource/Emory_University</owl:sameAs> -----
```

>Dbpedi links

```
</rdf:Description>
```

Similarly its done for University person, UniversityPosition , Organizational unit .

Following are the examples of each respectively.

Example of University Person

University person is subclass of foaf person

```
<rdf:Description rdf:about="http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#J.+Ullman">
```

```
<rdfs:subClassOf rdf:resource="http://xmlns.com/foaf/0.1/Person"/> --->subclass of person
```

```
<rdf:type rdf:resource="http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPerson"/>
```

```
</rdf:Description>
```

Example of UniversityPosition:

Instance of the class university position:

```
<rdf:Description rdf:about="http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#Editor">
```

```
<rdf:type rdf:resource="http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPosition"/>

</rdf:Description>
```

belongs to:

As discussed earlier belongs to is the object property which has domain and range

The domain and range are university person and university respectively. The instance of the belongs to object property is created and the additional property is added to the object property.

following is the implementation of belongs_to

```
ObjectProperty belongs_to=onto.getObjectProperty(prefix+"belongs__to");
Random or = new Random();
```

```
Individual m2=onto.createIndividual(prefix+or.nextInt(99999) +name,belongs_to);
```

```
m2.addProperty(RDFS.domain,UniversityPerson.getURI()+domain);
m2.addProperty(RDFS.range,University.getURI()+range);
m2.addProperty(RDF.predicate, "belongsto");
```

Example output of belongs to from output file

```
<rdf:Description rdf:about="http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#22118University_of_Siegen">
```

```
<rdf:type rdf:resource="http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#belongs__to"/>
```

```
<rdfs:domain>http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPersonLeben</rdfs:domain>
```

```
<rdfs:range>http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityUniversity_of_Siegen</rdfs:range>
```

`<rdf:predicate>belongsto</rdf:predicate>`

`</rdf:Description>`

Each instances is created unique by using the random number Plus the rdf type is uri of belong t_o

has postition:

As discussed earlier belongs to is the object property which has domain and range

The domain and range are university person and universityposition respectively. The instance of the belongs to object property is created and the additional property is added to the object property.

following is the implementation of has_position

```
ObjectProperty belongs_to=onto.getObjectProperty(prefix+" has_position ");
Random or = new Random();
```

```
Individual m2=onto.createIndividual(prefix+or.nextInt(99999) +name, has_position);
```

```
m2.addProperty(RDFS.domain,UniversityPerson.getURI()+domain);
m2.addProperty(RDFS.range,University.getURI()+range);
m2.addProperty(RDF.predicate, " has_position ");
```

Example output of belongs to from output file

`<rdf:Description rdf:about="http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#22118University_of_Siegen">`

`<rdf:type rdf:resource="http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4# has_position "/>`

`<rdfs:domain>http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPersonLeben</rdfs:domain>`


```
<rdfs:range>http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityUniversity_of_Siegen</rdfs:range>
```

```
<rdf:predicate>belongsto</rdf:predicate>
```

```
</rdf:Description>
```

Each instances is created unique by using the random number Plus the rdf type is uri of has_position

LiinkingStrategy:

RDF export is done by reading the the annotation in a for loop from the annotation set .The main

idea is to retrieve the annotation in the string format and replace the spaces in the string with underscore which is generally standard for url.

```
{String content="";
```

```
Integer id= annot.getId();
```

```
content = doc.getContent().getConten(annot.getStartNode().getOffset(),
```

```
annot.getEndNode().getOffset()).toString();
```

```
String mName= content.replace(" ", "_");
```

```
String InstanceURI = URLEncoder.encode(content,"UTF-8");
```

```
OntClass equipe = onto.getOntClass(prefix + "University" );
```

```
Individual m=onto.createIndividual(prefix +InstanceURI ,equipe);
```

Thus the each annotationn from selected annotation set is collected and is stored in content as a string format..

This String format is converted in to a link by adding the prefix to it .

Resource URIgeneration:

linking is done by globally defined prefix variable

```
prefix: "http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#";
```

prefix +InstanceURI and resource is creatted using this link .Thus unique for each instance.

Dbpedia Linking:

Dbpedia linking is done by using owl SameAS feature. link si created in same manner but instea of prefix variable new global variable is declared which is used to add the link like this .

```
String DBPEDIA="http://dbpedia.org/resource/";
```

```
Individual m=onto.createIndividual(prefix +mName ,equipe);  
String foaforg=FOAF.Organization.getURI();  
m.addProperty(RDF.type,equipe).addProperty(RDFS.subClassOf,FOAF.Organization  
) .addProperty(OWL.sameAs,DBPEDIA +mName);
```

Correlation linking:

Corelation is done by linking all the related they are obtained from the matches and also add the co refrencing objects to the list.

The co frencing list is created for each annotaiton and annotation category is created .

```
FeatureMap map = annot.getFeatures();  
if((map.get("matches"))!=null)
```

```
{
annotCategory=((ArrayList<Long>) map.get("matches"));
```

```
for(Object k :annotCategory )
{
```

```
if(!list.contains((Integer)k))
{
list.add((Integer)k);
```

Each corefencing anotation is retrieved from the id list and is stored inn rdf with owl sameAas feature.

```
for (Object m:annotCategory)
{
Annotation antecedent = blacklist1.get((Integer) m);
```

```
String content1 = doc.getContent().getContent
(antecedent.getStartNode().getOffset()
```

```
try {
String uri2=URLEncoder.encode(content2,"UTF-8");
} catch (UnsupportedEncodingException e) {
```

```
e.printStackTrace();
}
```

```
onto.createResource(prefix+content1).addProperty(OWL.sameAs, prefix +content2);
```

Example:output

<owl:sameAs>http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#David</owl:sameAs>

<owl:sameAs>http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#Professor David Warner</owl:sameAs>

TripleStore implementation:

Triple store implementation consists of Individual instances of the class defined in schema.

Each Instance is added to its type what class it is member of. If the class is subclass of any other class special property is added to define it .

for example:

<rdf:Description

rdf:about="http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#Swarthmore_College">

<rdf:type rdf:resource="http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#University"/>

<rdfs:subClassOf rdf:resource="http://xmlns.com/foaf/0.1/Organization"/>

<owl:sameAs>http://dbpedia.org/resource/Swarthmore_College</owl:sameAs>

<j.0:name>Swarthmore_College</j.0:name>

</rdf:Description>

same is done for object property but adding the domain and range of respective class

TOTAL number of triplets per document :approx 300

in total triplets 1765(per document triplet output on screen)

Sparqlendpoint :

The spqrql enpoint was was hosted on local server ,open source fuseki server .

Fuseki Query

dataset: /anish

SPARQL Query

```
PREFIX owl:<http://www.w3.org/2002/07/owl#>
SELECT ?s ?o
WHERE
{
  ?s owl:sameAs ?o
}
```

Output: Text

If XML output, add XSLT style sheet (blank for none):

☐ Force the accept header to text/plain regardless.

Get Results

SPARQL Update

SPARQL queries:

Q1 display the names of all university

Follwoing inds the sparql query

PREFIX owl:<http://www.w3.org/2002/07/owl#>

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

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

PREFIX j.0:<http://xmlns.com/foaf/0.1/>

SELECT ?s ?name

WHERE{ ?s rdf:type <http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#University>.

?s j.0:name ?name }

s	name
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#Polytechnic_University>	"Polytechnic_University"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UCLA>	"UCLA"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#Massachusetts_Institute_of_Technology>	"Massachusetts_Institute_of_Technology"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#Athabasca_University>	"Athabasca_University"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#University_of_Washington:>	"University_of_Washington:"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#Sussex_University>	"Sussex_University"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#San_Antonio>	"San_Antonio"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#WEB>	"WEB"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#Helsinki_University>	"Helsinki_University"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#CSE>	"CSE"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#University_of_Washington">	"University_of_Washington\"."
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#Dalhousie_University>	"Dalhousie_University"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#University_of_Southwestern>	"University_of_Southwestern"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#University_of_Ontario>	"University_of_Ontario"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#GA>	"GA"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#D>	"D"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#Baltimore>	"Baltimore"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#Structure_University>	"Structure_University"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#GROUP_University>	"GROUP_University"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#Dallas>	"Dallas"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#University_of_King's>	"University_of_King's"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#METROPOLITAN>	"METROPOLITAN"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#Webs_University>	"Webs_University"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#Rice_University>	"Rice_University"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#St._Thomas_University>	"St._Thomas_University"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#University_of_Northern_British_Columbia>	"University_of_Northern_British_Columbia"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#Carleton_University>	"Carleton_University"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#University_of_Illinois>	"University_of_Illinois"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#BUFFALO>	"BUFFALO"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#University_of_Victoria>	"University_of_Victoria"
<http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#Laurentian_University_of_Sudbury>	"Laurentian_University_of_Sudbury"

Q2 Find the names of all university employees, together with their position (if available) and organizational unit (if available)

PREFIX owl:<http://www.w3.org/2002/07/owl#>

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

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

SELECT

?name ?uniperson ?position

WHERE{ ?name rdf:type <http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#belongs__to>. ?name rdfs:domain ?uniperson.

?x rdf:type <http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#has_position>.

?x rdfs:domain ?uniperson.

?x rdfs:range ?positio }

output

```
-----
-----
-----
| name                                     | uniperson
| position                               |
=====
=====
=====
=====
=====
=====
| <http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#50645University_of_Siegen> |
"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPersonLeben" |
```

"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPositionLecturer" |
| <http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#50645University_of_Siegen> |
"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPersonLeben" |
"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPositionLecturer" |
| <http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#42457D> |
| "http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPersonGAR" |
"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPositionAssociate Professor" |
| <http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#32151Humboldt_University> |
"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPersonGoel" |
"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPositionLecturer" |
| <http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#32151Humboldt_University> |
"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPersonGoel" |
"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPositionLecturer" |
| <http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#26907University_of_Chester> |
"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPersonPrincipal" |
"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPositionVice-Chancellor" |
| <http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#26907University_of_Chester> |
"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPersonPrincipal" |
"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPositionPrincipal" |
| <http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#26907University_of_Chester> |
"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPersonPrincipal" |
"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#UniversityPositionVice-Chancellor" |
| <http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#26907University_of_Chester> |
"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-


```

4#UniversityPersonPrincipal"      |
"http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-
4#UniversityPositionVice-Chancellor"  |
| <http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-
4#26907University_of_Chester>      |

```

Q3 For a given university name, provide all information from your knowledge base, as well as

DBPedia

```
PREFIX owl:<http://www.w3.org/2002/07/owl#>
```

```
PREFIX owl:<http://www.w3.org/2002/07/owl#>
```

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

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

```
PREFIX j.0:<http://xmlns.com/foaf/0.1/>
```

```
PREFIX owl:<http://www.w3.org/2002/07/owl#>
```

```
PREFIX owl:<http://www.w3.org/2002/07/owl#>
```

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

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

```
SELECT  ?obj ?o ?DBPEDIAdata
```

```

WHERE {

  {
    <http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-
    4#St._Thomas_University> ?predi ?obj.
  }

  UNION{

    <http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-
    4#St._Thomas_University>

    owl:sameAs ?o

    SERVICE <http://dbpedia.org/sparql>

    {
      <http://dbpedia.org/resource/St._Thomas_University> ?q ?DBPEDIAdata
    }
  }
}

```

Output

```

-----
| obj                                | o                                |
| DBPEDIAdata                       |                                 |
=====
=====
=====
=====
| <http://www.semanticweb.org/anish/ontologies/2014/2/untitled-ontology-4#University> |
|                                     |
| <http://xmlns.com/foaf/0.1/Organization>                                     |
|                                     |
| "http://dbpedia.org/resource/St._Thomas_University"                         |
|                                     |
| "St._Thomas_University"                                                     |
|                                     |

```

"http://dbpedia.org/resource/St._Thomas_University"	owl:Thing
"http://dbpedia.org/resource/St._Thomas_University"	<http://dbpedia.org/ontology/Agent>
"http://dbpedia.org/resource/St._Thomas_University"	<http://dbpedia.org/ontology/Organisation>
"http://dbpedia.org/resource/St._Thomas_University"	<http://dbpedia.org/ontology/University>
"http://dbpedia.org/resource/St._Thomas_University"	<http://dbpedia.org/ontology/EducationalInstitution>
"http://dbpedia.org/resource/St._Thomas_University"	<http://schema.org/Organization>
"http://dbpedia.org/resource/St._Thomas_University"	<http://schema.org/EducationalOrganization>
"http://dbpedia.org/resource/St._Thomas_University"	<http://schema.org/CollegeOrUniversity>
"http://dbpedia.org/resource/St._Thomas_University"	<http://www.wikidata.org/entity/Q7591999>
"http://dbpedia.org/resource/St._Thomas_University"	929770
"http://dbpedia.org/resource/St._Thomas_University"	513634996
"http://dbpedia.org/resource/St._Thomas_University"	"St. Thomas University"@en
"http://dbpedia.org/resource/St._Thomas_University"	<http://dbpedia.org/resource/St._Thomas_University_(New_Brunswick)>
"http://dbpedia.org/resource/St._Thomas_University"	<http://dbpedia.org/resource/St._Thomas_University,_Japan>
"http://dbpedia.org/resource/St._Thomas_University"	<http://dbpedia.org/resource/St._Thomas_University_(Florida)>

"http://dbpedia.org/resource/St._Thomas_University"	<http://en.wikipedia.org/wiki/St._Thomas_University>
"http://dbpedia.org/resource/St._Thomas_University"	<http://en.wikipedia.org/wiki/St._Thomas_University?oldid=513634996>
"http://dbpedia.org/resource/St._Thomas_University" "9.47157e-06"^^<http://www.w3.org/2001/XMLSchema#float>	
"http://dbpedia.org/resource/St._Thomas_University" 9	
"http://dbpedia.org/resource/St._Thomas_University" 5	

Link Evaluation:

Out of 180 ,175 of univer sity has a link.

The coverage of your external links (%) 97.7777

The 25 university are listed below randomly from different text .

http://dbpedia.org/resource/University_of_Hamburg</TextWithNodes>
http://dbpedia.org/resource/University_of_Wisconsin-Madison
["http://dbpedia.org/resource/University_of_Vienna,"](http://dbpedia.org/resource/University_of_Vienna)
http://dbpedia.org/resource/University_of_Toronto
http://dbpedia.org/resource/University_of_Cambridge
http://dbpedia.org/resource/University_of_Wisconsin-Milwaukee
http://dbpedia.org/resource/Wayne_State_University
http://dbpedia.org/resource/University_of_California
http://dbpedia.org/resource/University_of_Bolton
http://dbpedia.org/resource/Johns_Hopkins_University
http://dbpedia.org/resource/Cambridge_University
http://dbpedia.org/resource/Istanbul_University
http://dbpedia.org/resource/Schiller_University
[http://dbpedia.org/resource/University_of_Hamburg;](http://dbpedia.org/resource/University_of_Hamburg)
http://dbpedia.org/resource/University_of_Birmingham
http://dbpedia.org/resource/Swansea_University
http://dbpedia.org/resource/Brookes_University

http://dbpedia.org/resource/University_of_Pittsburgh
http://dbpedia.org/resource/Ruskin_University
http://dbpedia.org/resource/University_of_Plymouth
http://dbpedia.org/resource/University_of_North_Carolina
["http://dbpedia.org/resource/University_of_Stirling,"](http://dbpedia.org/resource/University_of_Stirling)
http://dbpedia.org/resource/University_of_the_Arts
http://dbpedia.org/resource/University_of_Worcester
http://dbpedia.org/resource/Durham_University

Precision is number of links accurate to the context of the text .

here precision is 96% as they all mean to be universities which are actually being addressed to except university of arts which on dbpedia points to school of arts. Thus resulting in the ambiguity of the links.

To solve this ambiguity extra measure can be taken .like check more of the context of the text along with annotation .plus the location if mentioned in the text can be used to filter the ambiguity