Assignment 2: Ontology Development with Protégé

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Description

This ontology models the domain of the seasoning of food. It contains cuisines, spices, herbs and mixtures. Because the model starts to grow very large very fast I have limited the ontology (for now) to the spicy mixtures found on cooksmarts.com (http://www.cooksmarts.com/articles/ultimate-infographic-guide-spices/). Some of the classification is taken from chapter one in Handbook of Herbs and Spices edited by K.V. Peter, Woodhead Publishing 2001.
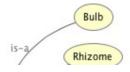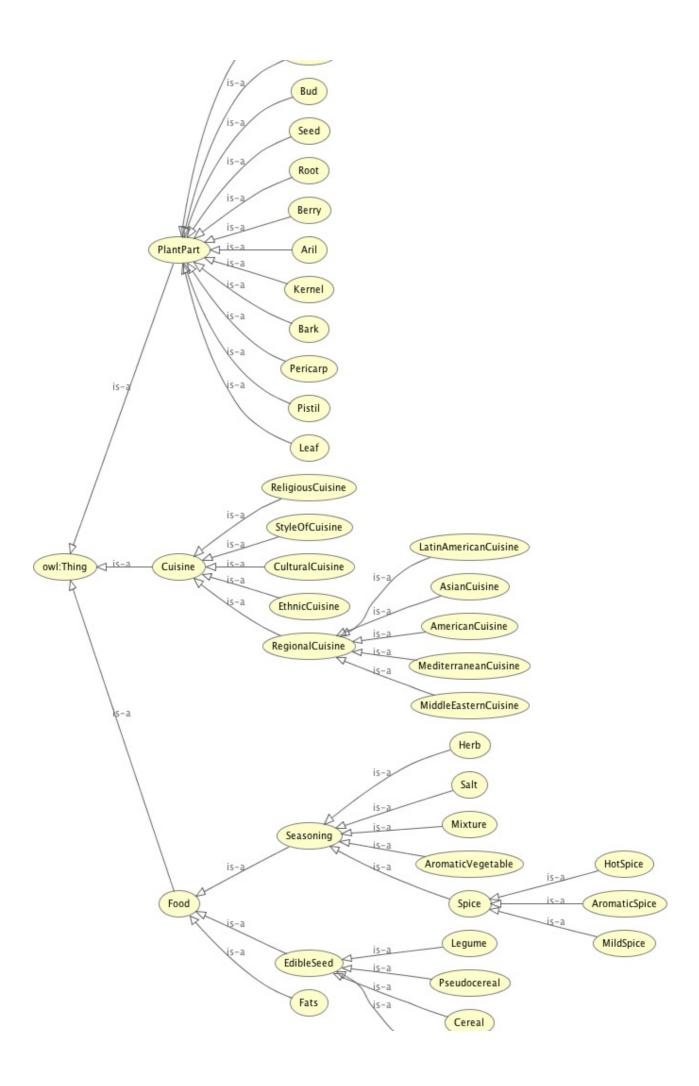
Model

Because this ontology uses a lot of natural kinds (names of spices for instance), it becomes less clear what is an individual. In the case of a student with a particular number this seems pretty straight-forward. However with for instance *Cinnamon* I am not talking about a particular stick of cinnamon in my hand or a batch of cinnamon with a particular number in the belly of some cargo ship. For all intents and purposes of this ontology the names of a particular plant, herb or spice is taken to instantiate the class it belongs to.
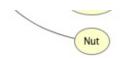
You can speak of a cuisine from a certain place, culture or religion. Cuisines from a particular place have a similar issue as the natural kinds in that they are grouped in ever larger regional areas. For instance the cuisine of let's say Rome is also a cuisine of Italy, South Europe and Europe. At each level there can be properties that apply.

I have stopped the classification a the level of countries and each cuisine from a particular country is an individual. For a few larger regions (Latin America, the Mediterranean and the Middle East) I have included a individual as well as a class a method called punning (https://www.w3.org/2007/OWL/wiki/Punning). I did this to allow for the region to group cuisines and at the same time be the subject of a property. Although the Cajun cuisine is commonly classified as an American cuisine. It is in fact the cuisine of an ethnic group. The countries and ethnic groups that the cuisines relate to are taken from dbpedia.org (https://dbpedia.org).

Class Hierarchy

Nut

Properties

name	type	inverse	domain	range
uses	object	isUsedIn	Cuisine	Food
cuisineIsFromPlace	object	placeHasCuisine	Cuisine	dbo:PopulatedPlace
cuisineIsFromEthnicGroup	object	ethnicGroupHasCuisine	Cuisine	dbo:EthnicGroup
contains	object	isContainedIn	Mixture	Food
hasBotanicalName	data	-	PlantPart	xsd:String

The dbo prefix stands for http://dbpedia.org/ontology/

name	example
uses	ThaiCuisine uses Basil
cuisineIsFromPlace	ThaiCuisine cuisineIsFromPlace Thailand
cuisineIsFromEthnicGroup	CajunCuisine cuisineIsFromEthnicGroup Cajun
contains	CurryPowder contains Fenugreek
hasBotanicalName	Allspice hasBotanicalName "Pimenta dioica"

Example Individuals

(super)type	examples
cuisine	ThaiCuisine, NorthAfricanCuisine, ItalianCuisine
Mixture	Soffrito, RasElHanout, HerbesDeProvance
Herb	Marjoram, Basil, Oregano
Spice	Nutmeg, Fenugreek, Cinnamon
AromaticVegetable	Carrot, Celery, Onion
Fat	Butter, Ghee, OliveOil

Queries

The queries are excuted with the following prefix.

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX :
<http://www.semanticweb.org/remkoboschker/ontologies/spice#>
```

1. Simple

List all foods used in the Thai cuisine.

```
SELECT ?food
WHERE {
   :ThaiCuisine :uses ?food
}
```

food
GreenCardamom
CoconutMilk
Cumin
ChilliPepper
KaffirLime
Lemongrass
Cilantro
Shallot
Garlic
CurryPowder
Basil
Galangal
PeanutOil
Turmeric
Ginger

2. Complex

List all foods used in both the Thai and the Indian cuisine.

```
SELECT ?food
WHERE {
  :ThaiCuisine :uses ?food .
  :IndianCuisine :uses ?food .
}
```

food
GreenCardamom
Cumin
CurryPowder
Turmeric
Ginger

3. Restrict to type

List all food used in the Thai cuisine whose type is Fats.

```
SELECT ?food
WHERE {
  :ThaiCuisine :uses ?food .
  ?food rdf:type :Fats .
}
```

food
CoconutMilk
PeanutOil

4. Restrict type to subclass of a type

List all food used in the Thai cuisine whose type is a direct subclass of the class Spice.

```
SELECT ?food ?type
WHERE {
  :ThaiCuisine :uses ?food .
  ?food rdf:type ?type .
  ?type rdfs:subClassOf :Spice
}
```

food	type
Turmeric	MildSpice
GreenCardamom	AromaticSpice
Cumin	AromaticSpice
Lemongrass	AromaticSpice
ChilliPepper	HotSpice
Galangal	HotSpice
Ginger	HotSpice

5. Using feature of SPARQL 1.1

Using SPARQL 1.1 property paths to list all food used by the Thai cuisine with a type that is a (transitive) subclass of the class Seasoning.

```
SELECT ?food ?type
WHERE {
  :ThaiCuisine :uses ?food .
  ?food rdf:type ?type .
  ?type rdfs:subClassOf* :Seasoning
}
```

food	type
GreenCardamom	AromaticSpice
Cumin	AromaticSpice
ChilliPepper	HotSpice
KaffirLime	Herb
Lemongrass	AromaticSpice

Cilantro	Herb
Shallot	AromaticVegetable
Garlic	AromaticVegetable
CurryPowder	Mixture
Basil	Herb
Galangal	HotSpice
Turmeric	MildSpice
Ginger	HotSpice