Korean Food Ontology
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Introduction

- The need for ontologies has increased in computer science or information science recently.
- Food is one of the important factors to understand the country. Because it is closely related to the culture and the lifestyle.
- There are various kinds of information about the Korean food such as names, recipes, ingredients, stuff, etc. But these are not used systematically.
- This paper describes the Korean Food Ontology designed for sharing and reconciliation of Knowledge.
- Especially, this is focused on the construction method of the Ontology and the inference performed on it.

Procedure

Step 1. Collect the nouns related to the food from the Korean cookbooks and dictionaries.
Step 2. Extract the relevant information from the definitions of the dictionary.
Step 3. Classify the Korean food terms to the concepts:
   - Top-down development process (names, recipes, nutrients, food stuffs, tastes)
Step 4. Express the information by using (SUIO-JKF) language
   - Define the classes and the class hierarchy properties
Step 5. Connect to the top-level ontology SUMO
Step 6. Perform the Reasoning within the SIGMA system

Components of Ontology

A. CONCEPT
- 5 types of upper classes in Korean Food
  - (food names, nutrients, ingredients…)
- Hierarchical structure (subclasses)
  - (instance ?VEGE Vegetable)
  - (instance ?KIMCHI Kimchi)
  - (instance ?BEVERAGE Beverage)
  - (instance ?REDPP RedPepper)
  - (instance SeasonedAndSimmeredChicken SteamedDishes)
- Translation English terms into Korean ‘termformat’
  - (termFormat SteamedDishes KoreanLanguage “Ccim”)
  - (termFormat SeasonedAndSimmeredChicken KoreanLanguage “Talkccim”)

B. PROPERTY
- Tastes of food, form(solid/liquid), calories, …
  - (instance ?BEVERAGE Beverage)
  - (exists (?VEGE ?SEASONING)
    - (termFormat SeasonedAndSimmeredChicken KoreanLanguage “Ccim”)
    - (exists (?VEGE ?SEASONING)
      - (termFormat Vegetable KoreanLanguage “Vegetable”)
      - (exists (PART ?SEASONING)
        - (termFormat Seasoning KoreanLanguage “Seasoning”)
        - (termFormat Steamed ?BEVERAGE)

C. INSTANCE
- Individuals Korean foods are contained
  - More than 100 types
  - (instance ?KOREANFOOD KoreanFood)

D. RELATION
- Child-parents relations(is-a-kind-of)
  - (instance ?KOREANFOOD KoreanFood)
- Part-whole relations(part-of)
  - Equal relations
  - Cause and effect relations(result)
  - Active and passive relations(resource/patient)
  - (instance ?KOREANFOOD KoreanFood)

Methods of Inference

A. SIGMA system
  - Automated theorem prover
  - Consistency check, instantiation, realization, retrieval
B. Reasoning for Korean Food Ontology
  - Subsumption
    - (assertion: What is a sub-class of CookedFood?)
    - (query: (sub-class ?X CookedFood))
  - Instantiation
    - (assertion: What is an instance of broccoli?)
    - (query: (instance ?X Broccoli))
  - Rule-based Reasoning with axioms
    - (assertion: What is a spicy side-dish?)
    - (query: (instance ?X SideDish) (lastAttribute ?X Spicy))

References

Frances, A. 2003. The Sigma Ontology Development Environment. In working Notes of the ESCA2013 Workshop on Ontology and Distributed System