



Towards an expert system to Sri Lankan indigenous medicinal plants

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Introduction

Sri Lanka is a country of rich history and heritage. An important one among them is the indigenous system of Medicine. Sri Lanka is blessed with a large variety of flora in which many of them have some medicinal properties. Each part of a plant including leaves, flowers, roots, seeds and barks have different properties and plays a vital role in indigenous medicine as well as for home remedies many Sri Lankans commonly practice for centuries.

Developing an information system to store the details of the medicinal plants, their properties and details of indigenous practices related to the plants would require a detailed study. A major mile stone would be to identify a more functional way to represent the knowledge in the concerned domain. This would make possible to retrieve the correct information for partial and vaguely detailed queries. In addition this knowledge base can be used for further data analysis. Such a knowledge base can be extended as a decision support system for indigenous medical practices to know, protect and use plants for a healthy and environmentally friendly living. Out of many knowledge representation methods, ontology is found to be satisfying the requirements of the intended research. The purpose of this communication is to disseminate the details of the ontology selected.

What is an Ontology?

Ontology is one of the knowledge representation techniques. Other important knowledge representation techniques are rules, frames and semantic nets. But ontology has comparable advantages over these techniques. Here knowledge is represented in *classes*, *subclasses* and *instances*. *Relations* and *attributes* are two other components of an ontology. Relations are used to relate the defined classes and instances. Attributes describe each class and instances.

Special considerations for ontology development

- ❖ The ontology should share the common understanding of the structure of the information among users.
- ❖ Ontology could be reused for related work.
- ❖ Ontology should separate the domain knowledge from operational knowledge.
- ❖ Ontology should be self explanatory in such a way that the common users can easily understand the findings.

Proposed Ontology

1. Defined classes and sub classes

In this representation five classes have been defined as follows:

- Plant
- Disease
- Preparation method
- Mixture
- Application category

Most of these classes have sub classes. All of them have instances, object properties and data properties.

2. Defined object properties

Object properties represent the relationship between two classes. Each relationship has an inverse relationship.

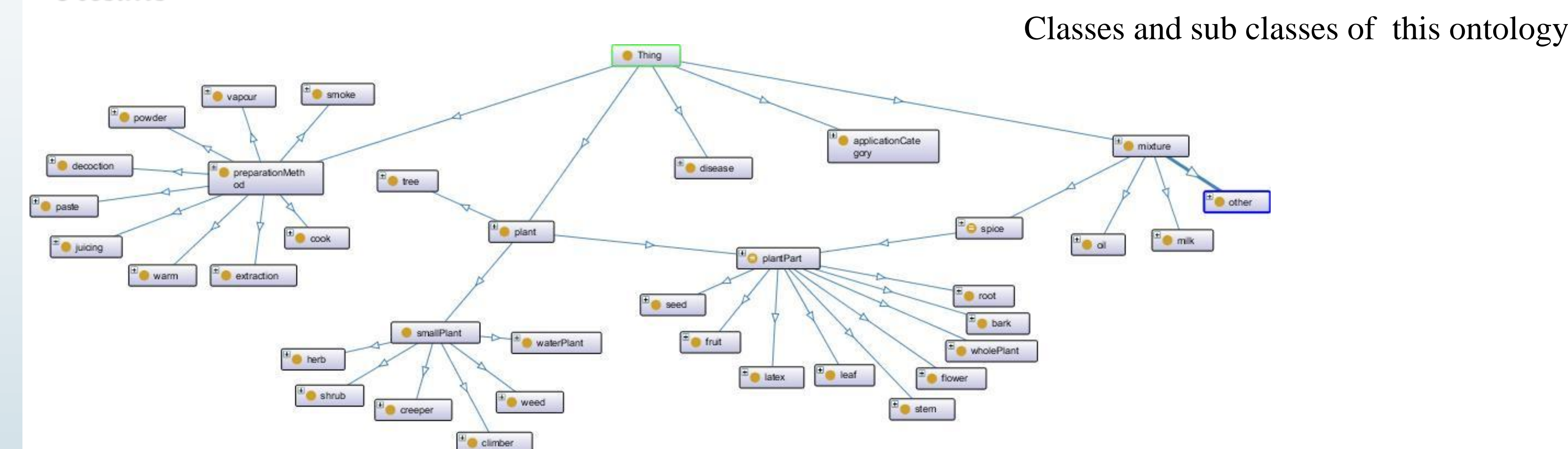
3. Define data properties

Each class has different attributes. All the attributes are defined in this stage.

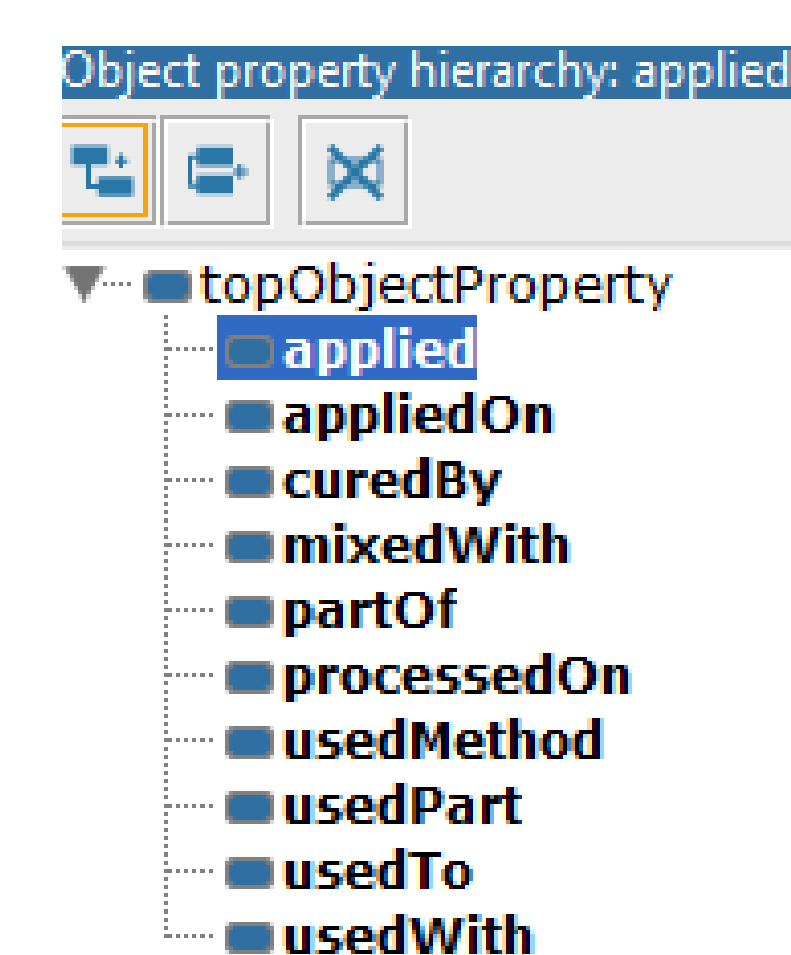
4. Create instances

Individuals for all classes are created in this step. More over individual data property values are assigned in this step.

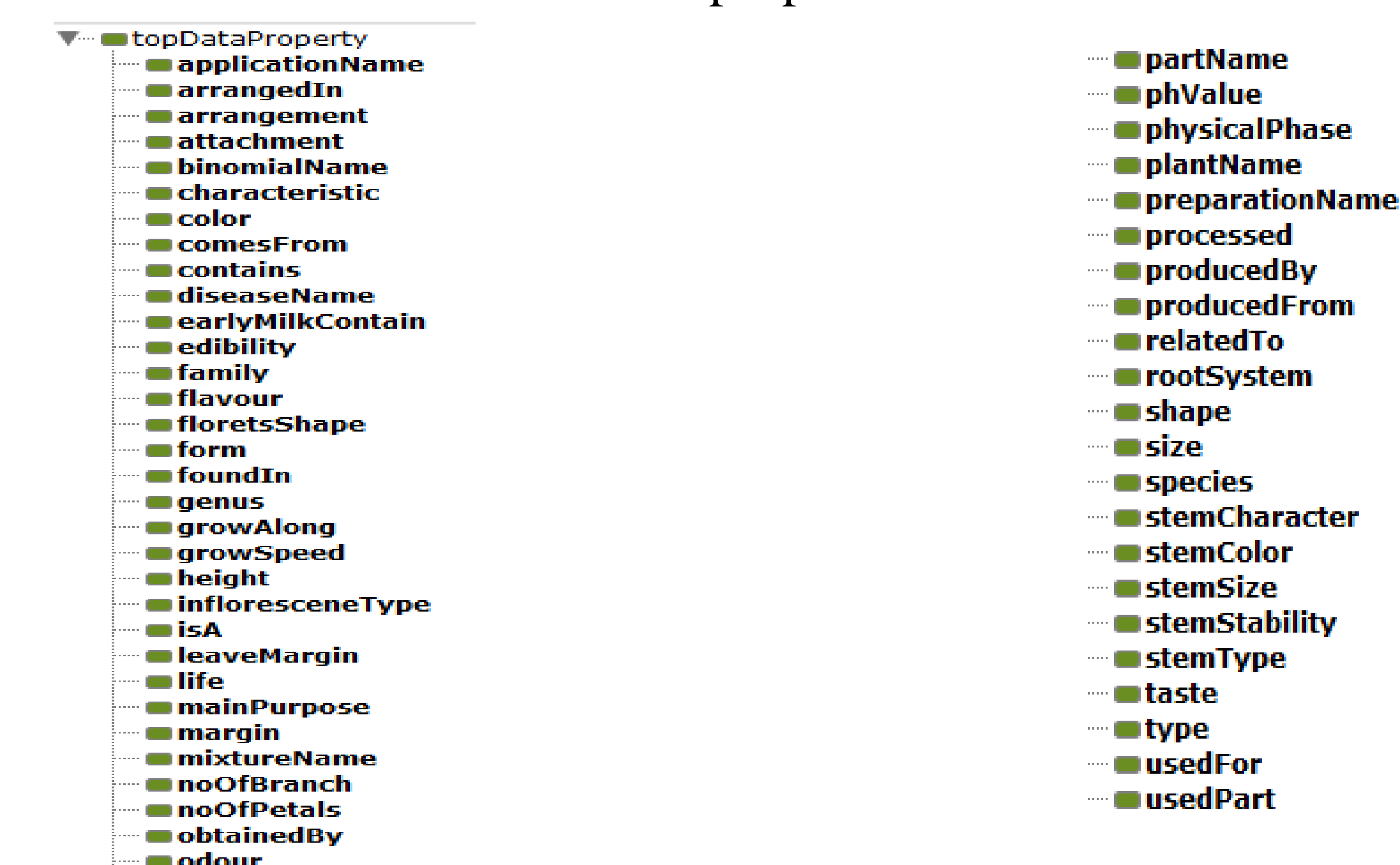
Results



Object properties



Data properties



Discussion

The above figure shows part of the developed ontology for medicinal plants, medicine preparation methods, application categories and the corresponding diseases. Only classes, sub classes and instances are shown in the figure. In most ontology, plants are divided as algae, fungi,...etc or like monocot and dicot. Here plants are simply divided as shrubs, weeds, trees, climbers and creepers, making it easy for common users to understand. Plants are related with plant parts. Plant parts are related with the diseases and preparation methods. Information regarding the plants and medicine preparation methods are obtained from “*Indian Medicinal Plants*” by K. R.Kirtikar and B.D.Basu. SPARQL language can be used to query over these knowledge base. Protege-5.0.0-beta-16 is used to develop and query this knowledge base.

Conclusion

We can represent the plants, their corresponding parts, disease which can be cured by this plant part, their preparation method and application category using the proposed ontology. There are more than one main class enabling the ontology to be used in related research work. Related information presented in this ontology makes it possible to accurately identify a plant correctly. The developed ontology entirely covers all the aspects of plants and its medicinal properties. Future work includes extend this ontology by adding the details of all regional plants and diseases.

References

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