Building Soil Information Retrieval System using Ontology: Based On Rules
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Abstract— Soil is the most vital characteristic and financial assets. Soil is a standout amongst the most critical assets for farming. In light of the state of the dirt appropriate yields can be developed. The point of this paper is to fabricate learning based framework for soil utilizing philosophy. The proposed framework gives capacities to hunt data about soil down different needs, for example, crop development, soil culturing, soil natural matters, soil biology and so forth. It will decrease learning shortage and go about as productive data recovery framework for soil.

Key words: Ontology, Agriculture, Knowledge-base, Protégé

I. INTRODUCTION

Information of soil is essential for agriculturists since it is one huge variable which impacts the plant cultivating and generation. Up to now, soil information also, data is put away broadly in different arrangements on the web, for example, HTML, databases and advanced libraries. The different arrangements are the primary issue while looking alternately recovering data. Along these lines, scientists persistently attempt to discover new strategies to enhance the execution of their framework. The cosmology is the one mainstream strategy which employs semantic and information representation with other data frameworks to improve execution of their recovery framework.

Cosmology is a model of any limited area of interest expressed as concepts, relationships, and principles about constructs and relationship important to a modeler. Metaphysics gives the common comprehension of the area. With the coming of semantic web innovations (OWL, RDF, SPARQL,SWRL) it is feasible for machines and people to translate and work together with different elements in a significant way.

More over the apparatuses are presently accessible for displaying of the space information. The area specialists can now utilize these instruments for taking care of various issues Geo technical architects can make utilization of these apparatuses to encode their insight by creating cosmology in type of ideas and their connections utilizing easy to utilize devices like Protégé.

Advancement of cosmology for designing reason unavoidably includes assessment of numerical expressions, hence there is a requirement for building up a tenet based metaphysics.

An orderly procedure required being developed of the guidelines based philosophy for grouping and confirmation of the outcome is advanced in this paper utilizing protégé instrument which is broadly utilized by scientists.

II. ONTOLOGY

There are various definitions for philosophy which indicates different perspectives and in different levels. The meaning of Ontology was initially proposed in 1992 by Tom Grubar. He characterizes Ontology as, "An Ontology is the particular of conceptualization" and it is given in his article which was distributed in 1993. He utilized this definition as a part of the connection of information sharing and cosmology is clarified as the portrayal of ideas and connections that can exist in a specialist or an area [1].

Metaphysics characterizes a typical vocabulary for scientists who need to share data in a space. It incorporates machine interpret-able meaning of essential ideas in the space and relations among them. Here are some explanations behind need of philosophy:

- To offer regular comprehension of the structure of data among individuals or programming specialists.
- To empower reuse of area learning.
- To make area suspicions unequivocal.
- To separate area learning from operational information.
- To investigate space information. [2]

From different definitions, it infers that ontology for a specific space is scientific categorization of that area joined with properties and standards. Scientific categorization of a space is vocabulary or ideas with specific plan and properties are connections which exist among those ideas. Actually, basically, philosophy comprises of Concepts, Relations, Axioms and Instances. It is utilized to display an area formally so it can be utilized for data coordination and learning sharing. Ontologies are fundamentally displayed and spoke to as charts. Prevalent dialect which is utilized for formal determination is OWL (Web Ontology Language), which is a semantic mark-up dialect.

III. SOIL

Soil is a thin layer of earth crust containing organic matter and minerals which acts as a natural medium for plant growth [3]. Soil formation is processes which will takes a long period of time may be 1000 years [4]. [5] Soil is formed from weathering of rocks. Weathering is a process of breaking down of rocks and minerals by several environmental factors such as climate, organisms, parent materials, relief and time. This process continues for long period of time which results in soil formation. Physical weathering and chemical weathering are the two types of weathering. Physical weathering is the process causes disintegration of rocks into small pieces without any chemical change. Chemical weathering is a process which dissolves rocks by water when interacts with minerals.

There are a few sorts of soil in India. Every dirt varies from each other taking into account physical
properties, substance properties and soil profiles. There are diverse layers of soil, for example, Epipedons and Endopedons both are normally known as indicative skylines. Epipedons mean surface which is top layer of the dirt and Endopedons mean subsurface which is center layer of the dirt. By and large soil profile alludes soil skyline. The dirt layers have skylines which are named as skyline A, B and C. Every skyline have unique qualities in view of that few procedures doing, for example, crop development, soil disintegration anticipation, soil cultivating and so forth.

Physical properties refers to soil water holding capacity, soil color, soil texture, soil structure, soil crusting, soil compression and compaction. Chemical properties refer to soil minerals. Based on physical and chemical properties soils are classified as red soil, laterite soil, black soil, alluvial soil, desert soil, and forest and hill soil. According to salt content soils are classified as acid soil, saline and alkaline soil, peaty and marshy soil.

Many scientists studied about soil and they classified soil not only based on its physical and chemical properties but also based on its genetic nature. Such genetic system of classifications is zonal soil, a-zonal soil and intra zonal soil. Soil taxonomy is of six categories such as 12 orders, 63 suborders, approximately 240 plus great group, more than 1000 subgroups, family and approximately 200 plus series in India and 12000 in USA.

All these soils are spread across all over India. Soil acidity is the most important property need to be considered before cultivating a crop and using fertilizers. It is nothing but presence of hydrogen ion in soil, pH measures soil acidity. Suppose if pH value is greater than 7 then soil is basic, if it is below 7 then soil is acidic and if it is equal to 7 then soil neutral. Based on soil acidity, soil salinity and alkalinity measure we can predict whether soil is eligible for cultivation or not.

Soil acidity and salt content varies based on climatic conditions and several other environmental factors. Environmental factors play a major role in soil characteristics and its nature towards agriculture.

IV. SOIL ONTOLOGY

There are 200 varieties of soils in India, all these soils are classified based on its physical properties, chemical properties, forming factors and its origin. The domain of these ontology covers major soil types, physical and chemical properties, soil formation, diagnostic horizon etc. It also covers its geographical location and its water holding capacity. In this ontology there are 12 classes, subclasses-132, relations-50, instances-25, restrictions-20 up to 6 levels.

Subclasses, relations and instances are structured based on its classification, its formation process, soil measures, regions, horizon and parameters such as soil density, volume etc.

In order to construct soil ontology, the following steps need to be done.
1) Create classes and subclasses
2) Create sibling class
3) Add Description to class
4) Create Individuals
5) Create object property
6) Create data type property
7) Create restriction
8) Use SPARQL for fetching the relevant data.

Creating class
1) Click owl classes tab
2) Create new class by clicking the create subclass icon.
3) Add name of the class by entering name in class address bar.

Creating subclass
1) Select the class for which you want to create subclass and click subclass icon.
2) Subclass will be created.

Create sibling class
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1) Create sibling class for main class 4 by clicking sibling class button.
2) Sibling class will be created.

Add Description to class

1) Double click the rdfs: comment box which is pointed by arrow.
2) Edit rdfs: comment box will open.
3) Add description in that box and press ok.
4) Description will be added.

Create individuals
Fig. 7: Creating Individuals
1) Select class for which you want to create individuals.

Fig. 8: Creating Individuals
2) Click the individuals tab.
3) Then click create individual button.
4) Enter the name of the individual in the address bar.
5) Individuals created.

Create object properties

Fig. 9: Creating Object properties
1) Click property tab and then click object property tab.
2) Then click object property button.
3) Object property button will be created.

Fig. 10: Creating Object properties
4) Adding domain for created property by clicking create domain button
5) Select class which we want as domain and press ok.
6) Domain will be created.
7) Like that click the range button and add range.

8) Now properties are created with domain and range.
Create data type property

1) Create data type property by clicking data property tab from property tab.
2) Add domain for the created data type property by clicking domain button.
3) Select range for adding value to that domain.

4) Add value by clicking add value icon.

5) Enter the value.

6) Value is created.

Create restriction

1) Select class for which we want to add restriction.

2) Press restriction button.
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V. CONCLUSION
Data as accessible in the web today is in particular unstructured and not reasonable for coordinated effort between diverse elements required in joint effort.

Collaboration happens adequately when the significance of the mutual learning of area is settled upon among the substances which are teaming up. This increases significance when joint effort necessities to happen among people and machines. Semantic web advancements which are developing and which are accessible today make this joint effort conceivable. Building soil characterization is the fundamental information which each geotechnical build needs keeping in mind the end goal to have a inexact judgment of building conduct of soils.

Engineer who is at webpage can advantage in utilizing semantic web innovations as he can rapidly and precisely touch base at the arrangement results, estimated designing conduct of soils furthermore works together with either people or programming specialists.

Information securing framework like protégé which are easy to utilize likes geotechnical engineer (space master) to speak to information as philosophy which serves together and adaptively take right judgment in the light of new data rising up out of the field conditions at work. Towards this course designing soil arrangement based on principles based cosmology is a little stride forward.

REFERENCES