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Ontology Development for Agricultural Research a Case Study of Wheat

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Abstract—*The study of agriculture is rural areas is most important as more than half population of India resides in villages Slow agricultural growth is a concern for policymakers as some two-thirds of India's people depend on rural employment for a living. Current agricultural practices are neither economically nor environmentally sustainable and India's yields for many agricultural commodities are low. Poorly maintained irrigation systems and almost universal lack of good extension services are among the factors responsible. In this research paper we study different type of ontology and crop classification. In this research paper we case study of wheat also.*

Keywords: *Ontologies , wheat classification ,Supply Chain Management.*

1. INTRODUCTION

There are many stakeholders(those who affected directly or indirectly) involved in supply chain management ,and the supply chain itself is a complex, dynamic and very big network that involved many people's like manufactures ,customers, warehouses. Supply chain management is concerned with managing the flow of products, funds, and information among the various supply chain stages.[1] Ontology ,on the other hand is "a formal, explicit specification of a shared conceptualization"[2].The main advantage for having such formal specification is to facilitate the knowledge sharing and re use among the various parties interested in that particular domain of knowledge. In this paper, the literature related to ontology development is reviewed, and particular focus to crop classification.

2. LITERATURE REVIEW

Ontology refers to an engineering artifact, constituted by a specific vocabulary, used to describe a certain reality, in addition to set of explicit assumptions regarding the intended meaning of words in the vocabulary[3]. An ontology defines a common vocabulary for researchers who need to share information in a domain. It includes machine-interpretable definitions of basic concepts in the domain and relations among them.

Why would someone want to develop an ontology? Some of the reasons are:

- To share common understanding of the structure of information among people or software agents
- To enable reuse of domain knowledge
- To make domain assumptions explicit
- To separate domain knowledge from the operational knowledge
- To analyze domain knowledge[3,4]

The Artificial-Intelligence literature contains many definitions of an ontology; many of these contradict one another. For the purposes of this guide an **ontology** is a formal explicit description of concepts in a domain of discourse (**classes** (sometimes called **concepts**)), properties of each concept describing various features and attributes of the concept (**slots** (sometimes called **roles** or **properties**)), and restrictions on slots (**facets** (sometimes called **role restrictions**)). An ontology together with a set of individual **instances** of classes constitutes a **knowledge base**. In reality, there is a fine line where the ontology ends and the knowledge base begins.[5]

Definition Of Ontology

An Ontology is the systematic formal axiomatic development of the logic of all forms and modes of being.

"Ontology is a formal explicit specification of shared conceptualization."

Formal

Ontology should be machine readable.

Explicit

Types of concepts used.

Conceptualization

Abstract model of world.

The main idea is to develop an understandable complete and sharable system of categories labels and relations that represent the real world.

Some ontologies allows

I. Communication among people and heterogeneous application systems.
II. Content base access on co -operate knowledge bases archives.
III. Understanding and agreement upon a peace of information structure.

IV. Agent understanding through interaction, communication negotiation of meaning.

Some Problems For Creating Ontology

I. It is difficult to implement a general ontology with specific domain.
II. It is two expensive to create very complex, complete and general ontology. Therefore less complete ,correct and consistent ontology have been used.
III. The person who takes part in ontology creation and ontology management ,creates and manages his/her point of views to represent ontology . [5]

Some most important Ontology editors and ontology manager are-

I. Protégé
II. SWOOP
III. KAON
IV. WSMX
V. OWL-S Editor
VI. Onto manager

Different Languages for Ontology creation are-
I. RDF(S)
II. DAML+OIL
III. OWL(Web Ontology Language)
IV. KIF

3. CROP CLASSIFICATION

WHEAT

WHEAT is a cereal grain originally from the Levant region of the near east but now cultivated worldwide. Wheat was the second most cereal in 2009.In 2010 world production of wheat was 651 million tons making it the third most produced cereal after maize and rice.[6,7]

Wheat is the primary food staple in north Africa and the middle East and is growing in popularity in Asia. Unlike rice ,Wheat production is more wide spread globally through china's share is almost one-sixth of the world.

4. WHEAT CLASSIFICATION

There are 6 wheat classification are given below
a) Hard red winter
b) Hard red spring
c) Soft red winter
d) Durum(hard)
e) Hard white
f) Soft white wheat[8]

Wheat Classified by sowing season:

Staring of November
Wheat normally needs between 110 and 130 days between Sowing and harvesting depending upon climate, seed type ,soil conditions etc.

Scientific Classification

Kingdom	Planate
(unranked)	**Angiosperms**
(unranked)	**monocots**
(unranked)	**commelinids**
order	**Poales**
Family	**Poaceae**
Sub family	**Pooideal**
Tribe	**Triticeae**
Genus	**Triticum**

5. SPECIES OF WHEAT AND ITS MERITS

Non-Irrigated Condition

Species	Notification Date	Productivity(Q. /HECTOR)	Time Duration	Height Of plant
K-8027	31-07-89	30-35	140-145	105-110
k-8962	01-01-96	25-35	90-110	110-120
K-9465	15-05-98	28-35	90-110	90-100
K-9644	2000	35-40	105-110	95-110
K-9351	2004	30-35	106-120	85-110
HDR-77	15-05-90	25-35	05-115	90-95
HD-2888	2005	30-35	120-125	100-110

Irrigated Condition

Species	Notification Date	Productivity(Q. /HECTOR)	Time Duration	Height Of plant
K-9107	1-1-96	45-50	130-135	105-110
K-0307	6-2-07	55-60	125-126	85-95
H.P.1731	04-05-95	55-60	130-140	85-96
NARENDRA WHEAT 1012	15-5-98	50-55	135-140	85-95
K-9006	15-05-98	50-55	130-135	105-110
H.U.W.468	09-06-99	55-60	130-140	85-95

D.L.784-3	17-08-93	45-50	130-135	85-90
U.P.2382	06-04-99	60-65	135-140	95-100
H.P.1761	09-09-97	45-50	135-140	90-95

6. WHEAT DISEASES

There are many types of Wheat diseases which is effected Wheat So we classified these diseases in main 4 types which are given below

BACTERIAL DISESES
FUNGAL DISESES
VIRAL DISESES
PHYTOPLASMAL DISEASES[9]

BACTERIAL DISESES

Bacterial leaf blight	**Pseudomonas syringas**
Bacterial mosaic	**Clavibacter michigonensis**
Bacterial Sheath rot	**Pseudomonas fuscovaginae**
Pink Seed	**Erwinia rhapontice**
Spike blight	**Rathayibacter tritici**

7. FUNGAL DISESES[10]

Alternaria leaf blight	Alternaria trsticina
Anthracnose	Glomer ella graminicola
Aureobasidium decay	Microdochium bolleyi
Black head molds	Alternaria spp. Cladosporium Spp. Epicocaum Spp. Stemphylium Spp. Other genera
Black point	Cladosporium Altenaria

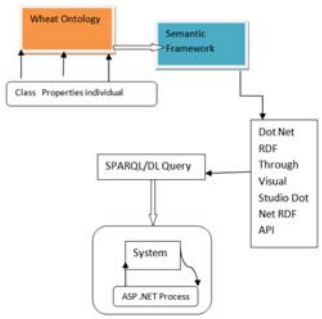
Wheat data In Last 5-6 Year

In Last 5 to 6 Year wheat production and productivity data rate is given below :

Year	Total Area (in Lakh Hect.)	Total Production (In Lakh Met. Tan)	Productivity (Q/Hect.)
2004-2005	93.74	234.30	25.00
2005-2006	93.16	240.90	25.86
2006-2007	93.90	260.27	27.72
2007-2008	93.99	263.12	27.99
2008-2009	95.13	285.54	30.02
2009-2010	96.68	275.18	28.46
2010-2011	96.365	300.006	31.13
2011-2012	97.311	316.620	32.54
2012-2013	97.34	313.32	32.19
2013-2014	NA	NA	NA

PRAPOSED SYSTEM

The Proposed System primarily consists of the classes, properties or the predicates in connection to the RDF and the individuals that are the objects instantiated through classes on top of which the Wheat ontology is drawn. The Wheat Ontology is built in Protégé 4.2. This ontology provides for the framework of the Wheat ontology System.



DotNetRDF which is a RDF API used in Microsoft Visual Studio for implementing Semantic Web Solution is extensively exploited over here. A SPARQL query is submitted to the DotNetRDF API which in conjunction with ASP.NET provides results as queried by the SPARQL interface. So the request and response is handled by the system.

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9. CONCLUSION AND FUTURE SCOPE
The use of semantic web in crop classification and its diseases helps the machine to take the appropriate decision regarding symptoms and cure. In future scope we develop an prototype ontology that integrate agriculture domain and semantic web.

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