ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Issue 4, April 2015

Generation of Personalized Ontology Based On Treatment Schemes Utilizing Semantics Rules

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ABSTRACT: A dramatic increase of demand for provided treatment quality has occurred during last decades. The main challenge is to increase the treatment quality. The personalization of treatment, since each patient constitutes a unique case. Health care provision encloses complex environment, since health care provision organizations are multidisciplinary. So we create the conceptualization of Disease-Treatment Ontology. The Disease-Treatment Ontology Comprises: The Clinical Pathway part, the quality assurance part, Details about virus, cost of treatments and diet maintenance.

KEYWORDS: Adaptiveclinicalpathway, clinicalpathwayontolo gy, personalized treatment.

1. INTRODUCTION

Ontology typically consists of a finite list of terms and the relationships between these terms. The terms denote important concepts (classes of objects) of the domain, while the relationships include hierarchies of classes. Ontology may also include other information, such as properties, value restrictions, disjointedness statements, and specifications of logical relationships between objects. Ontology languages are semantic markup languages for defining ontology's. We use Web Ontology Language (OWL), which was proposed as W3C Recommendation, for ontology specification. OWL facilitates greater machine interpretability of web content than XML, RDF, and RDF Schema by providing additional vocabularies along with a formal semantics.

The Semantic Web is an extension of the current web. Which information is given well-defined meaning, better enabling computers and people to work in co-operation. The Semantic Web is a collaborative movement led by the international standards body, the World Wide Web Consortium (W3C). The standard promotes common data formats on the World Wide Web. By encouraging the inclusion of semantic content in web pages, the Semantic Web aims at converting the current web, dominated by unstructured and semi-structured documents into a "web of data". The Semantic Web stack builds on the W3C'sResource Description Framework (RDF). According to the W3C, "The Semantic Web provides a common framework that allows data to be shared and reused across application, enterprise, and community boundaries. The term was coined by Tim Berners-Lee for a web of data that can be processed by machines.

The increment of treatment quality with decrement of healthcare provision costs is to be achieved. Modeling and utilization of standardized Clinical Protocols used in various domain of medical practice. Standardized clinical protocols comprise details: Medical plans, Corresponding actions for diagnosis, Treatment Scheme, Follow up. "Clinical pathways" is the effective and efficient tool to achieve the above mentioned objectives.

Clinical pathways allow the design and implementation of medical guidelines in a specific healthcare environment and decrease the occurrence of any undesired variability of medical practice. Disease-Treatment Ontology facilitates

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dynamic CP utilization for the development of Semantic Web Rules.

II. RELATED WORK

In[1]Dimitrios AI et al SEMPATH Ontology: Modeling Multidisciplinary Treatment Schemes Utilizing Semantics. It allows the conceptual modeling of the multidisciplinary entities engaged in the execution of CP (medical, organizational, financial worlds modeling) in a consistent way, leveraging the further utilization of the semantic infrastructure)

In[2]Marut BURANARACH et al Design and Implementation of an Ontology-based Clinical Reminder.We describe an ontology-based information and knowledge management framework that is important for chronic disease care management. The framework is designed to support two chronic care components: decision support and clinical information system

In [3] Christopher S.G. Khoo et al Developing an Ontology for Encoding Disease Treatment Information in Medical Abstracts.Disease-Treatment ontology which represents specific treatments that are considered for a particular disease, as described in medical articles.[1]

In [4] Syed Sibte et al Modeling the Form and Function of Clinical Practice Guidelines: An Ontological Model to Computerize Clinical Practice Guidelines System to Support Chronic Disease Healthcare.[2]

In [5] Jiangbo Dang , An ontological knowledge framework for adaptive medical workflow . Ontologies are a formal declarative knowledge representation model. It provides a foundation upon which machine understandable knowledge can be obtained, and as a result, it makes machine intelligence possible. Healthcare systems can adopt these technologies to make them ubiquitous, adaptive, and intelligent, and then serve patients better.[3]

In [6] W.E.McCarthy The REA accounting model: The generalized framework for accounting system in a shared data environment .The REA model is a technique for capturing information about economic phenomena. It describes a business as a set of economic resources, economic events and economic agents as well as relationships among them.

In[16] Rachid Benlamri et al Building a Diseases Symptoms Ontology for Medical Diagnosis: An Integrative approach Medical ontologies are valuable and effective methods of representing medical knowledge. In this direction, they are much stronger than biomedical vocabularies. In the process of medical diagnosis, each disease has several symptoms associated with it. There are currently no ontologies that relate diseases and symptoms and only attempts at their infancy along with some simple proposed models.

III. PROPOSED WORK

The main challenge to be confronted, so as to increase treatment quality, is the personalization of treatment, since each patient constitutes a unique case. Healthcare provision encloses a complex environment since healthcare provision organizations are highly multidisciplinary. In this paper, we present the conceptualization of the domain of clinical pathways (CP). The Disease-Treatment Ontology comprises three main parts: 1) The CP part 2) The virus information part 3) Risk assessment and Diet part.[4]

Our implementation achieves the conceptualization of the multidisciplinary domain of healthcare provision, in order to be further utilized for the implementation of a Semantic Web Rules (SWRL rules) repository. Modeling, implementing and execution of CP, which requires conceptualization enclosing multidisciplinary domain of knowledge.[5]

• First, Guidelines for clinical practice are becoming ever more popular in every sector of healthCare. Guidelines have the goal of indicating the decisions and tasks most appropriate for optimizing health outcomes and for controlling costs. They can be expressed either in the form of textual recommendations or as protocols or flow diagram. Standardized clinical protocols comprise details about Medical plans, Corresponding actions for diagnosis, Treatment Scheme,

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Follow up.[6]

- Second, Virus Information is providing the total information's about virus such as Virus name, Virus Stage, Type, Symptoms. Risk Assessment is providing the information about side effect and Disease Effect.[7]

- Third, Diet part tells about diet maintenance of the patients. [8]

3.1 SYSTEM ARCHITECTURE

To develop our Disease-Treatment ontology based on the ontology-based information and knowledge management comprise a set of evidence-based recommendations to both standardize and optimize the care process, whilst ensuring patient safety and quality of care.[9]

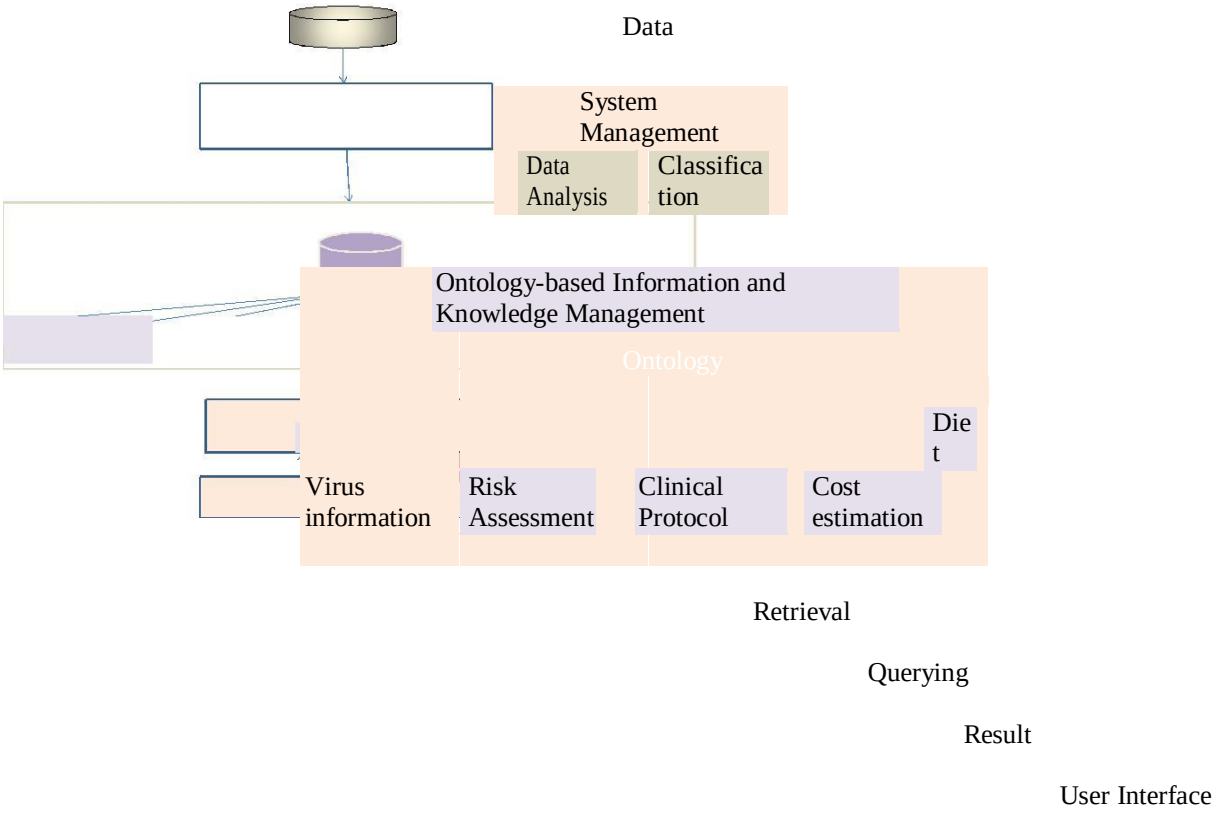

Fig. 1 Architectural Diagram

An ontology-based information and knowledge management process comprises a set of functional and temporal constraints, desired outcomes, set of actions and decision criterion.[10] A typical disease, as a dependent continuant, enacts extending, branching, and fading processes before it disappears. (i) The set of candidate ontology-based information and knowledge management were studied to extract and explicate the clinical knowledge; (ii)ontology-based information and knowledge management elements were identified and analyzed, which led to either the specification of new or the refinement of existing ontology classes, attributes and constraints to model the ontology-based information and knowledge management elements; (iii) Changes to the ontological model were reevaluated to ensure semantic consistency.(iv) Virus information and diet. Retrieval modules are used to extract the relevant information from the ontology. This consists of set of rules[11].

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IV. IMPLEMENTATION

Effective knowledge representation requires the use of standardized vocabularies to ensure both shared understanding between people and interoperability between information systems. Unfortunately, many existing biomedical vocabulary standards rest on incomplete, inconsistent or confused accounts of basic terms pertaining to diseases, diagnoses, and clinical phenotypes.[12]

Here we outline what we believe to be a logically and biologically coherent framework for the representation of such entities and of the relations between them. We defend a view of disease as involving in every case some physical basis within the organism that bears a disposition toward the execution of pathological processes.[13]

The modules used in this system are:
1) System Management
2)Ontology based Information and Knowledge Management

3) Retrieval

4) User Interface Module

SYSTEM MANAGEMENT

This module parses information from the medical data collection and adds them to the Ontology.[14] This includes data analysis and indexing, these two steps are used to classify the data based on their behaviors and used to create the Disease-treatment ontology and update the information's based on the clinical path ways.[15]

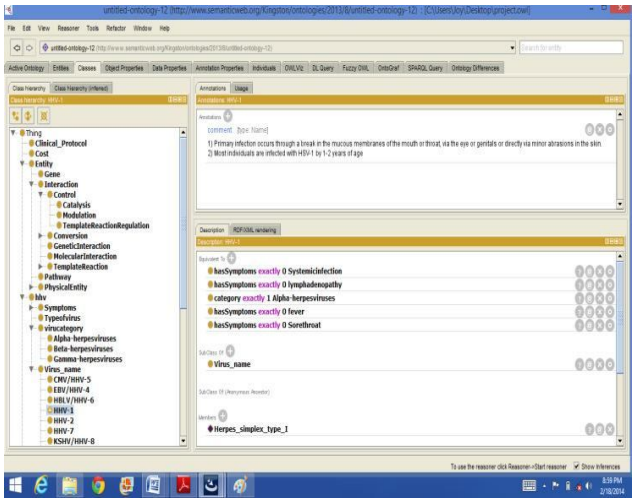

Fig. 2 Disease-Treatment Ontology Classifications

This fig.2 shows the detailed information about the

viruses, treatment schemes and then symptoms.[16]

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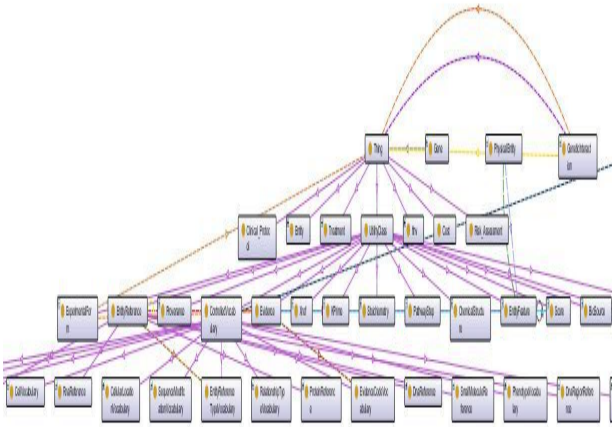

Fig. 2.1 Graphical View of Ontology

Fig.2 shows the graphical view of Ontology is used to determine different relation among the classes, objects and properties.[17]

ONTOLOGY-BASED INFORMATION AND KNOWLEDGE MANAGEMENT

Ontology-based information and knowledge management focuses on providing information and knowledge support on Virus information, Risk Assessment, Clinical Protocol, Cost estimation.[18] Virus Information is providing the total information's about virus such as Virus name, Virus Stage, Type, Symptoms. Risk Assessment is providing the information about side effect and Disease Effect. Standardized clinical protocols comprise details about Medical plans, Corresponding actions for diagnosis, Treatment Scheme, Follow up.[19]

RETRIEVAL

Retrieval modules are used to extract the relevant information from the ontology.[20] The design and development of the Disease-treatment Ontology leverages the design and representation of the semantic rules utilizing the SWRL (Semantic Web Rule Language) format. SWRL facilitates the integration of the modeled rules with the Disease-treatment Ontology.[21] The interaction between rules and ontology leads to new knowledge through the generation of new facts to be inserted as new concepts.[22]

USER INTERFACE MODULE

This module provides the system's functionality to its users.[23] It includes the following Use the application, where the user uses the system's functionality, Answer the query, where the user enters a query, retrieves relevant documents and reformulates the query, if the results are inefficient.[24] Present results to user reformulate the user's query, where the user's query is expanded with new terms.

V. CONCLUSION

The modeling, implementation, and execution of Ontology require extensive conceptualization since it encloses a highly multidisciplinary domain of knowledge. A disease and which physical disorder and treatment Schemes. Cover information's about virus and diet for patients and rules are used to extract the information from ontology. The future work of this project is expanding the ontology and generates more rules for user extractions.

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