ISSN 2250-3153

# A Survey on need for Semantic web

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***Abstract-*** The emerging trends of Semantic web attract the attention of researchers, due to the increased level of machine understandability which could offer an enhanced approach of acquiring more relevant results. It leads to redefining of the existing conventional web services (Web 2.0) into semantic web services (Web 3.0).The Conventional WSDL Services (Web Service Definition Language) are mapped into the semantic based OWL-S Services (Web Ontology Language for Services) through the addition of Semantic Annotations. This paper clearly focuses on giving a detailed overview of Semantic web, thereby states the need for redefinition of Web2.0.It stands as a guide to the researchers to gain an additional knowledge and for the beginners, a stepping stone into the semantic web research.

***Index Terms-*** OWL-S, Semantic web, WSDL.

## I. INTRODUCTION

The Current Generation lives in a fuzzy zone which is overwhelmed with data. This amount of data in the World gets increasing day-by-day and there is no end in sight. The personal computers everywhere make it too easy to save our data. On using data mining, the search on data is automated or at least simplified by using computers. This huge data stored with the storage medium needs the use of data mining Techniques to achieve better search strategies. The World Wide Web holds millions of resources that a user can acquire from the vendors. Nowadays, these web resources are acquired by the users through the use of Syntactic based Searches. The Syntactic search includes the keyword search schemes for acquiring relevant solutions from the huge resources available. The Search Engines and Web Crawlers are using these approaches for offering suitable solutions to the users. But, these keyword search schemes couldn't acquire more relevant page results. To overcome this drawback, semantic web gets evolved. The current web service depends with the syntactic mode of discovery. This limitation with the conventional mode of service leads to the evolution of Web 3.0 - Semantic Web.

The word 'semantics' is termed for meaning. The goal of web 3.0 is to add 'semantics' to the current web services to achieve machine interoperability. The Web 2.0 lacks with the need for understanding user's intention on search. Since the Key Word based queries couldn't predict their inter-links. This brings out the evolution of Semantic Web. But, it is a tedious task to develop an entirely new web service framework. Hence, the redefinition of web resources from syntactic discovery to semantics based discovery gets prevailed all over the World.

This paper focuses on this redefinition through the use of mapping from WSDL services (Web Service Definition Language) towards semantics. It can be done through the addition of semantic annotations within the WSDL files. The OWL-S (Web Ontology Language for Services) is a feature rich semantic language that supports ontology based approach, be applied for Semantic Mapping of Concepts.

The main contribution of this paper is to detail the need for web 3.0, to acquire better search schemes. On the other hand it offers a better understanding to the beginners who step into the field of Semantic Web research.

## II. SEMANTIC WEB

This section shows the underlying concepts of Semantic web and the limitations of web 2.0 which encourages researchers to step into Semantic web Research.

### *A. Semantic web*

The Semantic web is the next major evolution in connecting information. It is familiarly renowned as web3.0, Linked Data Web and Web of data etc-.It enables data to be linked from source to any other source and to be understood by computers. So, they can perform increasingly sophisticated tasks for us. The word 'Semantic' is termed for "Meaning" or "Understanding". The major difference between Semantic web and other technologies like Relational Database is that, Semantic web is concerned with meaning and not the structure of Data.

The three major technical standards that differentiate Semantic web applications from other applications are shown below:

- Resource Description Framework is a data modeling language for Semantic web. All Semantic web information be stored and represented in RDF using URIs and text strings as terms.
- SPARQL Protocol & RDF Querying Language is used to query data across various systems.
- Web Ontology Language is a schema language and Knowledge Representation Language.

This Web Ontology Language is described in detail with the later sections of this paper.

The Concept mapping in Human Brain can be compared with the use of ontology model in semantic web. For example: A teacher explaining the new topics to the students by referencing the old topics. The use of ontology offers an efficient data model for Semantic web to come true. The Semantic web doesn't mean to be about pages and links, It's about relationships between things, whether one thing is part of another? (or) when it happened?. In 2003, Semantic Web Research came into existence, but still there is no advance improvement. Though, It gets affected by many issues like huge data model and dotcom

burst etc-, the research is effectively growing in a progress with the step forwarding towards the achievement.

### *B. Limitations on Web 2.0*

In earlier days of invention, Hyper-cards are used to link documents. Later, World Wide Web came into existence. But, it is strange that the same web exists with a few advances over the attractive features of web. The current web services supports documents and files designed for Human user. But, Semantic Web supports documents that are designed to be processed by machines.

The current web services suffer with the limitations over uncertainty and denial. It is due to the complete syntactic mode of discovery. This mode of discovery depends with the key-word based search on resources. The web-crawler of a search engine tracks the pages of resources through matching the keywords mentioned with the title description on the page source. On matching these keywords, only related pages could be acquired as relevant results.

For example, Let us post a query in a search engine like Google "Keyword based search + research". It shows the pages with title related with "Keyword based search". The keywords are matched and the results are displayed upon the page ranks. The drawback is on not retrieving more relevant results. But, only related pages are retrieved. And accurate results could be acquired only through an efficient machine understanding of concepts.

### *C. Need for Redefinition of Web*

The above example of depicting the drawbacks of keyword searches shows the need for redefinition of current web services. The limitations on Web service description language file remains with their description that are syntactic. Also, this file doesn't have any support for named relationships. This problem of inefficient keyword searches can be solved through annotation of metadata. Annotation can be done by relating and tagging the descriptions with concepts in Ontologies.

To apply Semantic Annotations that bring semantics, the deeper knowledge about the semantic definition languages is must and be detailed in the following Section.

## III. SEMANTIC DEFINITION LANGUAGES

In this section, the basic component of web service definition language is shown. Also, an overview of the semantic definition languages like DAML-S and OWL-S are clearly illustrated. The OWL-S language is formerly known as DAML-S. The redefinition of web 2.0 includes the conversion of WSDL files into a Semantic Language. This translation can be done using addition of Semantic Annotations to WSDL files.

### *A. Web Service Definition Language (WSDL)*

The WSDL is an XML format used to describe network services as a set of endpoints operating on messages containing either document-oriented or procedure-oriented information, [3].

Table I : Basic components of WSDL

| | |
|---|---|
| **Service** | It is a container for a set of system functions being exposed to the web based protocols. |
| **Port** | It defines the address or connection point to a web service. |
| **Binding** | It specifies the interface and brings out the SOAP binding style definition. |
| **Port Type** | The < portType> element has been renamed to <interface> in WSDL 2.0. |
| **Operation** | Every Operation can be compared with a method or function call in programming. |
| **Types** | It describes the data. |

### *B. DARPA Agent Markup Language for Services (DAML-S)*

The DAML-S language uses the semantic information from DAML Ontologies and the Semantic Web to enrich the web service descriptions. It includes three major components as follows:

- Profile
  It defines the capabilities and additional features to describe the service.
- Process Model
  It describes the activity of the web service provider from which the web service requester can derive the interaction.
- Grounding
  It shows how the abstract information exchanges described in above process model is mapped onto actual messages.

In addition to these capabilities, A DAML-S Profile supports the different modes of discovery and the requester decision of whether to apply a chosen service. A DAML-S Process Model is an ordered collection of processes, where each process produces a state of information or a data exchange with the web service clients. Also, it distinguishes the processes into atomic and composite processes. The DAML-S Grounding is defined as a direct mapping from atomic processes to WSDL specifications of messages.

### *C. Web Ontology Language for Services (OWL-S)*

The OWL-S is a W3C Submission since 2004, It defines an upper ontology for describing the properties and capabilities of web services in OWL, [4].

The three components of OWL-S are follows:

- Service Profile
  It describes the service information which is necessary for the discovery process.
- Service model
  It details the composition, execution of process.
- Service Grounding
  It is the coordinator of Service Usage.

The process of discovery mechanism holds the base with OWL-S Service profile component. Hence, on redefining the web services the WSDL file descriptions are applied with

mapping algorithm to extract those descriptions to bring out OWL-Service profile. This mode of mapping algorithms be explained through featuring the works related with this redefinition of web services in the later sections of this paper.

## IV. RELATED WORK IN REDEFINITION OF WEB 2.0

The Redefinition of web services would be more efficient, If it can be applied as an automatic mapping scheme. But, the WSDL files lack certain features that supports automatic mapping. If manual mapping be done for redefining these web services, it will consume more time and cost. Hence, the use of semi automatic mapping algorithm comes into existence. The following related works shows the overview of Semantic mapping tools using different approaches on semi automation of mapping algorithms for redefinition of web services.

### *A. ASSAM: A Tool for semi-Automatically Annotating Semantic Web Services.*

This is a tool that assists a user in creating semantic metadata for Web Services. It is intended for vendors who want to switch over semantic web services through Integration of a number of services that admits annotations according to some shared Ontology, [7].The automatic creation of semantic data is favoured by use of two machine learning algorithms like iterative relational classification algorithm for semantically classifying Web Services and a Schema Mapping Algorithm that is based on an ensemble of String Distance Metrics.

It consists of two parts, a WSDL annotator application, and OATS, a data aggregation algorithm. The WSDL annotator is a tool that enables the user to semantically annotate a Web Service using a point-and-click interface. The key feature of the WSDL annotator is the ability to suggest which ontological class to use to annotate each element in the WSDL. To automatically aggregate the resulting heterogeneous data into some coherent structure, OATS (Operation Aggregation Tool for Web Services), a schema matching algorithm that is specifically suited to aggregating data from Web Services.

### *B. METEOR-S*

Meteor-S Web service annotation framework is a semi – automatic tool applied for annotating the web service descriptions with ontology. In manual mapping of concepts the choice of suitable Ontologies and the size of huge data on web services and Ontologies turn this process into a tedious task, [8]. This tool mainly focuses with generation of Schema graphs on matching them with Ontologies.

The use of ontology store is to reserve the ontology that will be used by the system to annotate the Web service descriptions. The user can directly add new ontologies to the store. The DAML and RDFS files are supported for Ontology modeling.

The Translator Library is used to generate the schema graph representations. It includes two translators for generation of schema graphs. The ‘wsdl2graph’ converts WSDL files into schema graphs and ‘Ontology2graph’ converts ontology files into schema graphs. The matcher library includes two types of matching algorithms as Element level matching and Schema matching algorithms.

The Element level matching algorithm [9], is applied for linguistic refining. It checks for the measures on names and sorts the relevance. The Schema matching algorithm is used to find the measure of structural similarity among two different concepts.

### *C. WSDL TO DAML-S*

The goal of WSDL2DAMLS is to apply a conversion between WSDL and DAML-S. The result of this conversion holds the complete specification of the Grounding and an incomplete specification of the Process Model and Profile. The incompleteness of the specification is due to the limited feature of WSDL that does not provide any process composition information, therefore the result of this conversion will also lack process composition information. Also, WSDL does not provide a service capability description, therefore the DAMLS Profile generated from WSDL must be manually completed, in further.However,WSDL2DAMLS gives the basic structure of a DAML-S description of Web services through complete specification of the Grounding and thereby, save much time on manual mapping.

### *D. A Semantic mapping scheme with standardization, on using Ontology Search and Standardization Engine (OSSE).*

The goal of this mapping scheme is to redefine the conventional web services using semantic markups and also the standardization of this definition, using concepts of Ontology. The use of Ontology Search and Standardization engine favours standardization, where the prior mapping tools failed to provide much standardization of concepts. The Standardization of concepts could achieve better search results, [11]. Since, the web resources to be dealt with are huge in number.

The standardization is a problem due to the issue that, If one concept finds same definition, there is no use of semantic web. The Ontologies list must be standardized in an order to avoid these issues on search. The Ontology Search and Standardization Engine offer standardization through three stages of refining using Linguistic search, Structural Refining and Statistical Refining. On linguistic refining related words are analyzed to compute Term Frequency. The use of concept trees brings out concept-to-concept relationships. And if these relations exist, rank values be assigned which is used to reorder the ontologies list. Thus, OSSE could provide better standardization and thereby it achieves better semantic mapping of concepts.

## V. CONCLUSION

This paper clearly illustrates the overview of need for Semantic web, the possible approaches of mapping to semantics and lists the effectiveness on this mapping to Semantic Web Services. The goal of this survey is to support the new researchers, who are interested to step into this research domain. It helps to get an insight into this dynamic field of study in Semantics. It is mentioned to be dynamic, as the semantic approaches are under upgrade and it step higher everyday to achieve a best model of Semantic web. The limitations on current web services are explained with the drawbacks on keyword based search. It could clearly stress the need for semantic web. The basic features of Semantic web definition languages and the

related work on semantic mapping tools also added to provide an introduction to the basic concepts underlying this study of redefining web services.

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