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An Enhanced CEM Modelling Using Ontology in Pervasive Environments

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ABSTRACT

Due to the increased growth in pervasive applications and wide spread in our day-to-day life activities there occurs a requirement for event awareness to safeguard users being distributed. For these situations, the behavior of the application depends on the sensed events in addition to internal state and communication between the users upon execution. The major roles are played by event and event awareness in pervasive for performing user choices on behalf of them. The paper proposes a model facilitating reusable event model based upon the ontology. It achieves event reasoning by giving structure for events, rules and their semantics. A multi-field platform usage model is created initially to obtain promising results

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INTRODUCTION

The necessity of every time and everywhere usage of computing model for mobile ad hoc networks in pervasive distributes the availability of handheld devices like PDA and smart phones with computing environments. The day-to-day lives are opted for such kind of situations due to the tremendous growth in computing devices. It makes the daily activities more comfortable (or) unsuccessful but anyways it needs a proper observation through which challenging roles are played by the event and event awareness.

The framework pictures the fundamental components in a pervasive environment as in Figure1. The relationship between the components is shown clearly using arrows running between them.

The components are characterized as,

Pervasive Environment:

The components holding autonomous, heterogeneity and variety of users, ad hoc connections between the devices, resources, devices, hardware and software sensors.

Event Modeling:

It explains the gathering, organizing, demonstration, storing and management of events.

Event Awareness:

It makes interpretation regarding the events which cause the actions based upon the decisions.

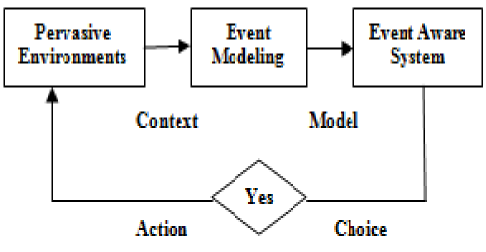

Fig. 1: Basic Elements of Event Aware Pervasive Computing

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Here, the pervasive environment provides a major challenge in usage of event information to the application programmers. The key focus is to provide ontology based semantically rich, reusable and extendable event models that can be managed. It in turn supports for concatenating the reasoning process in event aware applications over a multi-domain.

Event:

Dey (Wang, X., et al., 2004) statement for an event is, "A user, a place (or) a physical (or) computational object can be an entity. It is represented during the communication between a user and a submission".

The individuality of an entity is not needed to be inherited since the operation on an event for a particular time and space describes the communication on an entity.

The source of entity is categorized into entity classes since it is important in our representation process. The representation of event depends upon the entities and their relationships.

The classes are,

Customer Event: Characteristics, Location, Activity, …
Machine Event : Workstation, Rapidity, Display size, Location,…
Application Event : Version, Accessibility,…
Environment Event : Light, Moisture,…
Resource Event : Availability, Category, Volume,…
Network Event :Least speed, Highest speed,…
Location Event : Substance and its inclusion,…
Activity Event : Set up time, Finish time, Actor,…

Hierarchy is used to represent the organization of the above mentioned entities contained with event at the root. The root event entities hold sub-classes indicating narrations having common properties inherited from the root. These sub-classes contain lower sub-classes which describe the views that depend upon the field within the event where every field describes the components for specific applications like banking, hospitals, education, holidays, etc. These entities do not form a complete list so it needs a model which remains extendable that allows new components to be added up.

The basic characteristics of event are that it holds an actor (or) subject. The value and type of the event is stated using multiple properties. Based upon a specific property the situation of subject it is represented using a predicate and object. The RDF triple identification technique is used for identifying principle which is used to model the principle using ontology. The fundamental basic triple is given by <subject predicate object>. In the event representation model additional meta-data of event information regarding the basic triple like the initiation time, correctness, resource from which the event is captured are also included.

Event Modeling:

The pervasive environments hold the computational entities to be aware about the event in order to adjust themselves. An event model which is independent of field for representing the event, managing the event and interoperability of semantics are required. Here, a common event modeling based on ontology is pictured.

Objectification of Event Modeling:

The event modeling requires event attributes like resource, time, place, validity, claims, doubts, proofs, etc in addition to subject, predicate, object ripples for describing the event itself and expanding the event models towards assurance transmitting models. The entire objectified triple makes use of these attributes which gets its meaning only during submitting to a triple of particular occurrence. In order to understand this principle and for including these parameters into the event model it is necessary to initiate a high order RDF statement which in turn helps in making a statement about another statement. It is attained by constructing a model of the original statement and it serves a new resource along which properties can be added up. This is named as objectification (Chen, H., et al., 2003). The original statements are contained as resource within an objectified RDF database along with the additional statements. For modeling the original statements with RDF as resource four properties like subject, predicate, object and type are used. A new resource along with these four properties signifies the original statement which can be used as subject (or) object of other statements contained with additional statements about it.

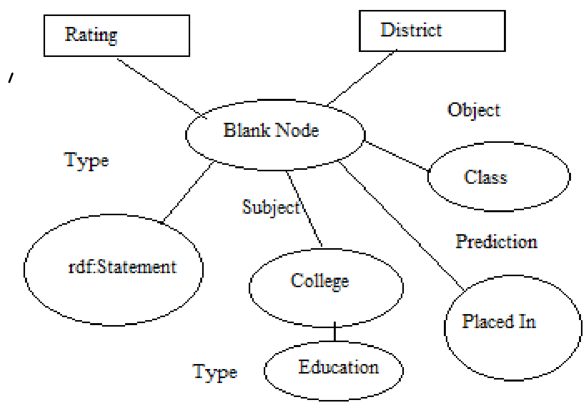

Fig. 2: RDF Data Model for Event Objectification

The figure 3 illustrates RDF data model of event. An ideal solution for representing more number of event attributes to the basic event triple is provided by RDF/OWL objectification principle.

<ns:College ns: is A ns: Institution/>
<ns: College ns: isSituatedin ns: Coimbatore/>
<ns: Coimbatore ns: ratingis "94"/>
<ns: xx rdf: type resource = rdf: statement/>
<ns:xx rdf: subject resource= ns:college/>
<ns:xx rdf:predicate resource=ns: issituatedin/>
<ns:xx rdf object resource=ns:Institution/>
<ns:xx ns: is ratedby "google"/>
<ns:xx ns: has rating "94"/>

Semantically Rich Event Model:

The illustration of location of a college in the below table is given using a simple query (select subject from event_table where predicate = "place in" and object = "TAMILNADU") where the output is selected as COIMBATORE. For practical purposes if the table holds information for supporting humans who knows the "rating" and "district" that are identical in the field of interest. Additionally, a human support also infers that SARAVANAMPATTY and ARASAMPALAYAM are now situated in same district together. By including these sort of data explanation using standard database is not an advisable technique.

Subject	Object	Predicate
SNSCT	Is Situated in	Vazhiyampalayam
KGISL	Is Situated in	Saravanampatti
SVSCE	Is Situated in	Arasampalayam
……	…….	…….

The above illustration pictures the need for an event model describing the concepts their ladder along with their relationships. For processing the information contained in documents by applications a web ontology language OWL is used as an opposition to the situations when presented by humans in the above query.

The W3C recommends OWL for event modeling which utilizes web standards for representing information like RDF and XML schema. Necessary interoperatbility for semantics between the event aware systems are provided by OWL. It provides the high degree of inference by additionally providing vocabulary along with formal semantics for defining classes, properties, relations and axioms.

For the concepts "rating" and "district" the OWL related property is used which defines them as same concept. In parallel the concepts defines the same concepts using OWL as jointly and co-positioned as,

<rdf:Description rdf:about = "together">
<owl: sameas rdf: resource = "co-locatedwith">
</rdf:Description>

For the concepts "rating" and "district" the OWL related property is used which defines them as same concept. In parallel the concepts defines the same concepts using OWL as jointly and co-positioned as,

Likewise, the concept co-situatedwith is balanced which means if A is co-situatedwith B then it is possible to say that B is co-situatewith with A and viceversa.

For a better understanding "In case if college I is situated in COIMBATORE and college 2 is also situated in the same district then the termination is that they are co-situated with each other". Example is given using common rule languages in Jena to represent the rule (sourceforge.net).

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[rule1: ? college1 nsp: situatedin ? Coimbatore)
(?college2 nsp:situatedin ? Coimbatore)
(?college1 nsp: Co-situatedwith ? college2)]

3.3Ontology Based Event Management Model:

An ontology based approach is presented for event modeling and its management. In event modeling the striking features of ontology are significant power, hierarchal organization, requirement, standard, support for well-organized reasoning, support for programming abstraction and interoperability.

A common event management model (CEMM) (Figure 3) is proposed for gathering, representation, explanation, management of event data consisting of three fundamental components as,

- **Event Semantics.**
- **Event Occurrence.**
- **Event Related Rules.**

The semantics, concepts and their relationships in the event data are represented using ontology. It is formed by the ontology combiner who describes the common event which is independent of field and events particular for field. Occurrence of events is represented by event data. The events are stored into the disk in the form of data. Rules are used to obtain choices and termination about the actions by the event aware system. There exist two rules for these sources,

User Rules – These are openly given by the users:
System Rules – These are understood by the system:

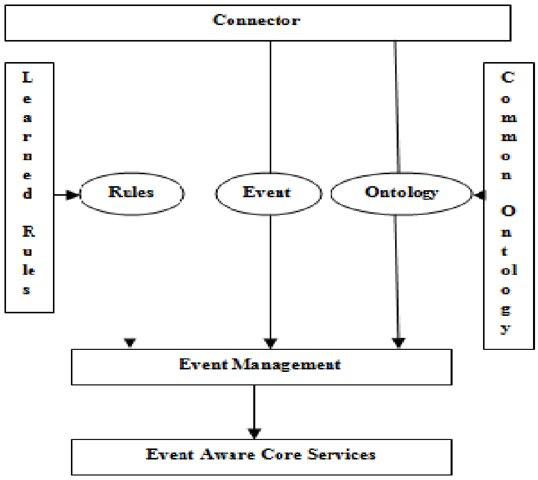

Fig. 3: CEMM Structure

The illustration for Common components is given using library management example based on the use of library for students. Based on the regulation student can borrow books depending on the rules set by the library for study purpose. It additionally assists beyond lectures, consulting professors, etc. They can access certain resources only within the library where they need to maintain perfect silence and should not damage the library property.

```
<rdf :RDF ……
  <row1: Class rdf: code = “College”>
<rdfs:subclassof>  <row1:class rdf: Id= “User”/> </rdfs: subclassof>
</owl:class>
<owl:class rdf: ID = “Library”>
<rdfs:subclassof>  <row1:class rdf:about = “#situation”/> </rdfs:subclassof>
</owl:class>
<owl:objectProperty rdf:ID = “borrowedby”>
<rdfs:range rdf: resource = “#books”/>
<rdfs:field rdf:resource = “#device”/>
</owl:ObjectProperty>
…………….
………………….
</rdf>
```

Fig. 4: OWL representation of the event library book system

It is possible to store constant data about static events using any standard database format and can be linked using libraries for database connectivity. These can be crowded selectively as event occurrences into the ontology structure during run time. The XML triples representation format is used to communicate to CEMM for logic events which are translated to indicate representation which makes the data ready for reasoning, explanation, combination and choices.

Event Reasoning – Case Study:

The event aware service platform is divided into four task groups (Figure 5) as,

Connection Manager - It provides connection to the users, platform and other module precise application field in which platform is used.

Data Resource (CEMM) - The components within these groups are responsible for providing necessary data for before- happening and after-happening event aware service. It contains,

Capturing the event - It is the connection to the event sources either in user connectivity (or) other devices which filters and sends useful events to the event database.

Event Ontology – It is a combination of field dependant ontology and common field independent ontology. It is fetched into the reasoning engine for further use.

Capturing the Rule - It stores the rules into the rule database and act as a connection to rule resources in user connectivity.

Event Aware Service - It is responsible for giving event aware services after reasoning on the event.

Additional Services

Information Detection Service - It provides features to improve self learning.

Association Service - It provides features for combining pairs in the locality space.

The components can include other services like protection and adjustment by extending itself since the key idea is to improve the core services.

Conclusion and Future Work:

An ontology based common event management system is proposed here. The model CEMM in a multi-field event aware is created. The event model based ontology with connection of rules and event occurrences plays a vital role for choices and reasoning involved to give an event aware service.

The illustration about library management is provided in the section which was also tested with the data collected from electricity bill monitoring.

The modelings of modules are achieved as independent components and the connection part is missing in the preliminary implementation. Furthermore, the focus is to develop event aware model entirely using CEMM.

REFRENCES

Dejene Ejigu, Marian Scuturici, Lionel Brunie, 2007. " An Ontology based approach to context modeling and reasoning in pervasive computing". Fifth IEEE International Conference on Pervasive Computing and Communications Workshops, ISBN: 0-7695-2788-4.

Marco Manca, M., P. Fabio Patern, S. Carmen, 2013. "Adaptive Mobile Multimodal User Interfaces for Dynamic Accessibility", Workshop on Mobile Accessibility", CHI.

El Idrissi, B., S. BaiÌˆna and K. BaiÌˆna, 2013. "Automatic generation of ontology from data models: A practical evaluation of existing approaches", in Research Challenges in Information Science (RCIS), 2013 IEEE Seventh International Conference on. IEEE, pp: 241-252.

Cali, A., G. Gottlob, A. Pieris, 2012. "Towards more expressive ontology languages: The query answering problem, " Artificial Intelligence, 193: 87-128.

Soylu, A., P. De Causmaecker, P. Desmet, 2009. Context and Adaptivity in Context-Aware Pervasive Computing Environments. in Proceedings of 2009 Symposia and Workshops on Ubiquitous, Autonomic and Trusted Computing, pp: 94-101.

Chaari, T., D. Ejigu, F. Laforest, M. Scuturici, 2006. "Modeling and Using Context in Adapting Applications to Pervasive Environments", In the Proceedings of the IEEE International Conference on Pervasive Services (ICPS'06), Lyon, France, pp: 111-120.

Henricksen, K. and J. Indulska, 2005. "Developing context-aware pervasive computing applications: Models and approach," Pervasive and Mobile Computing, Elsevier.

Strang, T., C. Linnhoff-Popien, 2004. "A Context Modeling Survey", Proceedings of the First International Workshop on Advanced Context Modelling, Reasoning and Management, Sixth International Conference on UbiComp2004. Nottingham, England.

Wang, X., D.Q. Zhang, T. Gu, H.K. Pung, 2004. "Ontology Based Context Modeling and Reasoning using OWL", workshop on context modeling and reasoning at IEEE International Conference on Pervasive Computing and Communication , Orlando, Florida.

Australian Journal of Basic and Applied Sciences, 8(16) October 2014, Pages: 388-393

Chen, H., T. Finin, A. Joshi, 2003. "An ontology for context-aware pervasive computing environments", Special Issue on Ontologies for Distributed Systems, Knowledge Engineering Review, Acapulco MX.