KC3 Browser: Semantic Mash-up and Link-free Browsing

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ABSTRACT
This paper proposes a general framework of for a system with a semantic browsing and visualization interface called Knowledge Communication, Collaboration and Creation Browser (*KC3 Browser*) integrates multimedia contests and web services on the grid networks, and makes a semantic mash-up called knowledge workspace (*k-workspace*) with various visual gadgets according to user's contexts (e.g. their interests, purpose and computational environments). KC3 Browser also achieves a *link-free browsing* for seamless knowledge access by generating semantic links based on an arbitrary knowledge models such as ontology and vector space models. It assists users to look down and to figure out various social and natural events from the web contents. We have implemented a prototype of KC3 Browser and tested it to an international project on risk intelligence against natural disaster.

Categories and Subject Descriptors
H.4.3 [Communications Applications]: *Information Browser*

General Terms: Design, Human Factors,

Keywords: Semantic Web, Semantic Browsing, Semantic Mash-up

1. INTRODUCTION
As the number and diversity of information sources on the Web has rapidly been increasing, there has been increasing interest in semantic browsing and mashup tools [1-5].

Even though these tools are sometimes efficient and convenient for knowledge accessing, discovering and understanding from the Web, it is difficult for novice end-users to master them according to their individual purposes, task, and interests. We need a smart infrastructure for semantic browsing on the Web which facilitates personal and community activities.

We propose a new framework for semantic mashup and browsing called *KC3 browser* which integrates conventional techniques: information visualization, data mining and the Semantic Web and to provide user friendly interfaces, semantic components and APIs as web services on the global grid networks. Our research has five main advantages:

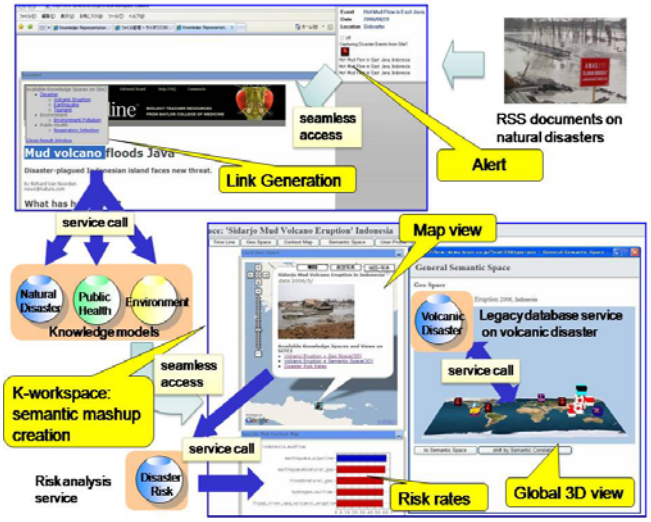

Figure 1: Overview of KC3 Browser.

- Link free browsing: KC3 browser dynamically generates semantic links and views for semantic browsing on the web.
- A flexible architecture: KC3 browser is independent of specific data-collection and mining modules as well as visualization and knowledge models.
- Lateral knowledge discovery: KC3 browser provides mechanisms and components to directly manipulate and coordinate on the multi aspect views (times, places, persons, organizations, and events) for cross-domain and cross-media knowledge discovery.

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2. KC3 BROWSER ARCHITECTURE

KC3 Browser consists of three main layers: (a) web service layer, (b) mashup layer and (c) presentation layer (Figure 2). Web service layer provides various information resources such as information extraction, data mining, knowledge model and legacy databases as web services on the grid network called *global knowledge grid* [6]. Mashup layer integrates the above contents and services as a chunk of knowledge called k-workspace which consists of four aspects: (i) semantic resources, i.e., vector space model, (ii) visualization resources, i.e. graphic components (iii) personal and social resources, i.e., user profiles and social factors, and (iv) content resources, i.e., Web contents (Figure 2). Publish layer provides the functions to show, publish, share and reuse k-workspaces as semantic mashups among open-ended communities on the Web. K-workspaces have one or more k-gadgets which provide simple functional units for presenting visualized contents (data, information and knowledge) to users. Outstanding feature of k-gadgets is that they work cooperatively and make semantic mashups according to user contexts.

All contents and graphic objects in k-workspaces are annotated with metadata base on knowledge models, and cross-referenced with internal or external semantic links called *k-links* generated by link generators.

3. PROTOTYPE AND APPLICAION

We have implemented a prototype of KC3W BROWSER and applied it to a project on risk intelligence against natural disasters confronting East Asia and the European Union (Figure 1). GUIs components in prototype has implemented in Ajax. The prototype system has used the vector space models [7] on volcanic disasters, environments, healthcares and international economics. The current system provides simple 8 types of K-gadgets: alert, timeline, map, document, user profile, expert information, 3D global map, 3D semantic space and risk analysis chart. We have generates about 100 k-workspaces from the disaster portal sites such as Global Volcanism Program [8], Wikipedia [9], and the other RSS-based News Sites on the Web.

In the result of the experiments, it is found that the 2000 Miyakajima eruption in Japan is similar to the 2006 mudflow disaster in Indonesia in that the effect volcanic gas on human health is prominently serious in the both disasters despite the fact

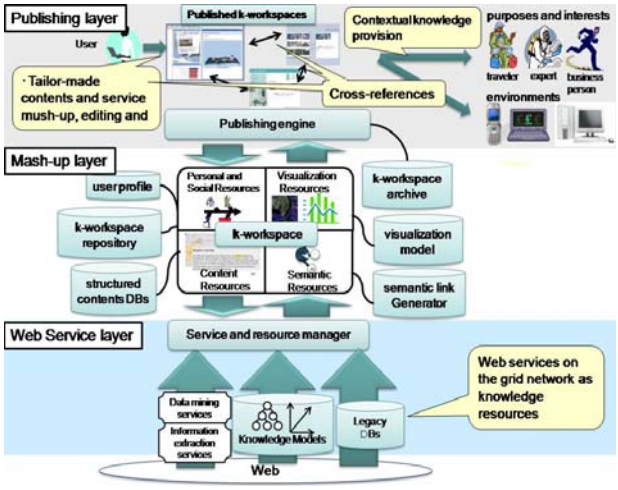

Figure 2: Architecture of KC3 Browser.

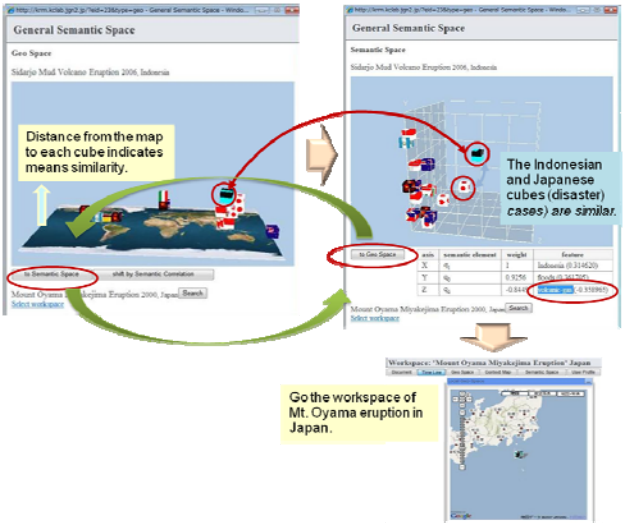

Figure 3: Discovery of common feature between different events

that the disaster types of the two are different (Figure 3). It indicated that our semantic mashup and link-free browsing approach allows us to enhance knowledge analyzing, sharing and reusing beyond the time, place and fields on the web.

4. CONCLUSION

This paper presented a framework of the next generation semantic browsing framework called KC3 browser which integrates the existing services and technologies; information visualization, visual data mining, web browsing, and knowledge models, and present well structured and visualized knowledge called the k-workspaces with various smart k-Gadgets according users interests, task, specialty, and computational environments.

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