A Dynamic Concept Base: A Component for Generative Systems

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ABSTRACT
This paper presents our on-going projects "Generative Website Project" and "Untitled Media Project", and a core computational component "Dynamic Concept Base (DCB)". The aim of these projects is to enhance interactions between public audiences, artists and artworks. The DCB is one of the core components across the projects supported by the Australasian CRC for Interactive Design (ACID) and Australian Centre for the Moving Image (ACMI).

Categories and Subject Descriptors
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms
Algorithms, Design, Experimentation

Keywords
Creativity support, Dynamic Concept Base, generative system

1. ON-GOING PROJECTS
The idea of the Dynamic Concept Base is being implemented as one of the central components across our current on-going projects. We discuss how the DCB works in the following two projects[1]: (1) Generative website project; and (2) Untitled Media Project.

1.1 Project 1: Generative Website
The idea is that an audience of a generative website is a person browsing a public posting website, such as public BBS, YouTube, Flicker, etc. The generative system behind the web site generates web contents that have meaningful sequences of information out of posted information, rather than simply providing posted information.

Suppose a video posting website has a number of video clips. A generative system behind the website segments the posted video clips into small units (shots) and restructure them into meaningful sequences with using annotations. Every time when new video clips and annotations are posted, sequences are dynamically generated, so that audiences enjoy dynamic video sequences.

Figure 1 shows a prototype of the generative video website. The interface is developed with Flash and server-side processors are Java servlet that communicates with the YouTube video servers [6].

The system retrieves and sequences videos from YouTube according to the similarity between tags attached to videos. An audience can rearrange the order of video clips in the sequences by linking / unlinking videos. Search results are dynamically woven each time when an audience sends a query. That is, audiences enjoy different experiences.

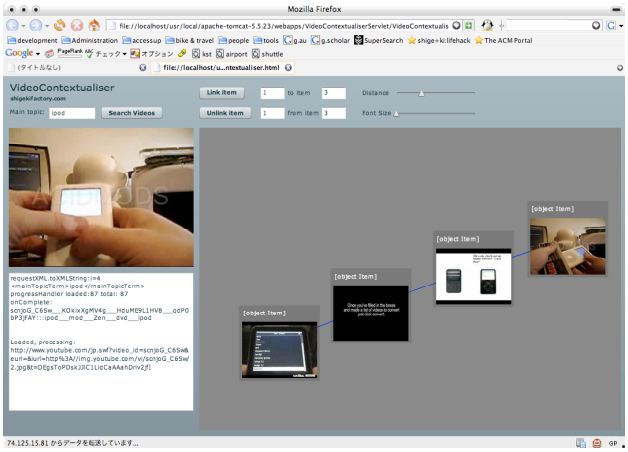


Figure 1 A Prototype of the Generative Video Website

1.2 Project 2: Untitled Media Project
The aim of this system is to show features and relationships among artworks exhibited in a gallery and exhibition. These information supports: (1) public audiences to have an overview of the exhibited artworks at a gallery; and (2) exhibition designers (curators) to design an exhibition site.

Visitors to a New Media gallery or exhibition are asked to complete a simple questionnaire (a paper-based/PDA-based tick-box survey shown in Figure 2) as they enjoy the gallery experience. We conducted an experiment at International Symposium on Electronic Arts (ISEA 2006). The collected information is visualised with Flash and made available for public[2] consideration [3].

In order to enhance further audiences' understanding of relationships between artworks, it is useful to arrange the artworks visualised by the system according to their similarities. The system computes coordinates in a two-dimensional space using the FastMap algorithm [2] for the investigated artworks based on the obtained similarities. The obtained coordinates and their mapping are shown in Figure 3.

[1] We have eight application plans at this moment.

[2] http://www.creativityandcognition.com/UntitledMedia/

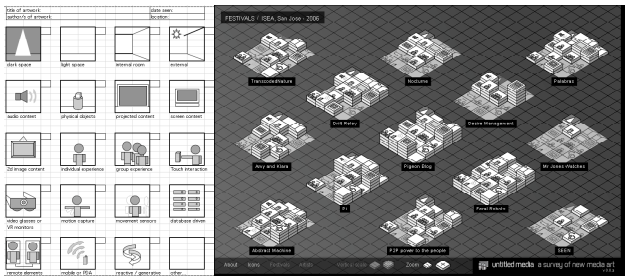
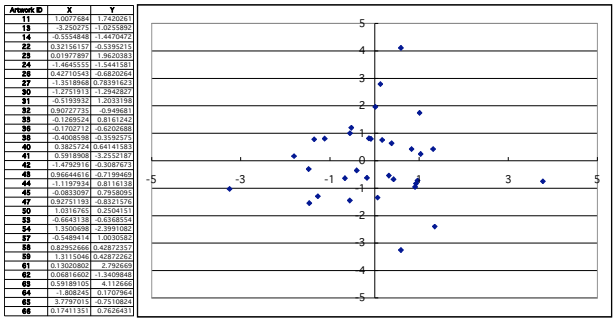


Figure 2 The Survey Form and the Result from ISEA 2006



Artwork ID	X	Y
11	1.0077684	1.7420261
13	-3.250275	-1.0255892
14	-0.5554848	-1.4470472
22	0.32156157	-0.5395215
23	0.01977897	1.9620383
24	-1.4645535	-1.5441581
26	0.42710543	-0.6820264
27	-1.3518968	0.78391623
30	-1.2751913	-1.2942827
31	-0.5193932	1.2033198
32	0.90727735	-0.949681
35	-0.1269524	0.81612421
36	-0.1702712	-0.6202688
38	-0.4008598	-0.3592575
40	0.3825724	0.64141583
41	0.5918908	-3.2552187
42	-1.4795916	-0.3087673
43	0.96644616	-0.7199469
44	-1.1197934	0.8116138
45	-0.0833097	0.7538095
47	0.92751193	-0.8321576
50	1.0316765	0.2504151
53	-0.6643138	-0.6368554
54	1.3500698	-2.3991082
57	-0.5489414	1.0030582
58	0.82952666	0.42872357
59	1.3115046	0.42872262
61	0.13020802	2.792669
62	0.06816602	-1.3409848
63	0.59189105	4.112666
64	-1.808245	0.1707964
65	3.7797015	-0.7510824
66	0.17411351	0.7626431

Figure 3 Relationships between Artworks

Suppose the curator thinks two artworks arranged far with each other on the system are actually similar, then the curator drags one or both of them and drops them close together. This interaction tells the system to reconfigure its definition of similarity between artworks. It is expected that the more the system learns from interactions, the better the system arranges artworks.

2. A DYNAMIC CONCEPT BASE

A Dynamic Concept Base (DCB) is a concept base that holds multiple similarity definition matrices which are dynamically reconfigured through interactions.

Some established fields, such as the medical field, have their own thesauri (ontology) that define similar words and concepts. However, other fields do not always have such an established ontology, or relationships between concepts are dynamic by nature. In the latter case, it is necessary to construct thesauri from available data [4]. In addition, thesauri do not show how similar the words are. A concept base is an extended thesaurus with values of similarities between concepts. As neither of the projects explained in the previous section do not have established ontology or thesaurus, a concept base needs to be developed. Our target domains are the ones that is not well-established where existing / incoming concepts and their relationships are neither stable nor clear. It is necessary to hold multiple definitions of similarities so that the most suitable one can be delivered to the user's current context.

A spatial representation is suitable for information-intensive tasks where existing information is not fully understood. The DCB presents and arranges information units based on similarities in a two-dimensional space. Similar units are closely arranged with each other. Then a user interacts with the space in three ways: (1) moving units; (2) grouping units; and (3) annotating groups (Figure 4). (1) is for formalising the information space [5] with reflection-in-action , (2) is for reconfiguring the relationships between units, and (3) is for contextualising the similarity matrix. If a user is formalising an information space in a similar way to one or some of the previous matrices, then reusing existing matrices is effective and efficient, rather than developing a new matrix from scratch.

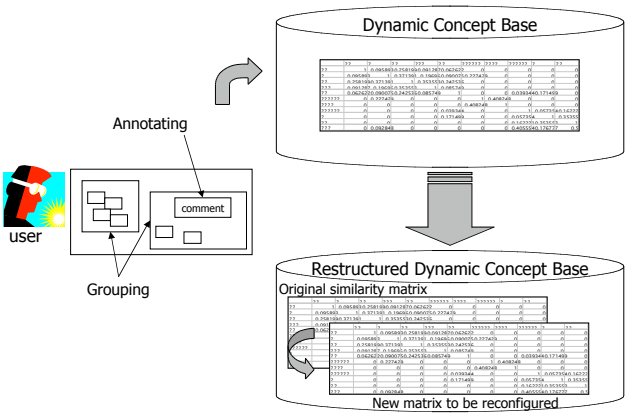


Figure 4 Reconfiguring the DCB through Interactions

After accumulating multiple reconfigured similarity matrices, the DCB selects a concept base that may fit the current user's context so that the user can reuse previous contexts. In the following sections, we explain how the three interactions work for realising the ideal DCB in practice.

The DCB is a generic component that has a number of potential applications (e.g. [1]). We are going to apply this component as a core component across our on-going projects.

3. ACKNOWLEDGMENTS

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