WWW Navigation Support System for Education (WebAngel)

While classes that utilize the Internet for educational purposes are growing in number, some problems have arisen. For example, the process of finding useful information can be laborious, and ways must be found for protecting students from undesirable information in an educational environment. In response to these problems, NTT Laboratories have developed a tool called WebAngel that facilitates the effective use of educational content on the Internet.

Classes that use WWW have been experiencing the following specific problems:
1. Required information is divided among multiple sites and cannot be used efficiently in a classroom.
2. Web site configuration and link order does not agree with class flow.
3. Children go to inappropriate pages while studying and the lack of knowing what pages on what site students are looking at creates confusion. Problems such as these place a big burden on the teacher. WebAngel, however, makes Web learning safe and effective by combining only necessary information from the myriad of pages on the Web to form teaching material. It accomplishes this by modifying a WWW proxy server with advanced functions. For example, WebAngel inserts a navigation button on the screen that, on the basis of previously specified lesson information, shows Web pages in the order intended by the teacher. It also limits Internet access by disabling links on Web pages. These functions enable the students to concentrate on their lesson without distractions. WebAngel, moreover, allows teachers to enter and display comments on each Web page in a lesson to stimulate learning and maintain interest. Finally, it enables lesson information to be easily created while browsing through bookmarks and search-engine results.

For the future, we plan to develop communication tools that students can use to communicate with each other while studying the same material, and to research the effects of feeding back usage history saved on the WebAngel server to the learning process.

(Cyber Solutions Laboratories)

Learning support by WebAngel

1. Receive the student’s request.
2. Get the HTML file as requested.
3. Modify the HTML file according to the control information defined by the teacher.
4. Send the HTML file reflecting teacher design such as comments.

Example of a WebAngel-supported page

Frames added by WebAngel.

<table>
<thead>
<tr>
<th>Navigation button</th>
<th>Table of contents window</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changing link destination, disabling links, etc. are possible.</td>
<td>Comment window</td>
</tr>
</tbody>
</table>
Map-Like Content Navigation System (AssociaGuide)

The explosive growth of the Internet and intranets has made it possible to access huge volumes of information from PCs. As the amount of available information grows and diversifies, however, it is becoming increasingly difficult for users to find what they want in an efficient manner. AssociaGuide is an associative content-navigation browser that uses a map-like easy-to-understand visual interface. It enables users to find desired information efficiently in map-like browsing space using operations similar to those of digital maps.

A typical application example of AssociaGuide is a browsing and retrieval system for video contents in network distribution. In the future, as network distribution increases and the types of video contents increase dramatically, we can envision EPG*, which digitizes traditional newspaper TV listings, becoming exceedingly large making it very difficult to search for and find a desired program. AssociaGuide, however, makes it possible to construct an associative-content-type of programming guide. With AssociaGuide, content categories like music, news, sports, and documentaries appear in map-like browsing space much like nebulas appear in space. If a user then zooms in on a category that he or she is interested in, small pictures (thumbnails) that represent the contents of that category will appear. The user can then click on a thumbnail in map-like browsing space to watch a video preview of the program, to review program details, or to view the program itself. In this way, AssociaGuide incorporates a function that enables users to enjoy video surfing in map-like browsing space. It also includes a content filtering function that narrows down content in browsing space according to user preferences, plus a "new arrival mode" to filter in newly arrived contents and a "ranking mode" that filters in only popular contents.

NTT is currently conducting a joint experiment (broadband TV guide trial) with Tokyo News Service, Ltd. NTT Laboratories plan to test and evaluate functions and expand market-creation activities through this experiment.

(Cyber Solutions Laboratories)

Environmental Impact Assessment System using GIS

For local governments and regional communities to create a better urban environment, it is important that an appropriate assessment be made of the environmental impact made by various businesses in society and that mutual understanding be reached with concerned parties. Such environment assessment includes geographical factors as input and environmental conditions as output, and it is important that the latter be expressed in easily understood terms. Against this background, we have been researching environmental impact assessment systems using GIS†. With the aim of anticipating the establishment of environment-related laws like the Environmental Impact Assessment Law as well as social changes, NTT Laboratories have developed two such systems. These are a Road-Traffic-Noise GIS and a PRTR‡ management system, which are summarized below.

While the conventional method of assessing urban noise is to measure noise volumes at typical places such as traffic intersections, revisions to the law call for a change to broader exposure assessment. The Road-Traffic-Noise GIS incorporates a set of prediction models based on a noise assessment manual and makes effective use of digital maps and attribute data to predict noise volumes at roadside buildings. PRTR is a system that aims to reduce environmental pollution by an indirect approach that takes public information as leverage. In Japan, government offices have the role of tabulating release and transfer amounts for 354 types of chemical substances reported by businesses. As a consequence, local governments collect a huge volume of PRTR data. PRTR-GIS can tabulate and analyze these data by substance, region, year of discharge, discharge destination, etc., and can produce easy-to-understand information as output.

For the future, we plan to develop an Environmental Information Network through system integration that combines clear environment indexes, environmental monitoring technology, etc.

(Lifestyle and Environmental Technology Laboratories)

** GIS: Geographical Information System

‡ PRTR: Pollutant Release and Transfer Registers

Environmental impact assessment GISs that have been developed
(The maps were calculated using random data for display.)

PRTR-GIS

Gradation map of pollution tabulated for each city.
Points indicate discharging factories.

Road-Traffic-Noise GIS

Colored map of road traffic noise at building positions.
**ContentServiceGateway**

The ContentServiceGateway provides users with various kinds of content-related data, such as copyright information, links to supplementary information, comments, etc., via DCD* accompanying distributed content or Content ID, a unique identifier of content prescribed by the Content ID Forum and is one of the codes approved by MPEG-21, embedded in content using digital watermark technology. The idea behind the development of ContentServiceGateway was to expose users to a wide variety of services by making it easy for them to access various kinds of information using Content ID, and to thus create markets above and beyond the simple distribution of content.

Diverse applications can be considered, including introduction to related services, inquiries to related services from the user side, provision of premium information according to various usage conditions, and locators to guide users to one's own service site. Furthermore, for the case of embedded Content ID by digital watermarking, the ContentServiceGateway can be used for not only digital content but also for analog content such as printed matter when using a universal serial bus (USB) camera.

In the future, we plan to introduce a function in the ContentServiceGateway to provide users with incentives to register or use content-related services like product purchasing and ticket booking.

(Cyber Solutions Laboratories)

* DCD: Distributed Content Descriptor

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**Electronic Catalog System on Broadband Networks (Visual Showcase)**

NTT Laboratories are researching and developing HiKARI Commerce Services that apply the features of optical networks to commerce to enable high-quality image-based communications, high-speed acquisition of information from many points, real-time interaction, and other functions that go beyond those of existing WWW-based e-commerce. One such service now under development is Visual Showcase for displaying and comparing product information on the Internet.

Visual Showcase features a display image and manipulation environment called "display space" that can dramatically enhance the user's ability to select products. It employs high-speed acquisition of information from many points to arrange a large number of product images in 3-D space and rearrange product information according to user preferences. For the consumer, this display space provides enjoyable net-window shopping and product searching and selection, and for a retail shop, it facilitates the creation of product displays that can emphasize key products for sale. This system also provides an authoring environment for the efficient and effective creation of catalogs featuring many products. This simplifies the task of improving a product display by allowing the catalog manager to devise displays and to analyze end-user logs on his own.

We can envision Visual Showcase being applied to kiosk-type terminals within corporate or business locations and to network appliances in the home.

(Service Integration Laboratories)

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**Example of a Visual Showcase system**

**Head office**
- Registration of picture usage conditions
- Conversion of picture formats
- Access log

**Shop**
- Arrangement of pictures in 3-D space
- Add information to a picture
- Access log

**Visual display**
- Provides a catalog registration tool, product registration/display tool, and other functions for simplifying shop tasks in managing network-based catalogs.

**Software to register pictures of merchandise in the system**

**Software to create a catalog from registered pictures**

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*IPR-DB*: Intellectual Property Rights-DataBase

- **Related service 1**: (Content retrieval)
- **Related service 2**: (Associated info.)
- **Related service 3**: (User registration)

**Service registry DB**
- Amendments of display information
- Alteration detection
- Download service

**Resolution and selection process**
- Content ID management center (Attributes display, alteration detection, download service)

**ID management center services**
- Basic services

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* IPR-DB: Preliminary Property Rights DataBase
Multilingual Information Access System

As the Internet reaches around the world and business becomes increasingly globalized, there is a growing need to gain easy access to the vast amounts of information in different languages that are now available on the Web. By combining information retrieval with language translation, the Multilingual Information Access System enables people to do just that: the system provides a way for monolingual users to gain access to information in other languages just using their own native language.

Queries are input in Japanese or whatever the user's native language happens to be, and then translated into queries in whatever other languages are required. These multilingual queries then perform a lateral search—that is, a metasearch—across search engines indexed in their various respective languages. Of course the user is still not able to read the information that is retrieved, because it is not in the user's native language. But with a single click, the Multilingual Information Access System translates whatever retrieval results are specified into the user's own language. Naturally, this ability to access information in languages other than your own works for any language combination that is supported by the system. For example, someone whose native language is Chinese could use the system to access and translate information found on a Japanese site into Chinese.

The current version of the Multilingual Information Access System was implemented to support four languages—English, Korean, Chinese, and Japanese—but the basic system architecture could easily accommodate a far larger number of languages.

(Cyber Space Laboratories)

Network-Integrated Car Navigation System

As information technology (IT) continues to progress in many fields, it is important that vehicles too be able to receive various kinds of information sharing services (called “telematics”). We can expect the linking of a vehicle’s onboard system with network servers to give birth to many new services above and beyond a simple terminal function for car navigation.

NTT Laboratories, in cooperation with automobile manufacturers, materialize the following four services providing easy access to real-time information anytime and anywhere by linking the onboard system with network servers. (1) Area-oriented information provision service enabling drivers to obtain information optimized by location and time. (2) Customized information retrieval service enabling quick access to desired information through simple operations. (3) Driver’s mail service that reads out mail to drivers and allows them to send replies while driving. (4) Convenient mobile telephone service providing anytime-and-anywhere telephone support. The following technologies have been developed to make these services a reality.

(1) Information distribution technology enabling vehicles to send their location to the network so that information distribution servers can distribute well-timed information, and enabling information providers to register information specifying distribution location and time.

(2) Voice-based human-machine interface (HMI) technology that provides voice-recognition/voice-synthesis engines on both the vehicle and network sides and a dialog engine on the network side so that drivers can use and manipulate information with ease.

(3) Information control technology to provide in-vehicle information services during driving by pre-reading of the road environment and continuous checking of the car’s running environment.

We plan to make in-depth studies of each of these services with the aim of achieving an information-rich environment inside vehicles.

(Service Integration Laboratories)