MUSICWEB DEN HAAG - DEVELOPING NEW TOOLS FOR HIGHER MUSIC EDUCATION, USING WIDE-AREA NETWORKS AND HYPERMEDIA TECHNOLOGY

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Abstract
MusicWeb is an international project group, with the objective to develop an infrastructure and applications for computer-aided music education. Keywords are: new pedagogical paradigms, musically relevant material, modular course design, reusable resources and tools, wide area networks, distributed technical infrastructure, object database with web gateway. This paper reports in particular on the recent development of educational materials at the Royal Conservatory in The Hague and on the realization of the technical infrastructure, designed in collaboration with the University of Glasgow and the Musikhochschule in Hannover.

1. Introduction

The European project group "MusicWeb" was founded in January 1995, with the objectives to discuss the problems of computer-aided music education and develop solutions for them. Since 1996, the year the last paper of the MusicWeb project was presented at the ICMC conference in Hong Kong (Boehm, de Jong and Hempel, 1996), the MusicWeb project has become a framework in which different institutions develop their own projects. At the moment active partners are the University of Glasgow, the Royal Conservatory of The Hague and the Musikhochschule Hannover. This paper will introduce concisely the current state of affairs, and report on the development of educational materials in The Hague.

2. Project sites

As mentioned, three different sites are actively involved at this moment. In Hannover and The Hague we focus on the use of communication and information technology in the process of teaching and learning. Glasgow is mainly concerned with the technical infrastructure of MusicWeb.

The Musikhochschule in Hannover is investigating the use of computers and information technology within the classroom. Two primary schools take part in a project that offers teachers and students access to a great variety of music-educational resources through the internet. During the classes, the computer may be used to supply information and produce printouts of material.

Today in The Hague we are developing applications and authoring tools that in the future will support learning activities in the regular music theory curriculum. These applications will be made available through dedicated workstations in the library of the Conservatory. They will also be available on the internet, through a login procedure.

In Glasgow a distributed technical infrastructure, including a link and an object database, a media server for streaming and a web gateway, is administered and serviced by the Performing Arts Data Service (PADS) in co-operation with the Department of Music. This infrastructure has the advantage that the authoring sites can concentrate on the creation of educational material, while using an up-to-date web server and media technologies, administered in Glasgow.

3. Technical Infrastructure

The system in Glasgow consists of two Silicon Graphics (SGI) Origin 200 servers: one is a media server streaming audio and video using SGI MediaBase software; the other runs an object-oriented database with a web gateway (Hyperwave Information Server) which stores the links, the data and the metadata of the material on both servers. When sound files are stored locally to ensure fast access and high quality, objects can be indexed and their metadata stored on the central server
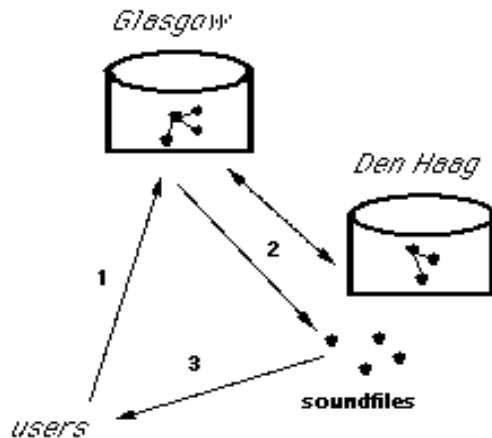

figure 1: technical infrastructure

The features of the technical infrastructure:

- Use of web gateways connected to an object-based database server system
- Separate link management or link databases, enabling automatic hyperlink consistency
- Storage of resources of any type, including simple, complex and composite
- Storage of resources anywhere, remote or locally, or distributed on different servers (server-pool)
- Use of graphical access or browsing techniques
- Controlled user access through rights and access management
- Scalable delivery mechanisms
- Modular and open protocol architecture enabling access to relational database management systems, catalogues and other future data servers and data clients
- Storage of metadata such as attributes of the object belonging to the metadata, thus achieving a "natural" integration of resource collections and their catalogues
- Detailed collection-specific user-access statistics

4. MusicWeb The Hague

A pilot project started at the Royal Conservatory in September 1997. This two-year project has the following objectives:

- to develop new pedagogical paradigms for the fields of aural training, analysis and harmony, using existing technology in a networked environment
- to design reusable modules, resources and tools for both teachers and students
- to make learning with this system a primarily *musical* experience, with the emphasis on the relation between practice and theory
- to develop authoring guidelines outlining standard methodologies for designing courseware-materials within the MusicWeb context
- to integrate MusicWeb with the existing curriculum

4.1. Course structure

Our most important goal is to ensure the integration of high-quality resource material, texts and exercises, and to achieve a high degree of reusability. The hyperwave architecture allows the storage of objects, representing for example score excerpts, soundfiles and images, that can be used in different applications simultaneously. With these objects, educational applications (*modules*) can be produced with the use of standard HTML and custom javascripts. We have designed a structure in which these modules can be combined to form courses. A collection of modules by one or more authors is called a course. A javascript is automatically generated to function as a menu for a course. Teachers and students can contribute new modules to the system, and subsequently use them in different courses. Links can be added on different levels. This creates the possibility to make all kinds of associative connections between modules.

4.2 The frameset

The heart of every module is the main text and its corresponding annotations. We found that it is confusing to have the main text, annotations and footnotes all on one page, so we created a separate frame for the annotations and footnotes. This prevents the user from having to jump back and forth all the time. Including the menu, this results in a standardized frameset, which consists of three frames, with a possible division of the middle frame into two. Each of the frames has a specific function. Figure 2 shows a typical screen layout:
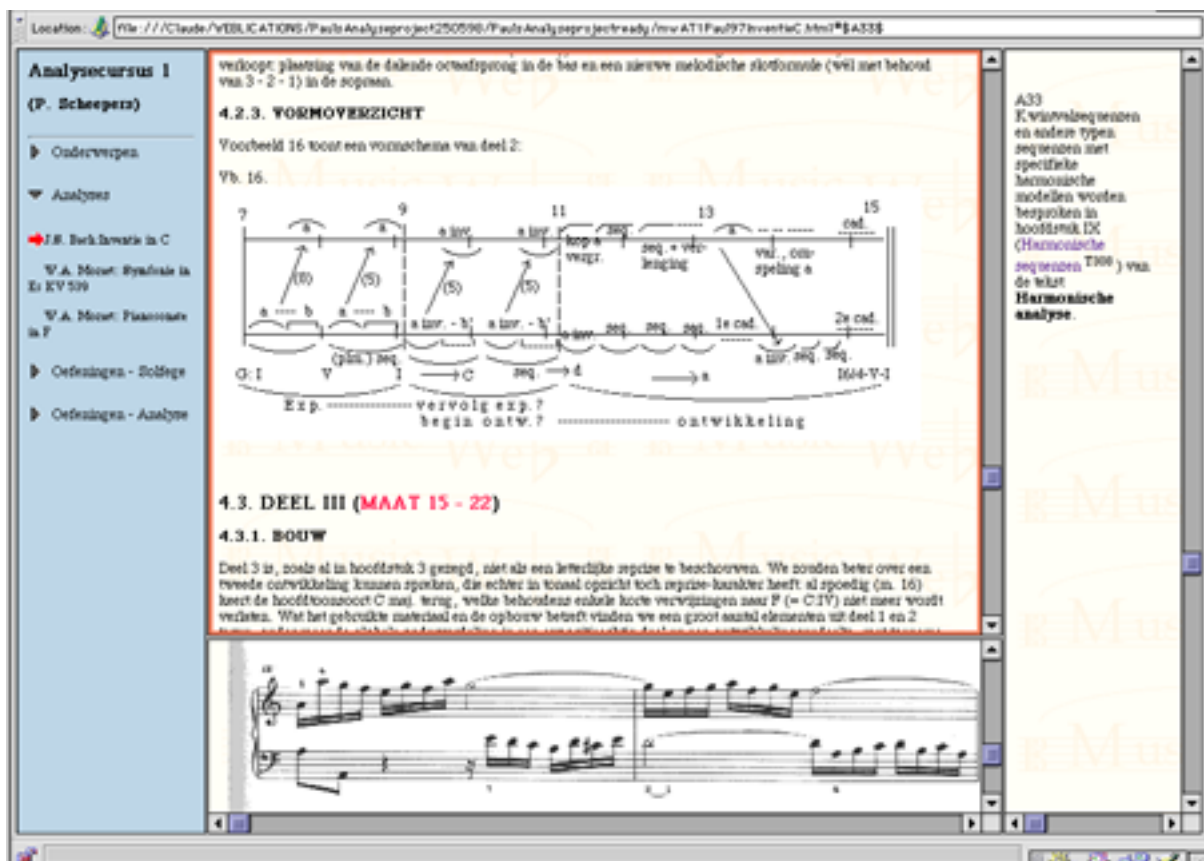

figure 2: frameset

The left frame is the *navigation window* and displays the menu of a course. The middle frame is the *main text window* and displays the main text of the current module. The right frame is the *annotation window* and shows footnotes, annotations and links that belong to the main text. The middle frame can be divided. The lower part of the divided frame is called *resource window*. It accommodates resources such as articles alongside the main text, with the advantage that the user has access to additional information without leaving the current module.

It is possible to make a link from the annotation window to a resource from a different module, for instance to a main text. In this case, by clicking on the link the corresponding text will appear in the resource window. Further experiments have demonstrated a variety of possible uses, depending on the ideas of the author.

An important consequence of the standardization of the frameset is that now we are able to produce authoring guidelines. With these guidelines teachers who know nothing about HTML can also contribute material.

4.3 Tools

A set of reusable tools has been designed. These tools can be used in their original form, or they can be adapted to a specific situation.

The *menu maker* is a javascript which generates a menu for a course based on the modules specified by the author in a simple HTML input form. In the future it should also be possible to generate menus from hyperwave collections dynamically.

The *quiz tool* is a javascript combined with an HTML form and a set of style sheets, which can be adapted to a variety of contexts. The tool produces a multiple choice quiz. When an author creates a quiz, he can define any number of optional answers from which the user can choose. The answers are linked to a group of files representing the questions. These files may be soundfiles or images. The javascript generates questions randomly, avoiding immediate repetition of the same question. The layout can be customized by choosing a specific style-sheet.

The *harmony tool* is a javascript which handles the input of harmonic information. It is designed to process more sophisticated input than the basic quiz tool would provide. This enables an author to make exercises dealing with detailed harmonic analysis. A combination with the quiz tool is possible.

A *question sheet* is an input form in which questions, answers and annotations can be entered. With these data, various interactions can be implemented.

4.4 The future

Student tests are scheduled for this academic year. The outcome of the tests will be an input for further developments. Particularly important is the continuing design and production of exercise tools in order to support students' individual needs more effectively. Our goal is to move toward more musically intuitive modes of interaction. Therefore, first of all, we need a standard music representation language for the web. Such a language would make direct input of notes, as well as dynamically created scores and score examples, possible. Another issue that needs attention is audio and the net; especially the development of more sophisticated network tools for the remote control of data on audio servers is needed.

5. Summary

MusicWeb intends to support higher music education by offering a well structured learning environment with a strong emphasis on musical relevance. The modular design and reusability of tools and materials should appeal to many teachers and students regardless of their technological background.

References

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