

“Variations for WWW” Network Music by MAX and the WWW

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Abstract

“Variations for WWW” is a network music application utilizing the interactive possibilities of the Internet. Users who access this site compose or play a piece, called “Variations”. These “Variations” are interactive: they can be heard while they are created. “Variations” explores many possibilities of network music. It has established a creative and interactive music environment which any capable netizen can access, and furthermore, this music flows continuously as an installation in cyberspace. “Variations” is realized by an experimental way of connecting MAX and the WWW. Such MAX-Web connection produces new possibilities of musical communication and collaboration.

1. Introduction

Ever since the mass emergence of the Internet, there has been much debate and many attempts to create new forms of expression in various fields of art. A new artform can be produced by using the Internet as a medium of artistic expression---and it has already been host to some intriguing works on the net. However, there has been little musical work, until today, that uses interactive musical expression which is intrinsic to the nature of the network.

What are some of these interesting characteristics of networking? One of them is interactivity as opposed to unilaterality, and another is the idea of sharing as opposed to monopolizing. Given these concerns, our project "Variations" seeks a mode of existence for musical expression on the network. "Variations" is a project that transforms the act of accessing a web-site into a process of composing/playing music interactively. A user/player can take part in the playing of the "Variations" on the net by accessing the site.

In order to realize the main purpose of “Variations”, we have experimented with connecting MAX and the Internet. The main points of "Variations" are: to connect MAX and the Web, allow users to operate MAX from a web standard browser as a client, and the use of MAX as a server. Therefore, “Variations” accepts any users' access from any client--- hence, any browser or OS, and provides them with interesting musical feedback.

The “Variations” are derived from a main, or “kernel”, theme. This kernel theme remains unchanged, yet the music is continuously derived from it, with subtle variations induced. The “Variations” are various patterns obtained by processing client data such as the name and access time of the user/player. During this process, “Variations” does audio streaming by RealAudio to transmit the music back to the client. Users who access the site can collaborate in a musical work, as well as listen to the work together with other participants. RealAudio is convenient: users don't have to set up a complicated MIDI system, and they can play "Variations" with merely a web browser and a RealAudio Plug-in.

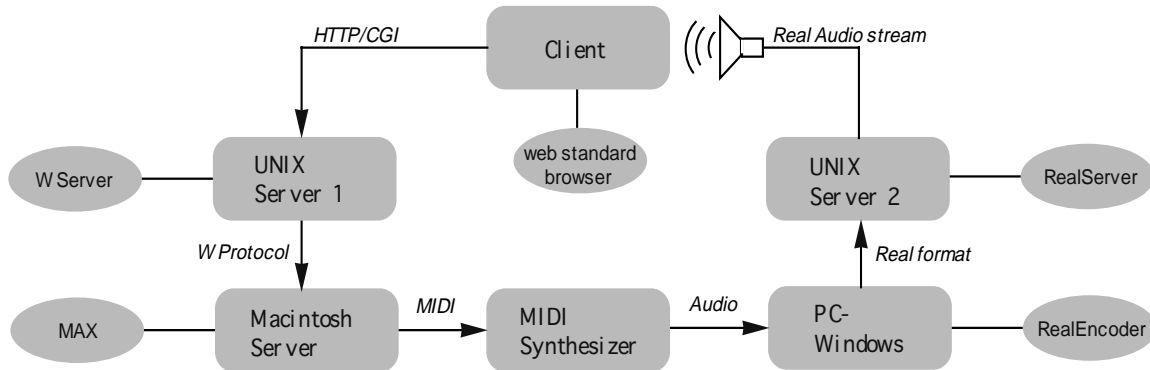
Sharing an experience of playing/listening to music in a media-space brought into existence by the network, rather than in a tactile space is what we believe to be a form of music in the network-age.

2. System

First, users access the web site “Variations”, and input data via an html form. Next, the data is sent to the W server via a CGI program. The data sent to the W server is received by MAX on a Macintosh running on the server side.

MAX generates MIDI data, reflecting variations in the kernel theme. The MIDI data is converted to audio data, and encoded to Real format by Real Encoder. After that, the .ra data is streamed through Real Server. Users who access “Variations” listen to the results of their actions coming back from the Internet.

Adding a communication function to MAX can be achieved by using wc patch, W protocol and W server, by David Zicarelli. By virtue of this W protocol, inter-MAX communication can be actualized. Because the W protocol was originally developed for inter-MAX communication such as patch exchange, it is difficult to download information from the Web to MAX simply by using the W server in a direct manner. We have succeeded in overcoming this problem and have made web-MAX communication possible by making use of a CGI interface to the W server. Now it is possible to send arbitrary data, such as access information, to MAX.



3. MAX-Web communication

W was originally designed for MAX to MAX communication for users connected to a TCP/IP network. “Variations” instead employs W as a means of facilitating communication between a web client and Max.

3.1. wc object

The wc object is designed to connect via TCP/IP to a server that understands the W protocol. The wc object has three inlets (from left to right, the data inlet, the chat inlet and the control inlet) and four outlets. We use the control inlet only in “Variations”. The control inlet accepts messages such as login, download, update, sendthru, etc. “Variations” utilizes login, chan and logout.

The login message is utilized to allow access from Max to the W server. Communication between the W server and Max is established by the chan message. The wc object maintains a connection to the W server and thus can receive messages from a web client at anytime.

Just like the “s/send object”, the wc object has a function to send a message to the “r/receive object” by address without visual patching. As in the above figure, when wc, which is connected to the W server, receives any sort of message from a user it sends the message directly to the “r/receive object”.

3.2. W Protocol

The W protocol is a message format for communication between Max and the W server. For example, a login message might be:

```
logi0009seinoshin
```

Of the available command codes, four types (which are logi, logo, scha, send) are used in “Variations”.

The outlet of the wc object sends a message to the W server in the above format. By making a CGI program which submits data which conforms to this format, communication with MAX via the W server will become possible.

3.3. CGI and HTML Form

In the html form, three types of information will be selected by the user---name, type of instrument and loop time. This data is received by the CGI program, conforming to the message format of W protocol, which passes this data on to the specific port of the W server. We use the TCP/IP package in Perl for CGI to pass the data to the server.

The number of patterns of variation is based on the name input by the user. It is numbered to avoid selecting an identical pattern when access is made multiple times with the same name.

-Form sample on html is as below:

```
<input type=text size=20 name="composer">
<select size=1 name=loop>
  <option value=5>      5
  <option value=25 selected>  25
  <option value=50>    50
  <option value=75>    75
  <option value=100>  100
  <option value=uk>    ???
</select>
<select size=1 name=instr >
  <option value=1>     e. piano
  <option value=2>     marimba
  <option value=3>     vibe
  <option value=4>     piano
  <option value=5>     percussion
  <option value=6>     bell
</select>
```

- relevant Perl script portion:

```
$name =~ s/$name/$counter$name/;
$list = "$name $loopt $instr";
$len = length($list);
$lencounter = length($counter);
$head = "client ";
$lenhead = length($head);
$len = $len + $lenhead;

tcp_client(S, "hostname.host.somewhere", 1990);
sleep(1);
printf S ("logi%4d%s", $lencounter, $counter);
sleep(1);
print S "scha00021 ";
sleep(1);
printf S ("send%4d%s%s", $len, $head, $list);
sleep(1);
print S "logo0000";
```

4. Results

“Variations for WWW” was first exhibited at NTT-ICC (Tokyo) in December 1997 and at a media art event called “flow” at *Jofukuji* temple (Kanagawa) on April 1998. Currently “Variations” accepts users’ access full time on a server at Keio University’s Computer Music Lab (<http://platinum.sfc.keio.ac.jp/~sns/va/>).

In these events, users occasionally had difficulty discriminating variations in the music, despite the fact that they made these variations by their own actions.

Though "Variations" allows anyone to participate in music making, its participants often sense that the musical feedback is indistinct, as the system's selection of variation patterns is dependent upon the nature of the server and the user. In our next iteration of "Variations", we are striving to both make the music even more interesting and at the same time provide users with a better sense of how their actions influence the music.

5. Future

-MIDI data streaming

The present streaming system of "Variations" is rather complicated. It consists of a MIDI module at the server side which transforms MIDI data generated by MAX into audio data. This data is sent to the RealEncoder where it is encoded into the proprietary RealAudio data. Finally, the RealServer receives this RealAudio data and streams it over the internet to users.

The RealSystem G2 and MidLive RS plug-in by YAMAHA were released in the summer of 1998, making MIDI streaming possible for users who have MIDI system they can stream MIDI data generated by the MAX server from the Net.

-Supplement with visual information

The direct streaming of MIDI data could also be utilized to produce dynamic imagery which corresponds with the musical output of "Variations". Images, currently static, could be synchronized with sound. Such an addition of visual feedback will stimulate a deeper understanding and participation by the users.

-A new server program

A new server program, compatible with the W protocol could be written to create a tighter dynamic between the CGI and the server side MAX patch.

6. Summary

"Variations for WWW" is a network music utilizing the interactive possibilities of the Internet.

The concepts of "Variations" are:

- music that anyone can play
- it allows multiple users to collaborate interactively
- it is a creative music environment on the Net
- and it provides continuously flowing music as an installation in cyberspace

The main points of "Variations" are:

- to connect MAX and the Web
- use MAX as a server
- operate MAX via html form by a web browser
- avoid using a complicated MIDI system
- provide access to users with merely a web standard browser and a RealAudio Plug-in

References

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