Pervasive 2009 Workshop

Pervasive Computing and Interactive Art

May 14th, Nara, Japan

Workshop Organizers :

Philippe Codognet, co-Director, Japanese-French Laboratory for Informatics, CNRS, France / University of Tokyo, Japan.
Ryohei Nakatsu, Director, Interactive & Digital Media Institute (IDMI) National University of Singapore, Singapore.
Naoko Tosa, Professor, Academic Center for Computing and Media Studies, Kyoto University, Japan.

Workshop Program

13:30 – 15:30 Papers and Demos

(1) **Kazushige Murata** "The Importance of University-related Informal Networks for the Contents/IT Industry Creation"

(2) **Philippe Codognet and Gilbert Nouno** "From Landscape to Soundscape”

(3) **Ryohei Nakatsu** "Dance Robot for Physical Entertainment"

(4) **Naoko Tosa** " Hitch Haiku: An Interactive Supporting System for Composing Haiku Poem"

15:30 – 16:00 Break

16:30 – 18:00 Panel Discussion :
Interactive Cultural Experience - Interactions with Asian Cultures

Chair: Ryohei Nakatsu (National University of Singapore)

Panelists: Ryohei Nakatsu (National University of Singapore, Singapore)
Naoko Tosa (Kyoto University, Japan)
Michihiko Minoh (Kyoto University, Japan)
Kazuyuki Konagaya (Osaka City University, Japan)
Haruo Takemura (Osaka University, Japan)
Philippe Codognet (CNRS/JFLI, Japan)

Concept

Digital and interactive art has been developing rapidly in the last twenty years and has now become a mature field. Artists are now experimenting with the latest technologies and are sometimes developing works together with researchers in order to explore new types of interaction and novel use of digital technologies, including mobile technology, context-aware devices, sensor networks, etc. The key point is that artworks are aimed to be in direct contact with the general public and therefore provide an excellent test-bed to experiment new ideas and their acceptance by the mainstream public. Many digital artworks can thus also be seen as innovative devices engaging the public in new types of interactions with new media and envisioning thus usages and social impact.

The objective of the workshop is to bring together artists, researchers and media designers in order to explore innovative use of pervasive and ubiquitous technologies for cultural applications. Artists are now exploring new horizons beyond the “white box” or the “black box” inside museum exhibitions, e.g. digital artworks installed in public space which require minimal and intuitive interaction that can take advantage of today’s pervasive technologies. We believe that such a domain can be explored only through an inter-disciplinary dialogue between science, technology, art and the humanities.

We therefore invite contributions on following topics:

- Sensor-based visual and sound installations
- Digital installations for intelligent public spaces and outdoor spaces
- location-based digital artworks
- mobile artworks
- interactive art installations
- Tools and emerging technologies for cultural applications of pervasive computing
- Museum installations and pervasive technologies

We kindly ask prospective participants to submit either a research paper (up to 8 pages), an artwork presentation (up to 8 pages) or a position paper describing ongoing work (up to 4 pages), in relation to one or several of the workshop topics.

Submissions should be sent to the contact email below by Feb 7th, 2009, and should be in English and in .doc or .pdf file formats.

Papers will be reviewed by the workshop committee and selected on the basis of relevance, originality and impact. Accepted papers will appear online and in the workshop proceedings distributed at Pervasive 2009. It is planned to produce a book with extended versions of the papers presented at the workshop.

The Importance of Informal Networks in IT Industry Advancement in Japan: Toward the Making of Creative City

Kazushige MURATA

(Master of Public Administration (Urban Policy), Graduate School for Creative Cities (GSCC), OCU; Staff of Kyoto City Hall)

1. The importance of the university related personal networks in IT industry

MURATA (2007a) examined the networks about IT ventures in Tokyo, and MURATA (2007b) also explored those about IT ventures in Kansai regions (Kyoto and Osaka).

The results unveil the importance of the informal networks among and between graduates, students and researchers in main universities and similar organizations in which IT industry advancement has been successful. I will explain it's details as follows.

Recently, the famous Cluster Theory is propounded by Harvard Business School Professor Michael Porter. The originality and difference of Porter's theory compared to the traditional industrial agglomeration Theory are ①its competitive nature as well as corporation and ②the inclusion of universities and institutions as consisting element of the networks (Porter 1998).

In these new industries, universities will play very important roles since the IT industry itself has knowledge-based nature. As Porter points out, the Cluster Theory combines the network theory and competition theory. Concepts such as the Network, the Geographical Proximity, and the Coordinate Organizations have become key points.

In the field of Japanese manufacturing industry, TANAKA (2004) mentions the importance of the local jobs network and the intermediate in-between organizations; in addition, in the Management Theory. Japanese famous business science scholar NONAKA (1996) points out the significance of 'Tacit Knowledge (in Japanese 'ANMOKUCHI')' and its expressive process in the very moment of innovation, which has a great impact to the world.

2. The problems of knowledge exchange policies among the previous unspecified number

Meanwhile, each municipality(administrations) focuses on the incubator policies and exchange meetings as policies for promoting new industries such as IT industry. As KONAGAYA(1999, 2005) indicates, these policies are based on typically 'Silicon Alley policy' that former New York City Mayor Rudolph Giuliani had conducted with the New York Economic Development Corporation (EDC) (see Figure 1). There is a main channel of the new industrial development: (a) the channel of the real estate-related support → incubator policies, (b) the channel of trade association related support → the exchange party policies.

However, knowledge exchange policies among the previous unspecified number made rather poor outcomes such as excellent innovations and so on.

According to MURATA (2007a, 2007b, 2009), although local governments and their affiliated organizations have conducted forums and exchange party programs countless times where strangers meet with each other to expand their networks, it is difficult—particularly in Japan—for people to fully share significant information with strangers. One would think that there would be quite a few truly important business discussions that arose among strangers. In reality, as opposed to expectations, the following points are hardly discussed: ①new business promotions, new business ideas, ② loans for a new business or a new enterprise, contracts, procedures, or the administration of a business enterprise.

In this sense, it appears that we have reached a stage of reconsidering the new industry support policies in terms of how these results can be improved by TRUST based informal networks such as SOCIAL CAPITAL(Murata 2007a, 2007b, 2009). (Figure. 2 : Cited from Figure 21-1 in *Sozo toshi no Senryaku,* KoyoShobo).

3. The importance of the trusting network: social capital in the IT industry

In the new industry, it has become necessary to have appropriate conditions for idea exchanges to fully function. It seems necessary for networking members to have a relationship of the mutual TRUST so that various mechanisms, such as the instantaneous exchange of ideas, can happen within the network in a manner similar to the Tacit Knowing excange.

As one possibility, the informal networks among former students of the same university should be considered. The network that relates to the university is also a human relation: the non-blood kinship of ‘alumni’ network. Additionally the network among students in the university, friendship between near university students, networks between researchers and professors in the universities, and so on.

In fact, it is also well known that in the United States, the network within a university is quite important; in particular, there are many cases where students in the same university launch a new enterprise together in the Silicon Valley. It can be argued that the successful people tend to take advantage of confidential relationships in the United States. In particular, the intellectual network—the informal networks of the university—seems to be the most important.

If the importance as such can be confirmed, it would appear that in Japan, we also can emphasize the importance of networking in academic research institutes such as universities.

4. The network in the IT industry is the relationship between the foregoer and the follower

Meanwhile, in terms of these human networks, the accumulated experimental study is widely known in the “Sapporo Valley” (Hokkaido Jōhō sangyōshi henshūIinkai, 2000).

However, despite the importance of these studies, in other areas—particularly in the field of the information industry—much research has not been conducted in Japan. At this point, based on the critical analysis, this study explores in more detail the role of informal university networks since their establishment in the Japanese information industry.

As one example, MURATA (2007a) examined the business organizations related to Web 2.0 that were rapidly developing in the second IT revolution in Tokyo region (see Figure 2).

MURATA (2007b) also did research regarding the networks among the alumni of the Microcomputer Clubs (MAIKON KURABU) at universities in Kyoto and Osaka (Kansai Region); this suggests the importance of informal universities related networks (see Figure 3).

Therefore, as a economic promotion policy of new (such as IT) industries, it may be effective to promote and to revitalize the informal university related networks than the more random, unspecified networking opportunities.

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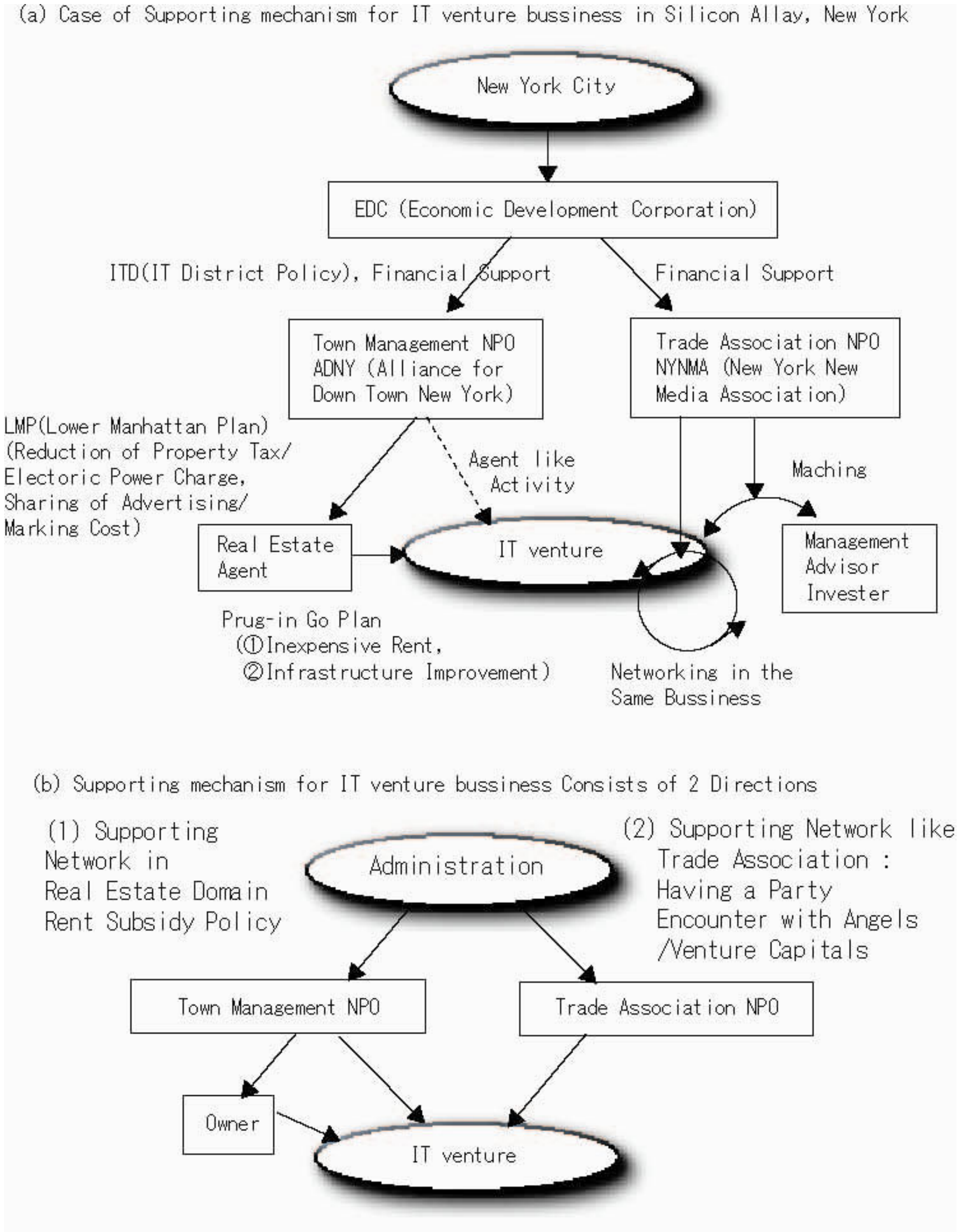

FIG1: Supporting mechanism and Promotion Policy for IT venture bussiness in Software and Internet Service KONAGAYA(1999,2005)

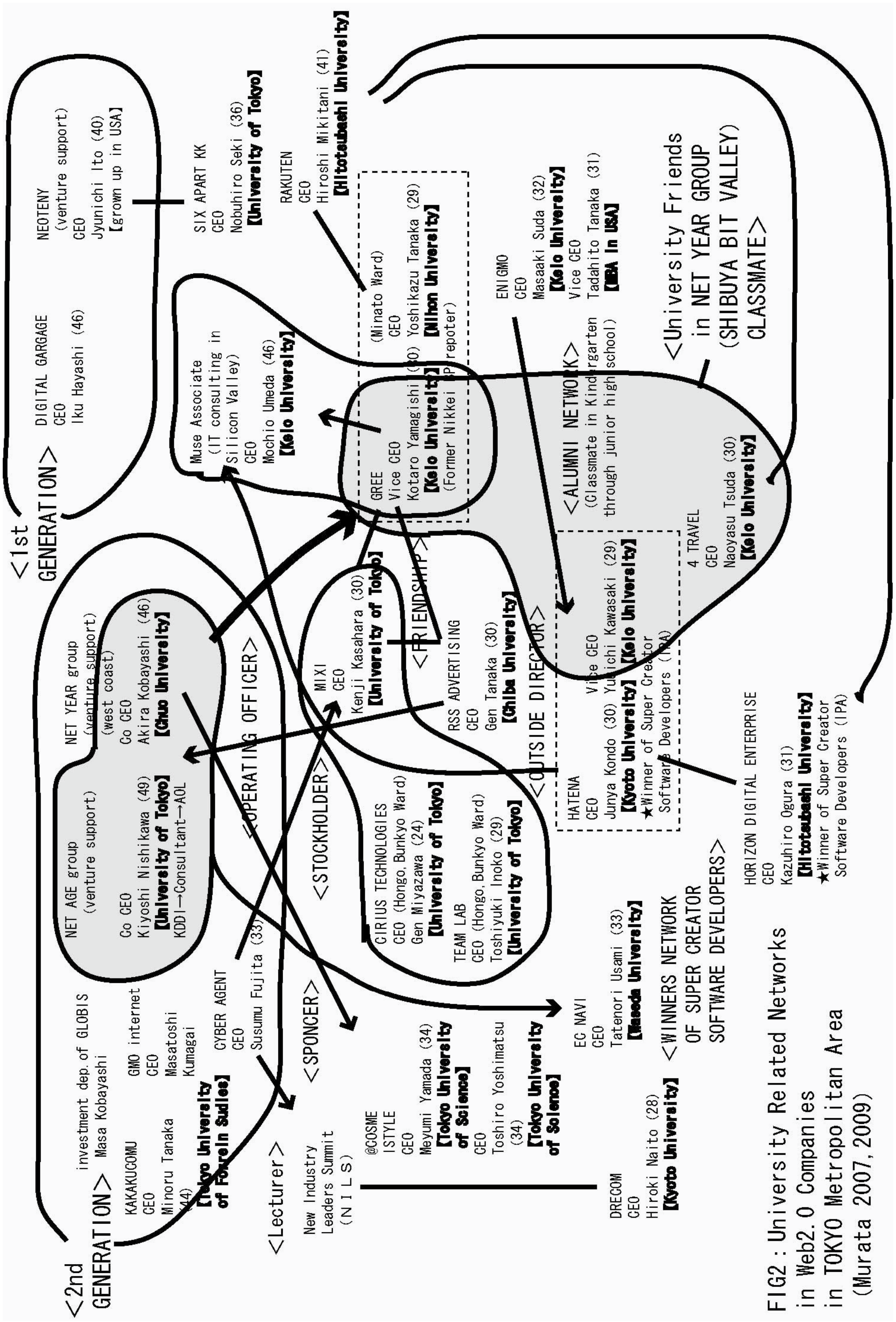

FIG2: University Related Networks in Web2.0 Companies in TOKYO Metropolitan Area (Murata 2007, 2009)

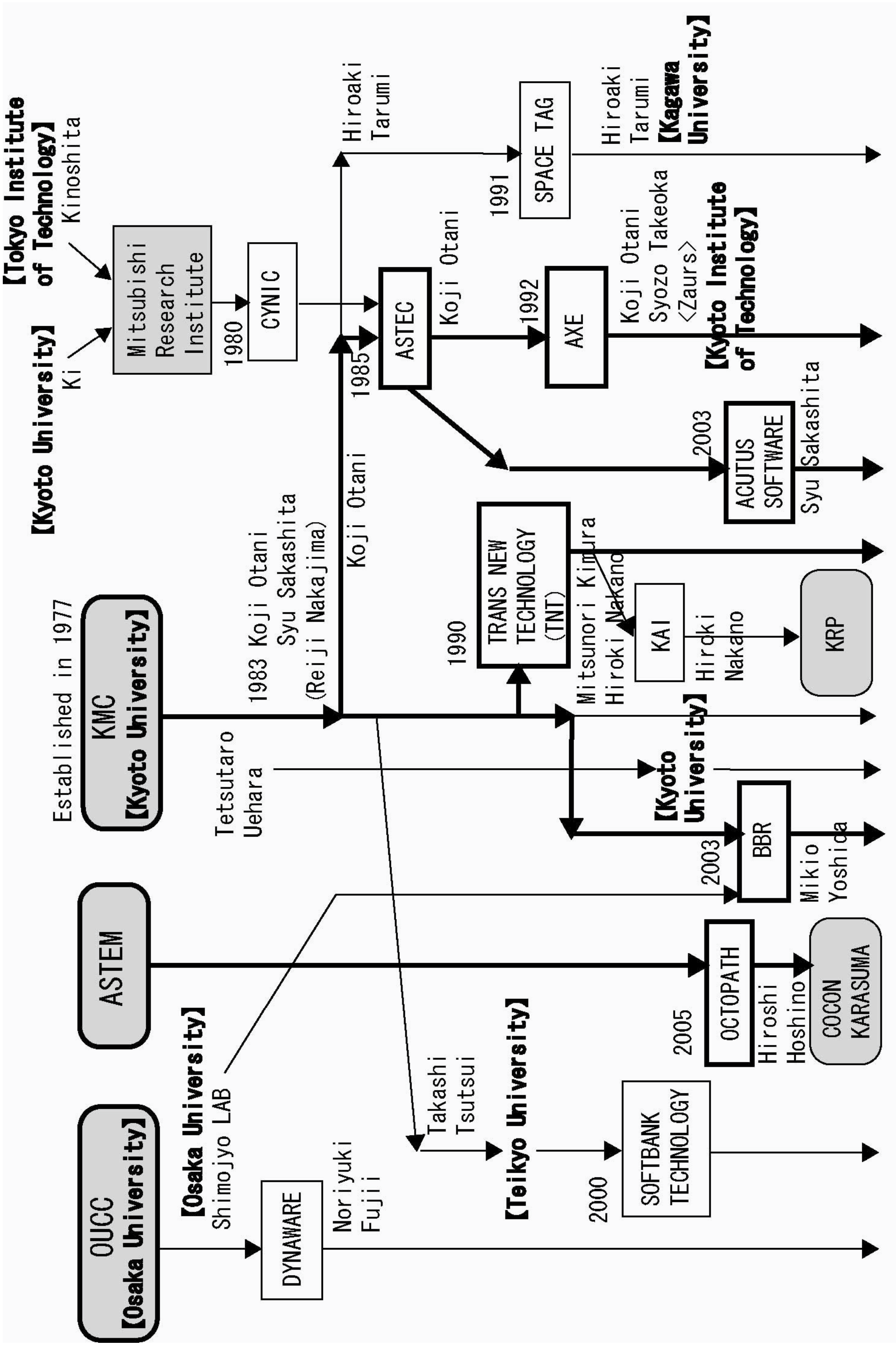

FIG3 : University Related Networks in IT Companies around Kyoto and Osaka (Murata 2007, 2009)

From Landscape to Soundscape

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Abstract Red Light Spotters is a multi-contextual interactive project which aims to create an open and real-time musical environment sharing relations with and extending a natural ambient environment, namely an urban landscape. The basic idea is to convert in real-time the input from a camera sensor recording a urban landscape (Tokyo city, at night) into an electronic musical soundscape. This is achieved by considering each blinking light as a rhythm source (or to combine several lights into a single source in order to have more complex rythmic structures), to associate it to some sound from a sound bank and possibly add some sound effects, This will thus generate many layers of intertwined rhythms that represent the pulse of the city through its blinking lights. Therefore this project encompass artistic creation process embedding image tracking, artificial intelligence with inductive original tempo tracking and beat prediction algorithms. We perform pertinent image and symbolic descriptors extractions, as pulsation and rhythm features, in order to synchronize both musical and control worlds with the natural visual environment. We end up with emergent rhythmic process for musical creation interpreted and performed to a certain extent by sound artists.

1. Introduction

We present in this paper a media art installation project that has been specifically developed for Tokyo urban landscape at night. One particularity of Tokyo is that each high-rise building have a few red light on its top floor and sometimes also on the side in order to signal its presence to planes and helicopters, and that those lights are red colored and blinking, but all with different rhythms. As there are many such building in Tokyo, the blinking red lights on top of buildings are creating a mesmerizing dynamic virtual landscape and can be used to create rhythms and music. It encompass artistic creation process embedding image tracking, artificial intelligence with inductive original tempo tracking and beat prediction algorithms. We perform pertinent image and symbolic descriptors extractions, as pulsation and rhythm features, in order to synchronize both musical and control worlds with the natural visual environment. We end up with emergent rhythmic process for musical creation interpreted and performed to a certain extent by sound artists.

The town of Tokyo at night, with its specific blinking red lights skyline ambience, see Figure 1, is the first experimental urban setup that we propose to use as an immersive visual and musical experience. Our concept is aimed to create intelligent real-time relationships between the context of the installation and the exhibition space itself; that is, between the environmental images of the town (i.e., somehow a landscape of lights) and the interactive musical surrounding occurrences and resonances. The spectators will thus be immersed in these related images and sounds and intuitively link them together, as the music is created by the city itself. However, we do not want to make this relationship too much explicit for the spectators, as this is not an "interactive technology demo" but a sound artwork, therefore our goal is to have the spectators first appreciating the musical ambience as such and then to have them slowly realizing the relationships and interactions between the city lights and the sound rhythms. We also wish to leave the music landscape and composition tool open in order to renew itself in different contexts depending on the location, the time and the sound artists. It has to be noted that this media art installation can be exhibited in other cities that its original *in situ* presentation: one can combine a live video stream from a Tokyo City observatory and the music generation process on site. However in order to achieve the immersive effect of having both visual and auditory sensations and to provide a feeling of “presence” to bthe spectator, a large projection screen is needed for the live video streaming, and therefore we need high quality video, such as HDTV or even better 4K cinema, which would therefore require a large bandwidth for streaming through Internet. *In situ* installation is thus much easier and cheaper. We are currently in discussion with such City View Observatory in Tokyo in order to plan for installing the *Red Lights Spotters* installation within this year.

Figure 1. *Tokyo Red Lights*

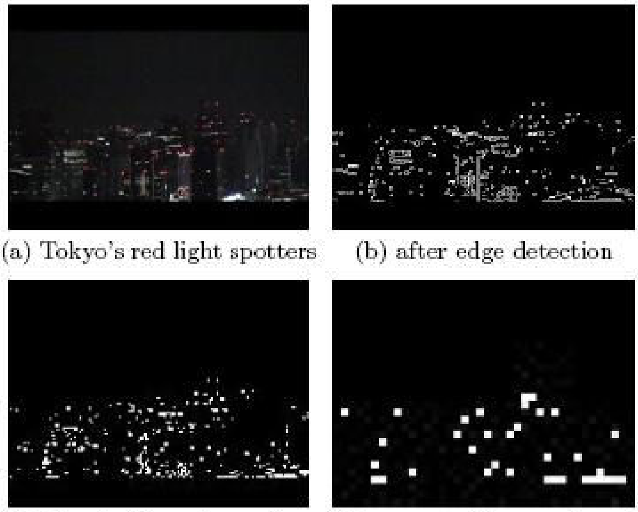
2. From Images to Sounds

In this section we describe the real-time processing of the data flux and the transformations they undergo in the installation space. The emphasis is put on the perceptual experience that should result from this process, as the visual landscape would be the initial element offered to the eyes of the viewers who become listeners and potentially actors of their own multi-sensorial experience. By this, we aim to extract or reveal a certain amount of information handled in the image - the blinking red lights - and turn this information into musical output that we can control and modulate artistically.

The initial perceptive data is the dynamic view of the city with its intricate mesh of flashing red lights. It is turned by video camera grabbing into a series of image frames that we reduce after image-signal processing into a set of blinking dots (Fig.2) with characteristic parameters such as intensity, frequency and time-phase. These parameters extractions -features or descriptors - lead us to some rhythmic considerations and relations that we can achieve through different ways of grouping and correlating the blinking lights. We end up with an interdependent rhythmic structure in relation with the expectations that the viewer might have while contemplating the natural view offered to his eyes.

We relate the expectation of the spectator with some elements of anticipation: we use in an inner-predictive way parameters in the computation of the predictive tempo tracking algorithm. We implement the algorithmic process on the temporal flowing sequence of the flashing red lights so as to produce musical events synchronized with the quasi-random visual occurrences. Doing so, the musical content consists of real-time generated rhythms and sounds based on some predictability related to the quasi-random visual dots components. By adding very simple rules to the output of this on-the-fly-created compositional environment, we bring on emergent musical process [13]. We call the red lights quasi-random elements as the lights might have a quasi-constant time blinking interval - also called inter-onset if speaking about musical data. The way we decide to group the observed ashing dots can be dynamically modified and has a major influence on the tempo/synchronization decoding part.

The tempo/synchronization decoding process is based on an inference stochastic framework which translates the visual impulses and turns them into musical rhythmic and textural elements. The way to look at the skyline landscape is manifold because of the too numerous lights, and thus we also keep a varied and open-ended interpretative musical environment that can be turned into either a compositional, improvisational or interpretative context depending on the choices made at a given time by the composer/interpreter of the musical session. Our musical environment is open to different sound artists and musical styles. We are also considering in a further extension about the possibility of inviting the public to be part of the interpretative musical process. The quality of the interaction we are looking for is not only a simple and basic human-machine interaction, but rather a human to human interaction through machine technology. This idea is important as it considers the technology as a medium delivering and being the information as the same time. The point of view on the machines and their use evolves to a doubtless interactive context involving spectators at the foreground. In this installation, the technology is a factor of communication but does not receive the main focus, as opposed to so many digital art installations which focus on technology more than on the artistic process itself. We situate this project in a new media and technology-dependent way of conceiving and producing artistic processes and also relations between spectators, as exemplified in many work of contemporary art in the last decades [3]. This underlies that the sensorial emotion resulting form the attending experience is more important than the technology itself. Because computer technology and electronic-devices have now become basic elements of everyday life in the emerging ubiquitous society, we aim at designing with them a contextual ambient media experience which might underline and emphasis the natural and interactive links between vision and audition.



(a) Tokyo's red light spotters (b) after edge detection

(c) thresholding to reduce the number of flashing dots (d) manageable number of flashing dots for tactus quest

Figure 2. *Image processing on video input*

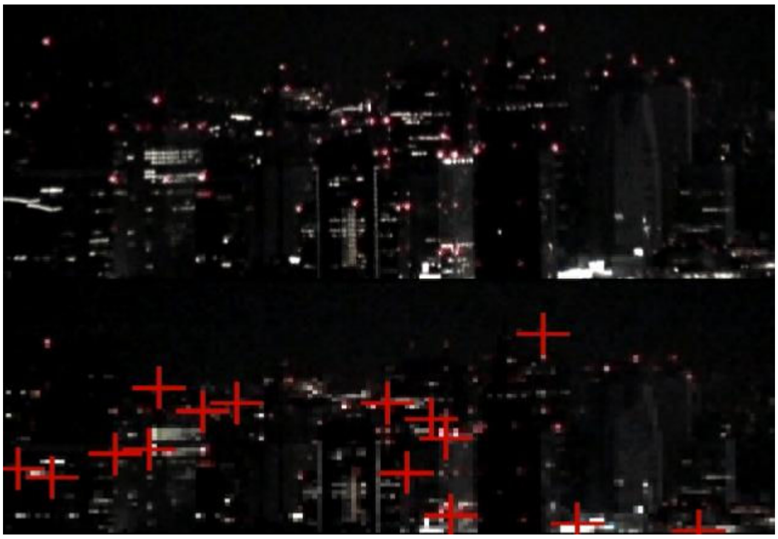


Figure 3. *identification of active red lights on video input*

On the figure above, on can see on a particular frame of the video input the identification of the active red lights, that is, those with intensity greater than some given threshold

3. Musical Time

The notion of musical time, as simple as it seems to be, can be a surprisingly difficult concept to grasp. Music is composed of events which unfold within owing time. The way they are organized creates a perceptual sensation of musical time. This organized time oscillates between two extremes, one completely loose and the other completely straight in its organization. Some composers refers to this quality of time as a continuous time and a striated time [2], and even if applied to harmony in a general sense of the music, it applies very well to the musical time. The reality of musical time lies between these two extreme boundaries.

What we are interested in is the distribution of time which is closer to the striated time - namely a pulsed time – in which we can perceive a more or less strong cyclic sensation of organized time that we interpret as a pulsation and then as a tempo.

We have proposed a method based on an optimal grid search to solve the problem of pulsation estimation and tracking [9]. We consider the domain of symbolic events occurring in a series of onset time {Tn} and focus our research on a temporal set of events which represent the instant polyphony or poly-rhythms of flashing dots. We can have the same approach if we consider the events as onset extracted from audio signal [4,8].

The main problem to solve is to estimate in real time a pulsation which can be considered as the best matching pulsation of a temporal input sequence. This also implies there is not a single and unique master pulsation representative of the temporal data. Considering phrases of rhythm, this aspect is confirmed by the operation of transcription, when asking people to notate a rhythm they are listening to. When performing the imitation of musical tempo, it is often common to experience octave errors. Simha Arom [1] names one of these best underlying pulses the *tactus*, he also presents the incredible amount of confusing names trying to describe different and not always clear notions related to tempo. The tactus is presented as the greatest of the smallest pulses that induces the tempo, and which enable the rhythmic structure to unfold on a sometimes unheard and hidden temporal grid. This consideration is one of the hypothesis of our research : if there is perception of a tempo, we presume there is a regularity which could be revealed by a filigree grid built by the tactus pulse. Of course this regularity is more or less accurate. When performing music, the tempo is moving, either because of unwanted inaccuracy, or because of a specific musical style. When extracted from flashing dots we consider as random variables, it is obvious that the resulting tempo, if found, would likely be non constant and depending on the (possibly changing) group of observed dots.

Considering the above hypothesis of perceptual regularity inducing a tempo, we are looking for a regular grid that can materialize the tempo. If we make this underneath grid appear, we also propose a quantification of the temporal events. This quantification is one of the solutions of the rhythmic transcription of the input phrase.

To consider onsets of the input sequence, we threshold the intensity of the flashing dots coming out of the image matrix analysis, cf. Fig.2(d): when going above this threshold in a cyclic time, the trigger generate successive attacks, from which inter-onsets.

4. Implementation

We do not have the space to develop here some more theoretical aspects of the tactus and temporal flow of pulsations used to drive a musical tempo, nor to present the algorithms developed for tempo tracking. they are detailed in [9,10].

We have chosen the real-time Max/MSP and PureData audio/control environment to implement the optimal grid algorithm as a Max object written with the external C++ facilities programming library which enables to share the code for OS X and Windows computers, both for Max/MSP4 and PureData5 environments. The image analysis and its rhythmic decoding is also done in the real-time Max/MSP environment. The image processing makes use of a specific edge detection algorithm [14] implemented in the Max/MSP graphic library Jitter. The figure below depicts the overall architecture of the system.

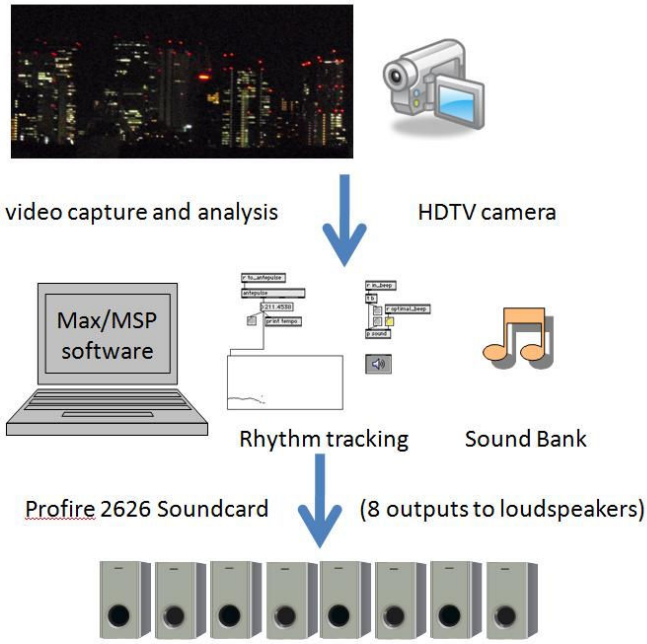


Figure 4. *Architecture of the* Red Light Spotters *system*

It is interesting to note that we can use the Red Light Spotters in two manners:

(1) as a stand-alone installation, generating ambient music from camera input, as depicted above,

(2) as part of a performance together with a musician or DJ, as depicted below.

Both the computer-based Red Light Spotters system and the electronic musician or DJ are playing side by side, and the musician can either play his own music or modify in real-time the parameters of Red Light Spotters system to make him better suit his musical style. Examples of such interactions could be the association of rhythmic sources to his/her own sound bank, live assignment or modification of the association to rhythmic sources to sounds or simply the application of some sound effects to some selected rhythmic source.

However, this would be possible only when the Red Light Spotters system will be converted from a Max/MSP object (program) to a plug-in for music software such as Ableton Live, used by electronic musician in live performances. This has not been done yet, but it is worth noticing that the forthcoming version 8 of the Ableton Live software will integrate Max/MSP, making therefore such integration easy.

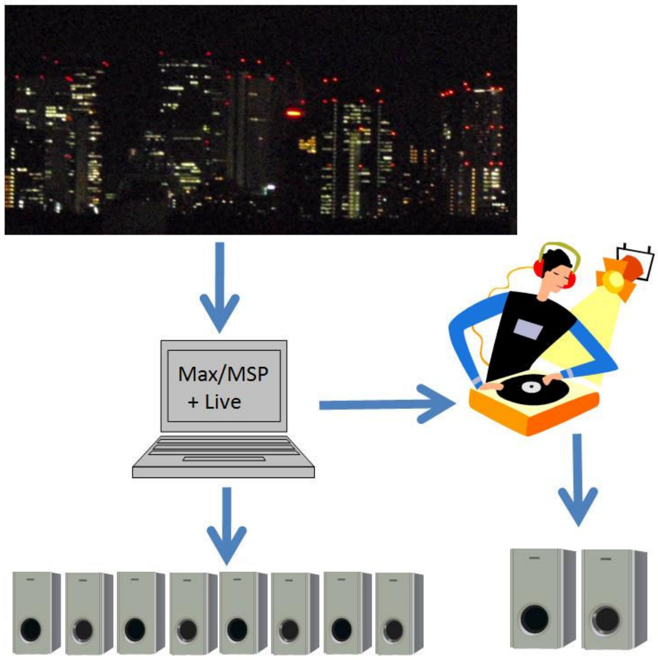


Figure 5. *set-up for live performance with DJ/musician*

5. Artistic aspects

The musical hybrid compositional and interpretative system we propose is open in the sense that it is independent of any given music genre or style. Nevertheless, in order give an idea of the electronic ambient music that can be generated by a system such as *Red Light Spotters*, an example audio file encoded in mp3 can be downloaded from the following website:

However, our intent is to let the musician/artist free to use the sounds, samples, audio effects and musical textures and combine them as he likes. We are providing a framework where this musical process is easy to work with. Concerning the performative aspects, several control devices such as touch screens could be used to create an interactive interpretation of the mixing or sound control processes. By the use of basic interaction rules applied to the parallel decoded tempo - like reaching some point together, being close to the same speed, etc - we achieve some emergent behaviors which generate some musical forms.

It has to be noted that due the rhythmic sound-generation process, the most obvious music that can be created with *Red Light Spotters* is clearly in the spirit of Steve Reich's minimal music, e.g. early works “Piano phase” (1967) or later compositions such as “Six marimbas” (1973-1986) and “Music for 18 musicians” (1974-1976), although we are currently investigating a more contemporary style, also influenced by ambient electronica and dub style. Other musical styles could of course be investigated, but will require more development time in order to adapt and connect the rhythm generators to meaningful musical processes. Also it is worth noticing that as the rhythm generators used in Red Light Spotters can be considered as quasi-random, another influential style is the so-called random music, as pioneered in the 50's by John Cage with such musical pieces as Music of Changes (1951), in which the musical score is written using chance operations, and even more HPSCHD (1969), which uses computer-generated chance operations real-time for various sound sources. Indeed the technology available nowadays makes it possible for a more exible and complex interactions.

In the field of digital arts, the concept of interaction has repeatedly been identified as a fundamental characteristic and this notion is one of the fundamental advance brought by the use of computers in art installations [11, 5, 12]. In the paradigm of the interface, interaction has often been considered as a necessarily reduced and incomplete dialogue between the human and the machine, as a means of access that will always be frustrating since it is imperfectly codified according to the digital reality hidden at the core of the machine. In taking up this route, numerous artists have done their utmost to devise interfaces that are more or less natural to allow for an improved interaction with their digital works, as if the viewer's immersion should necessarily go through a complex technological apparatus. That approach, however,forgets that immersion is cognitive before being perceptive, the reality of a work clearly being invented and recreated by the viewer and not just perceived and undergone. A few artists have designed sound installations linking perception and imagination.

A pioneering digital artwork using contextual information and real-time generated music is Ping by Chris Chafe and Greg Niemeyer, first presented in the Art and Technology exhibition at San Francisco MOMA in 2001. The title refers to the “ping” command in Unix, which can measure the time needed to reach any specific TCP/IP address on the internet. Therefore in this work, several rhythms are created by several distinct computers, each one pinging a specific TCP/IP address. This environment could hardly be definedas musical but somehow aimed at representing in an auditory manner some (partial) topology of the internet, resulting in an intuitive notion of close and distant in this virtual network. Another more recent example is “Emotional Traffic” (*e-traffic*) by Maurice Benayoun, exhibited at V2, Rotterdam, in 2005. This work uses the measurement of the number of occurrences of some words representing emotions (like hope, fear, satisfaction, etc) in search engines on the web to produce a sound environment echoing the emotional state of the planet at a given instant. These words were also graphically represented within visual representations on projected screens.

6. Conclusion

Red Light Spotters is an interactive sound installation that turns an ambient dynamic urban landscape into real-time generated musical soundscape. A key-point is the extraction of tempo in real-time for the groups of blinking lights that form rhythm generators, as this symbolic information can be used in many ways: not only to control the actual tempo of a musical instrument but to infuence any parameter in the real-time sound generation (e.g. the waveform of an oscillator, the reverb delay, etc).

Another interesting point is that this installation is very flexible: it can either creates a sound environment in a purely automatic mode, or allow for a real-time performance by a musician or sound artist who could modify in real-time the grouping of blinking lights and the association between those rhythm generators and sounds. It can also make room for a mixed approach, where a musician blend his own music with the *Red Light Spotters*. In its current stage, this installation is closely linked to the Tokyo urban landscape and thus to be shown during night time in some Tokyo city view observatory, but could be further developed and adapted to other cities and urban landscape, as the only basic requirement is to have some rhythmic flow that has to be captured by the camera sensors and analyzed by the tempo-tracking algorithm. It can be for instance the flow of people or cars in a particular urban location

Acknowledgment

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Dance Robot for Physical Entertainment

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Abstract Dance is one form of entertainment where physical movement is the key factor. The main reason why robots are experiencing a kind of "boom" is that they have a physical body. We propose a robot dance system that combines these two elements. First, various factors concerning entertainment and dance are studied. Then we propose the dance system by robot using motion unit and the synthetic rule referring the speech synthesis. Also we describe the details of the system by focusing on its software functions. Finally we show the evaluation results of robot dance performances.

Keywords: Humanoid robot, dance, dance generation, text-to-speech.

1 Introduction

The research and development of various kinds of robots is actively being carried out, especially in Japan [1][2][3][4][5]. Several reasons explain the current robot boom. One main reason is that robots have physical bodies, and so human-robot interaction extends beyond human-computer interaction.

Although in the future these robots are expected to support various aspects of our daily life, so far their capabilities are very limited. At present, installing such a task in robots remains very difficult. To break through such a situation, entertainment might be a good application area for robots.

Developing a dancing robot would be remarkable from various points of view. First, it might become a new form of entertainment, activates both the body and brain. Watching humans dance is already one established type of entertainment. Second, we might develop a new type of communication with computers, because dance can be considered one of the most sophisticated nonverbal communication methods.

Based on the above considerations we started to research dancing robots. In this paper we clarify the relationship among entertainment, humans, and robots and propose a robot dance system by robot using motion unit and the synthetic rule referring the speech synthesis. Also we will describe an evaluation experiment carried out to test this basic concept's feasibility.

2 Dance Entertainment and Robots

2.1 Entertainment

The role of entertainment in our daily life is very important. It offers relaxation and thus contributes to our mental health. Many aspects concerning entertainment must be considered and discussed [6]. One of the most important may be the existence of two sides: entertainer and audience. Although these two sides change positions depending on the case, the existence of performers and spectators is an absolute prerequisite for entertainment. Many entertainments have both entertainer and spectator characteristics. In the case of dance, people sometimes go to theaters to watch good dance performances, and they sometimes go to dance clubs or discos to dance themselves.

Furthermore, when viewed from a different aspect entertainment can be classified into two types. One is a real-time type that includes performers or entertainers performing live in front of an audience. Good examples include plays and/or concerts. Another is the non-real-time type; reading books and watching movies are good examples.

Following this classification, dance basically belongs to the real-time type of entertainment. For robot dancing, however, as described later, its position is somewhat special.

2.2 Dance Robot

One main reason why we choose dance as an entertainment for robots is that dance is quite sophisticated [7]. Based on the considerations described above, what is the role of robots in dance entertainment? Dance robots allow us to become both entertainers and spectators. When watching a robot dance, we are spectators. On the other side, many people will probably want to install dance motions on their robots and show these actions to others. In this case they are entertainers. For the classification between real-time and non-real-time entertainment, dance robots also have significant characteristics. If we want to show people the robot dance, we have to install the dance actions beforehand, meaning that the robot dance is non-real-time entertainment. At the same time, by developing interactive capabilities, the robot would show impromptu dancing behaviors. For example, it could change the dance depending on audience requests. Or it could sense the audience mood and could adopt its dancing behaviors to reflect the sensor results. A dance robot could provide flexible entertainment that ranges between real-time and non-real-time entertainment.

3 Dance Robot System

3.1 Basic Concept

Based on the above considerations we want to develop a system that can generate various dance motions. Since different dance genres exist, it is necessary to restrict dance genres to a specific one. Then the system would generate various dance motions by selecting several basic dance motions and by concatenating them. This basic idea resembles text-to-speech synthesis (TTS) [8], where by restricting the language to be synthesized and by selecting a basic speech unit, any kind of text described by the language can be generated. The following is the basic concept adopted in TTS:

(1) Speech consists of a concatenation of basic speech units.
(2) Selection of the speech unit is crucial.
(3) Connection of speech units is also crucial.

As basic speech units, various basic units such as phonemes, phoneme pairs, CV (consonant-vowel concatenation), CVC, VCV and so on have been studied [8]. Based on research of the last several decades, phonemes including variations that depend on previous and following phonemes are widely used as speech units. Taking these situations into consideration, the basic concept of dance generation is as follows:

(1) We restrict the generated dance to a specific genre.
(2) All dance motions consist of a concatenation of several basic dance motions.
(3) Deciding what to select dance units as basic dance motions is very important.
(4) Connecting dance units is crucial.
(5) Also it is crucial how to express a dance unit as robot motion.

In the following sections, we answer the above questions.

3.2 Dance Genre

For basic dance motions, there are several researches on classic ballet [9]. The classification of ballet motions is based on several leg positions and movements called steps. Although each leg position and step has its own name, basically no rules describe the details of whole body motions. We chose hip-hop as the dance genre because all of its dance steps and motions are classified into several categories, so it is easier to handle the whole body motions of hip-hop than ballet.

3.3 Dance Unit

Next we must decide the basic unit for dance motions. As described above, since each hip-hop step/body motion has its own name, it can be selected as a dance unit. However, it is difficult for an amateur to extract them from continuous dance motions. Therefore we collaborated with a professional dancer to simplify the extraction of basic motions from continuous dance motions. In addition, when constructing robot motions based on human motions, we must deform complicated human motions into rather simple robot motions. In this deformation process, a professional dancer's advice is also of great help.

3.4 Concatenation of Dance Units

The next question is how to connect each motion unit. One method interpolates the last posture of the previous motion and the first posture of the next motion. The difficulty in the case of a dancing robot is how to connect these two motions and prevent the robot from falling down. We introduced a method in which a neutral posture represented by a standing still pose is used as a transition posture between two dance units. In this case developing an algorithm is unnecessary to generate a transitional motion that connects two different motions.

3.5 Realization of Robot Dance Motion

The next issue is transforming human dance motions into the motions of robots. One common method adopts a motion capture system that is used to generate the motion of CG characters. For a robot, however, due to the limitations of the degree of freedom at each joint, directly transforming the motion captured by the system into robot motion does not work well. Research that transforms captured motions into robot motions is described in [10] that treats a Japanese traditional dance whose motions include legs moving slowly and smoothly front/back and left/right instead of dynamically. In this case it is relatively easy to maintain balance. However, hip-hop motions include dynamic body motions, and therefore it is difficult to maintain balance. Taking these situations into considerations, we chose a method where each motion unit extracted from continuous motion is transformed manually.

3.6 System Architecture

Based on the above considerations, we constructed the first prototype of a robot dance system, as shown in Fig. 1, that consists of dance unit sequence generation, a dance unit database, and dance unit concatenation.

(1) Dance unit database

A large amount of dance units are stored here; each one corresponds to a basic short dance motion and is expressed as robot motion data.

(2) Dance unit sequence generation

An input data that expresses a dance motion is analyzed and converted into a sequence of dance units by this part. At the present stage a sequence of dance units is directly used as input data and fed into the system.

(3) Dance unit concatenation

As is described in 3.4, a neutral posture is introduced as an intermediate posture between two dance units, and therefore, they can be easily connected.

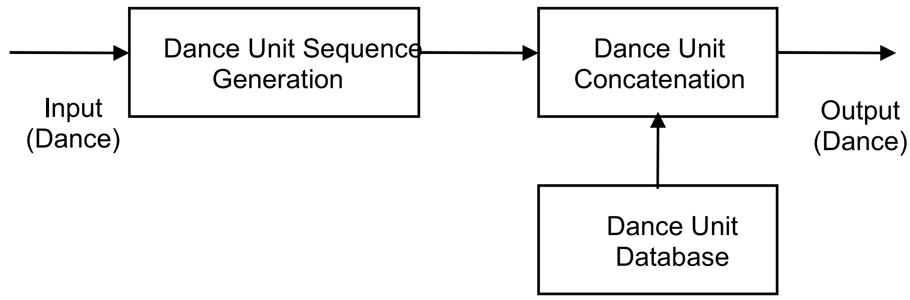


Fig. 1 Structure of dance robot system

4 System Development and Evaluation

4.1 Humanoid Robot

From the several humanoid robots already available on the market, we selected a humanoid robot developed by Nirvana Technology [11] and installed dance motions on it. Figure 2 shows its appearance, and Table 1 shows its basic specifications. Various robot motions can be designed and produced on PC using a “motion editor” realized by motion making and editing software.

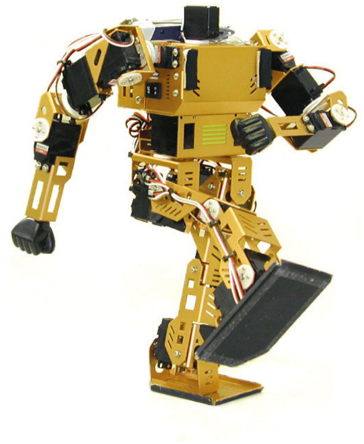


Fig. 2 Humanoid robot

Size/Weight	34 cm / 1.7 kg
Degree of flexibility	22 (12 legs, 8 arms, 1 waist, 1 head)
CPU	SH2/7047F
Motor	KO PDS-2144, FUTABA S3003, FUTABA S3102, FUTABA S3103
Battery	DC6V

Table 1 Specifications of humanoid robot

4.2 Development of Dance Unit Database

As described above, we collaborated with a dancer to develop a dance unit database and conducted the following database generation:

(1) First, a typical hip-hop motion of several minutes long was recorded.

(2) Then we observed and discussed the dance sequence and selected about 60 motions as dance units that included almost all the representative hip-hop motions.

(3) We asked the dancer to separately perform each motion corresponding to each dance unit and recorded it. At the same time we asked him to start each dance motion from a “natural standing posture” and to finish in the same posture.

(4) By watching each dance motion being performed, we tried to create a robot dance motion that corresponds to human dance motion using motion editor.

4.3 Evaluation of Robot Dancing

Using the system described above we carried out simple evaluation experiments.

4.3.1 Comparison of the two types of robot dance units

We evaluated the two types of dance units; one was generated by the professional dancer (type 1) and the other by non-experts (type 2). First we classified all the dance motions into three categories according to the complications of the motions; primary, intermediate, and advanced. And we selected one representative motion for each category. These dance motions are "Lock"(primary), "Rolling Arm" (intermediate), and "Club"(advanced). Then we generated two types of robot dance motions for each of these motions.

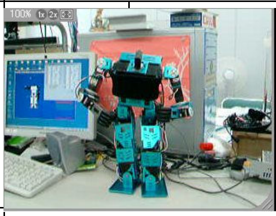
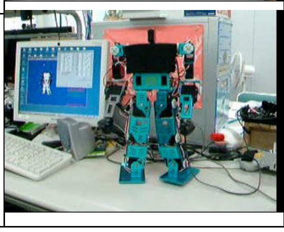
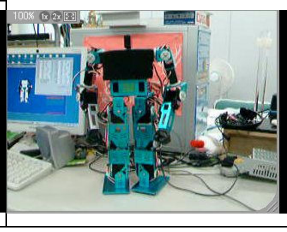
	Robot motion (type 1)	Robot motion (type 2)	Dancer Performance
(a)			
(b)			
(c)			

Fig. 3 Comparison of three dance motions

Ten subjects were asked to compare these two types of robot dance motions by giving a score ranging from 1 to 5 to each dance motion (1 is the worst and 5 is the best). Figure 3 shows the comparison between the two types of dance motions; robot dance motions developed by the dancer himself (type 1) and those developed by non-experts (type 2) for three kinds of motions; (a) Lock, (b) Rolling arm, and (c) Crab. Also the live dance motions performed by the dancer is shown as references. Figure 4 shows the evaluation results for each of the three kinds of motions. The evaluation result and the consideration for each motion are described below.

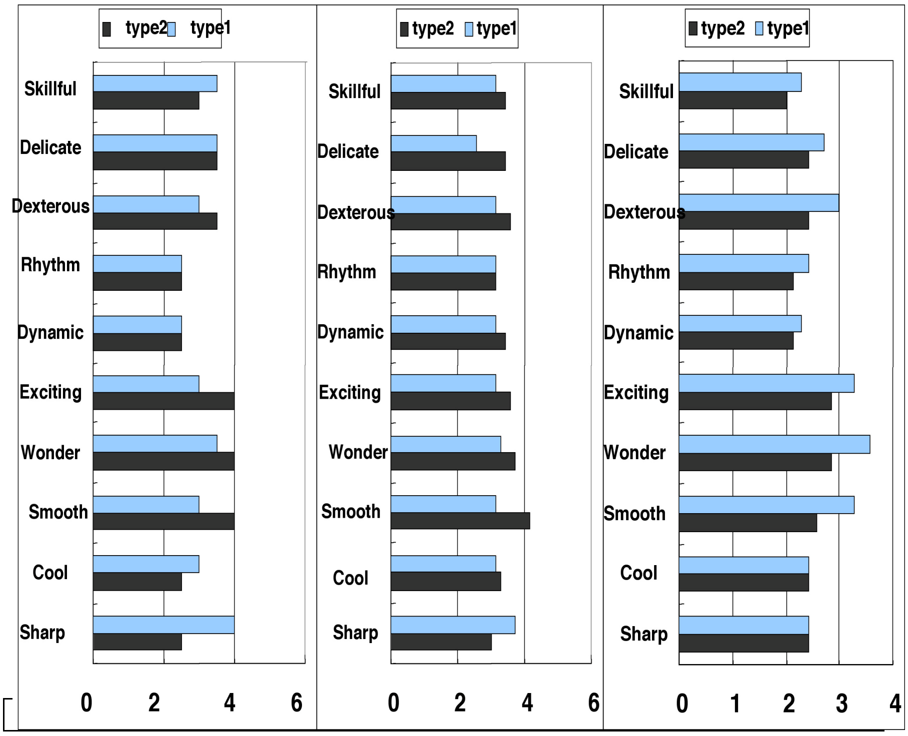


Fig. 4 Evaluation results for three kinds of motions

(1)Lock

This is a repeating motion of moving and stopping like being locked. In this move the sharpness of stopping motion is an important factor as a dance. For "sharpness," type 1 motion (motion designed by a professional dancer) obtained the higher score than type 2 (motions designed by non-experts) as expected. On the other hand, for such evaluation items as "exciting," "wonder," and "smooth," the type 2 motion got higher scores than the type 1 motion. It seems that the stop-and-go motion designed by the dancer was judged awkward by the subjects.

(2)Rolling arm

This is a motion of moving body while turning arms smoothly. For the sharpness, the type 1 motion obtained higher score than the type 2. But for other evaluation items, the type 2 motions generally got slightly higher scores. Especially for "smooth" type 2 received much higher scores against type 1. Originally this motion contains a step raising legs, and the type 1 motion precisely simulates this process and in the case of sharpness it worked well and obtained the high score. On the other hand, the type 2 motion achieves this move by sliding legs without raising legs. As a result, it was judged that the type 2 motion looked smoother than the type 1, and this gave a influence to the result of smoothness evaluation and others.

(3)Crab

This motion is a move peculiar to the Hip-hop dance. It includes a move of sliding legs sideways without raising them and fixing their backside on floor and thus moving the body sideways. The motion designed by the professional dancer (type 1) receives higher scores than the motion designed by non-expert (type 2) for almost all evaluation items. Especially, important evaluation items for this move such as “exciting,” “wonder,” and “smooth,” the type 1 obtains fairly higher evaluation scores than the type 2.

These result shows that as the robot dance motions become more complex, they can get higher scores. The reason for this would be that the professional dancer understands so well the characteristics of each dance motion and his knowledge and now-how is reflected on the robot dance motion. Even though it does not appear so well in the case of simple motions, this characteristic reveals itself in the case of complicated motions. On the other hand, the motion designed by non-expert (type 2) obtained higher evaluation scores than the type 1 for simple motions. The explanation for this would be that the subjects got good impressions for the over-actions and the unstableness that the type 2 motions generally contain and express themselves. Contrarily, the type 1 motions designed by a professional dancer are sophisticated without containing such over-action nor unstableness. This characteristic sometimes leads to rather low evaluation scores as the subjects are non-expert of dances and thus could not understand the details of the dance motions where the knowledge and now-how of the professional are stored.

4.3.2 Evaluation of the continuous dance motion

Then we carried out the experiment to evaluate the feasibility of the dance generation system. We compared two types of continuous dance motions. One is a continuous dance motion which is automatically generated by this system and has the length of about one minute (type 3). Another is the same dance motion where instead of automatic generation the professional dancer designed the whole continuous dance motion from scratch (type 4).

For evaluation twelve items generally used for the sensibility evaluation such as "stable," "soft", “smooth,” and so on were selected. Each evaluation item has a seven level score ranging from -3 to 3. For example, for the evaluation item "stable" the 0 means neutral, 3 means very stable, and -3 is very unstable. Figure 5 shows the evaluation result. The type 4 obtained fairly good results for most of the evaluation items. This means that the evaluation items were fairly well selected. Generally the dance motion generated by this dance generation system (type 3) obtained lower evaluation scores than the type 4 motion. Especially, for such evaluation items as "harmony," "lightness," and "tempo, " the type 3 motion obtained minus evaluation scores. This is because the subject felt unnaturalness due to the neutral posture effect used to connect the two dance units. This means that the system still needs further improvement to generate continuous dance motion, especially for the connection of two dance units. At the same time, however, the type 3 motion got plus scores for "stability", "cool", and "intentional." Especially for "cool" and "intentional" the evaluation results are almost as high as the results of the type 4 motion. This shows that the continuous dance motion generated by this system would be effective as far as it is used as a performance even at the present stage.

The difference between type 3 and type 4 motions are that in the case of type 3 motion it goes back to a neutral position at the point of the dance unit connection. It is necessary to improve this point by introducing better neutral posture or introducing multiple neutral postures.

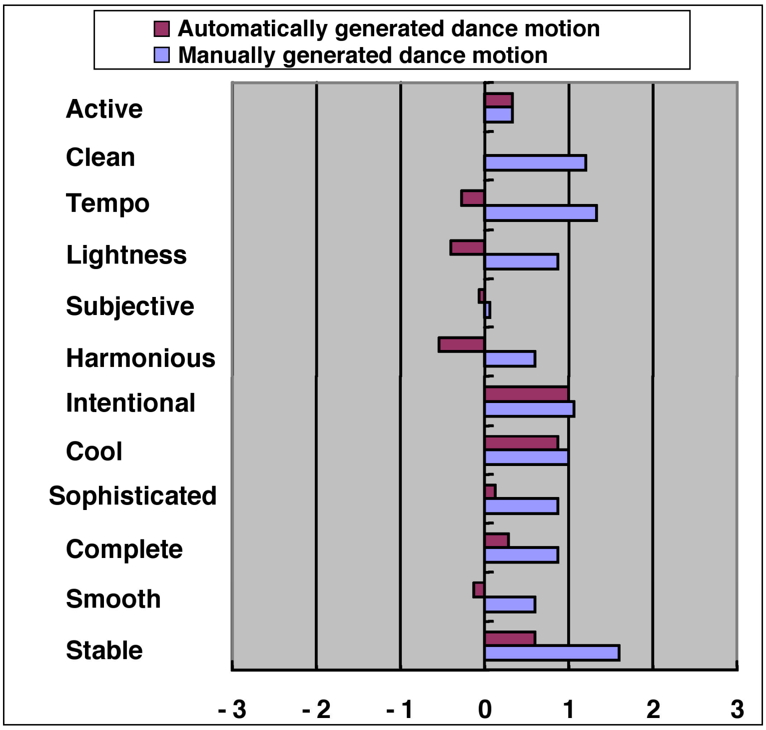


Fig. 5 Comparison between automatically generated motions and manually generated motions

5 Conclusion

In this paper we proposed a dance robot system as a new application area for humanoid robots. We clarified several distinctive entertainment characteristics and investigated the role of robots in entertainment.

Based on these basic considerations we proposed a dance robot system in which a humanoid robot performs various dance motions. We hypothesized that any dance motion consists of a concatenation of short dance motions called dance units. This basic idea was imported from TTS, where any text can be converted into speech by concatenating short basic speech called speech units. Based on this basic idea, we collaborated with a professional dancer. After recording and analyzing his hip-hop dancing, we extracted about sixty dance units and converted them into the motions of a humanoid robot. By concatenating these dance units we found that a huge amount of dance variations for the hip-hop genre could be achieved.

Then we carried out two types of evaluation experiments. First we compared dance motions designed by the professional dancer and the ones by non-experts of dancing. We found that as the dance motions become more complicated and sophisticated, the dance motions by the dancer got higher evaluation results. Then we compared a continuous dance motion automatically generated by this system and one fully manually designed. Although the automatically generated dance got lower evaluation results, for some evaluation items it got almost the same scores. This means that this system is promising from a point of automatic dance generation. Further studies must address the following issues. First we have to investigate how many dance units are enough to generate any type of hip-hop dance. Also we have to investigate the feasibility of a neutral posture that connects two dance units. As only one type of neutral posture was used so far, still there is some unnaturalness for the automatically generated continuous dance motion. We expect that by introducing several other neutral postures, continuous dance motions achieved by the robot would become more natural.

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New Hitch Haiku: an Interactive Renku Poem Composition Supporting Tool applied for Sightseeing Navigation System

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Abstract

As well-known, cultures are rooted in their unique regions, histories and languages. Communication media have been developed to circulate these cultural characteristics. As a part of our research “Cultural Computing”, which means the translation of cultures using scientific methods representing essential aspects of Japanese culture [1], an interactive Renku poem generation supporting system was developed to study the reproduction of a traditional Japanese Renku by computer. This system extended the functionality of our previous Hitch-Haiku system to the Renku based on same association method and attached more cultural characteristics on it: the Renku verse displayed on the Japanese-style color pattern which represents the same season in Renku Kigo (seasonal reference) and the generated Renku verse including the information of sightseeing place.

Keywords

Poem, Renku, Renku generation, Art, Interactive art, association method

Introduction

Haiku is a Japanese traditional poem style with minimal length of seventeen morae (on in Japanese) in three metrical phrases including a seasonal word called *“Kigo.”* The original form of Haiku was called Hokku and in the late 19th century Shiki Masaoka revised it and finally established the present form of Haiku [3]. Haiku include various imaginative expressions and thus has been applauded by many people. Haiku is a story that generates context - the shortest story in the world. Known as the first great Haiku poet in the Japanese history, Matsuo Basho is responsible for *“Oku No Hosomichi”*, a prime example of his work [4].

In 1959, Theo Lutz developed a system of a poem generation for the first time [5]. The system only showed words at random on grammatical rule, and could not generate a poem with user’s interactions. In 1971, for the first time Masterman developed the generation system of a Haiku [6]. By rearranging the words which users chose from the pull down menu in the interaction process the system generates a Haiku. However, in these interactions, users could input only a few limited words into the system.

In the field of Interactive Art or Game, the quality of contents is important, like

“Passage Sets / One Pulls Pivots at the Tip of the Tongue” by Bill Seaman [7], and *“An Anecdoted Archive from cold War”* by George Legrady [8][9]. But from technologies viewpoint, only simple techniques have been used. On the other hands, in the field of AI, many researchers and developers have been using various kinds of techniques to find some relations among input words/phrases by users and to compose answers in relation to these inputs [10]. These techniques have been often used, because using one of these techniques they can develop an interactive system that can achieve relatively interesting interactions. But the relations they try to find out and they try to use in their systems are static, and the quality of their interactions have been mostly dependent on the quality of the relations given beforehand.

Based on his long carrier and an editor and a philosopher, Matsuoka four several basic forms called “*Thoughtforms*,” that exist as basic form of relations among things [11]. By tracing and re-constructing some relations indicated by *“thoughtforms,”* Tosa and Matsuoka created an art work called *“i.plot”*, which displays dynamically hidden relations and contextual emergences of English, Chinese Character, and so on [12]. As this technique can re-construct interesting relations and enable to generate better Haiku, Tosa and Obara applied the technique to develop an interactive system, “Hitch Haiku”, which supports a user for composing a Haiku. The user only need to input some words into the system, and the system can compose phrases consisting of five-seven-five morae which most fit to the user inputs. The system is called Hitch Haiku as it generates a Haiku “hitching” the phrases chosen based on the user inputs.

In order to extend this Hitch Haiku system and apply it to wider field, we adopt the success of the previous system, that is, generation of better quality Haiku using association method, and use more cultural features to develop a new interactive Renku composition supporting system which is applied for the Kyoto sightseeing navigation system.

Conception

The new Hitch Haiku system is designed to be a Renku composition supporting sub-system applied in the sightseeing navigation system which is based on our previous Hitch Haiku system, an interactive Haiku generation supporting system. Compared with the old Hitch Haiku system, there are three unique features in our new Hitch Haiku system:

1) to generate Renku verse using searching and association method, the latter is the major point to get the better quality of Renku verse

The rules of Renku is much more restricted and complicated than those of Haiku, especially the limitation usage of Kireji in Renku creation. Based on the experience from previous experiment that the quality of the Haiku generated depends on the sensitivity of the user input words, we give up the steps of attaching Kireji to user input words to generate the phrases and try to generate the phrases of Renku verse in the way like human done, i.e., create the haiku phrase by the meaning of previous generated phrase and new

keyword which can correspond to the previous generated phrase.
2) During the generation of Renku verse, optionally we applied the Haiku thesaurus words related to the sightseeing place. Thus, it is possible to include the features of the specific sightseeing place into the Renku verse.
3) To show generated Renku verse on the Japanese-style color pattern, and furthermore, the selection of background color pattern is based on the representative season which corresponds to the Kigo of the generated Renku verse. Therefore, the user can feel the cultural characteristics not only from the phrases of Renku verse but also from the background color pattern which is also harmonious to the Renku verse.
By adding above features into our new Hitch Haiku system, we hope that the generated Renku verse and display style can show users more cultural characteristics.

Process of Generation

The Renku generation procedure in our new system is the process shown in follows (Fig.1). In details, the system works in the following steps:
(1) A user input his or her two favorite words (or phrases) in a text box of the Hokku (the first Haiku of the Renku) input webpage and select the sightseeing place in the Kyoto city from a optional selection box which including the most famous 110 hot spots of this city using mobile phone.
(2) The system searches the Haiku phrase databases both with and without Kigo and found out the phrases including one of the user input word and randomly select one. For Hokku, the system will do a special selection procedure: prior to select the phrase with Kireji. For the other Renku verses, because the Kirejis are forbidden, the system will select the phrase without any Kireji.
(3) In the other hand, the system searches the Haiku thesaurus word related to the user chosen sightseeing place. This Haiku thesaurus word will be used in the later Renku phrase generation.
(4) Once the first phrase was selected, a syntactic analysis for this phrase is carried out in the web server and the basic forms of noun or verb from each phrase are extracted.
(5) Then the system apply the elemental words of first phrase and the rest one of user input words to generate the second phrase of Renku verse by using association method. More in details, the system searches the words associated with the above elemental words and user input word, and extract the phrases including the association words from six types of databases in the system, which are Haiku thesaurus, Kigo thesaurus, idiom thesaurus, case frame of onomatopoeia, thesaurus, and case frame.
Furthermore, the system scores all phrases by weight: Haiku thesaurus is 3, Kigo thesaurus is 3, idiom thesaurus is 3, case frame of onomatopoeia is 3, thesaurus is 3, case frame is 1, user’s relation is 5. If a phrase includes two or more association words, the system sums the weight respectively. The system chooses one of the phrases with the highest weight.

(6) After generation the second phrase of Renku verse, the similar steps to (4) and (5) are executed again. The difference is this time, the system use the elemental words from the second phrase of Renku verse and the Haiku thesaurus word to do the association.
(7) Finally, the system "hitches" these three phrases to create the Renku verse. Obviously, the difference between old Hitch Haiku system and the new one is that the new system "hitches" phrases internally and natively.

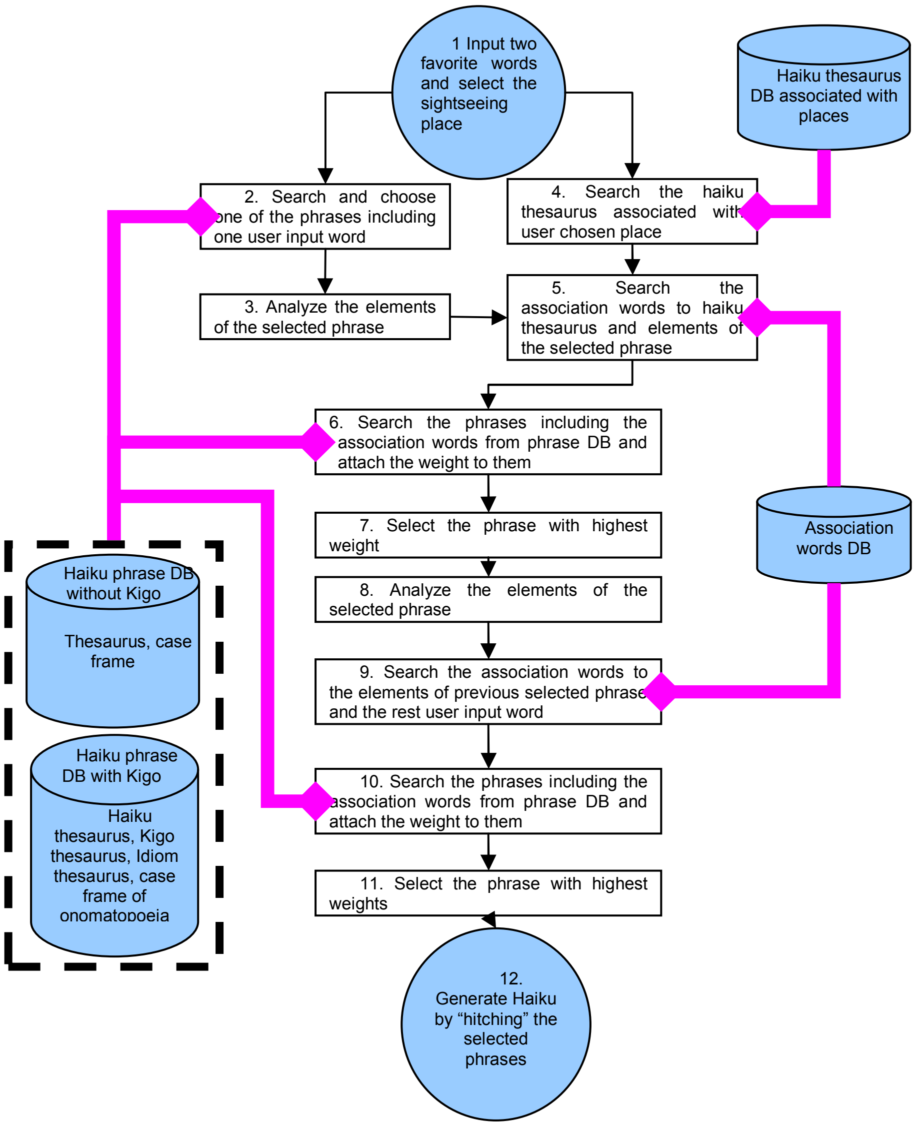


Fig. 1 the flowchart of Haiku generation algorithm

Database

In our new Hitch Haiku system, six types of databases, which are case frame database (about 31,000 records), thesaurus database (about 32,000 records), Haiku thesaurus database (about 2,500 records), Kigo thesaurus database (about 13,000), idiom thesaurus database (about 1,300 records) and the database of Case frame of onomatopoeia (about 8,800 records) are remained. But considering the requirements to generate Renku verse, for examples, the verse to describe the moon or flower in the specific season, we added more such information into these databases.

Furthermore, we added new Haiku thesaurus database for the sightseeing places in Kyoto city to show more local cultural background and local Haiku information which can integrate new Hitch Haiku system tightly to the sightseeing navigation system.

Interaction Example

With illustration figures listed below, we explain the abstract of usage of our system:
(1) A user log in the Hitch Haiku system with ID number (Fig.2).
(2) The user can select one of the functionalities provided by Hitch Haiku system by press the corresponding button (Fig. 3).
(3) The user inputs the two favorite words into text boxes and chooses the hot spot from 110 famous sightseeing places in Kyoto city (Fig. 4).
(4) After the button "Send" was pressed, the system accepts the inputs from user and shows the auto-generated Haiku phrases on a typical Japanese-style color pattern which represents the same season described in Haiku Kigo. (Fig.5).
(5) If the user does not like the auto-generated Haiku, the user can choose regeneration with same inputs by pressing "Retry" button or do the modification by himself / herself.
(6) If the user satisfies with the generated Haiku, the user can press "Ok" button, so that the system will save the result into user-note database and show the representative photo of the sightseeing place chosen by the user with address information (Fig. 6).

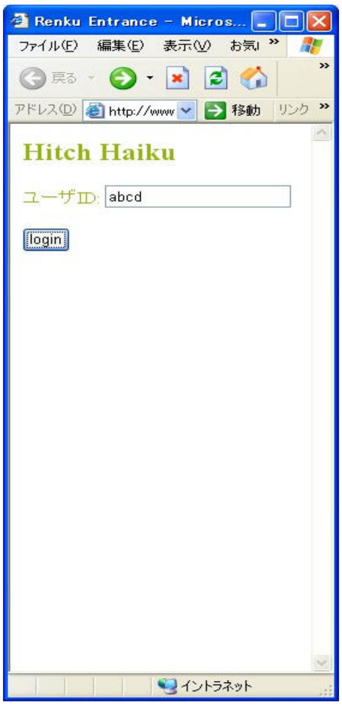


Fig. 2: the interface of user login

Fig. 3: selection of functionality provided by Hitch Haiku System

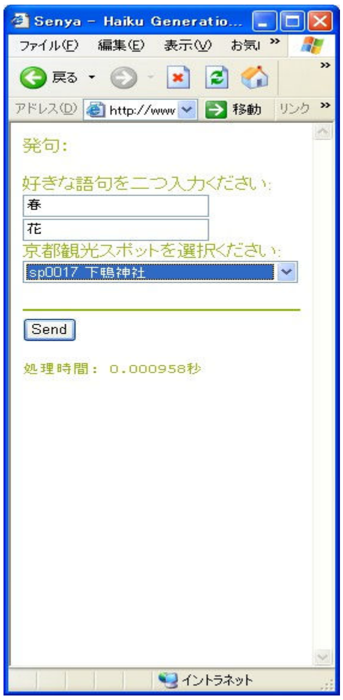


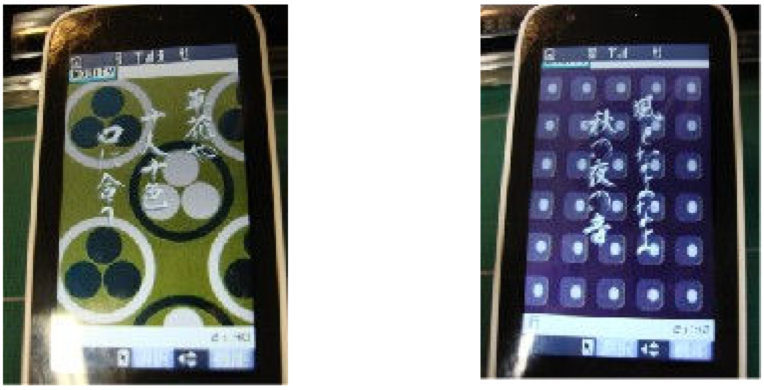
Fig. 4: input the favorite two words and choose the spot place of sightseeing place in Kyoto city

Fig. 5: show the generated haiku phrases on a Japanese-style picture

Fig. 6: show the representative photo of user chosen place

Fig. 7: an example show the ruby for some phrase difficult to read

The following photos were the snapshots (Hokku and Waki, the first and second verses of Renku) of the mobile phone taken from the verification experiment.



(a) Generated Hokku (b) Generated Waki

Fig. 8 snapshots of mobile phone in verification experiment

Conclusion

A new interactive Renku generation support system has been developed to help user enjoy the sightseeing in Kyoto city by using mobile phone, which is based on our previous interactive Haiku composition support system – Hitch Haiku. The theme of both researches is cultural computing. In order to get the better quality of Renku verses, we abandon the Kireji attachment step in the old Hitch Haiku system and mainly apply the association method to hitch the meaning of adjunct phrase tightly. In the other hand, to improve the cultural characteristics representation, the new Hitch Haiku system apply the Haiku thesaurus word to generate the Renku phrase so that the generated phrase can embed the feature of user chosen sightseeing place. Moreover, the new system adopts the Japanese-style color pattern as the background to show the auto-generated Renku verse to enhance the visual effect. In particular, the season that the selected color pattern represented is consentient to the Kigo of the generated Renku verse.

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Interactive Cultural Experience
–
Interactions with Asian Cultures

Panel discussion

Chair: Ryohei Nakatsu (National University of Singapore)

Panelist: Ryohei Nakatsu (National University of Singapore)
Naoko Tosa (Kyoto University, Japan)
Michihiko Minoh (Kyoto University, Japan)
Kazuyuki Konagaya (Osaka City University, Japan)
Haruo Takemura (Osaka University, Japan)
Philippe Codognet (CNRS/ JFLI, Japan)

Asia is a vast treasure trove of cultures based on its long history. Its culture includes historical heritages, religions, various forms of arts, life styles in different countries, etc. At the same time Asian cultures have a lot of variations as they cover various kinds human races, regions, climates, etc. For Westerners Asian cultures have been a kind of mystery as they look so different from Western cultures.

However, the integration of interaction technologies and Asian cultural contents would make it possible for Westerners to approach Asian cultures more easily and to have a better understanding for them. In this panel first we want to discuss how we could develop various kinds of interactive exhibits for museums and other places so that through the interactive experiences with these exhibits Westerners would have better understanding of Asian cultures.

At the same time the advance of communication and network technologies has made it clearer that Westerners and Asians share a lot of basic characteristics as well as cultures. Therefore in this panel also we want discuss the basic nature of Asian and Western cultures and hope to reach a consensus that at the bottom these two cultures share a lot.