RENCON: toward a new evaluation method for performance rendering systems

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Abstract

Evaluating computer music research from the system point of view has not been established because of the subjective nature of music. In order for such research areas to evolve and prosper, we believe the evaluation method based on objective understanding is essential. We started and propel RENCON (performance rendering concours), a world-wide-landmark-project tobe, in order to seek and propose an evaluation method for music systems taking performance rendering system as the typical research of manipulating Kansei information. Musicians and musicologists also expect to see the result of the project in how to describe music analysis and cognition objectively. Futhermore by letting people be widely consious of the project, we hope RENCON to enlight people on the computer music research, encourage them to participate it, and enpower the research itself. In this paper we will report the activities of RENCON and its majestic goal.

Keywords: RENCON, performance rendering, evaluation, Kansei, natural/artificial performance

1 Introduction

Performance rendering system generates automatically musical performance with emotions and expression as if it is performed by a human player. Since performance rendering handles the object with subjectivity and Kansei, widely used number-oriented evaluation methods are not suitable for the system. So far the selection of music generated in each system varies depending on the issues of each system or preference of researchers. In order for the performance rendering research to evolve, an appropriate evaluation method is indispensable. The method should make people consent with the evaluation result by objective reasons at the same time satisfy them from the musical point of view.

We propose RENCON, performance rendering concours, as a project in order to seek and propse an evaluation method for music systems taking performance rendering system as a good start (RENCON). By running Rencon a continuous worldwide project, more and more people will be consious of the project, consequently we hope Rencon to enlight people on the computer music research, encourage them to participate it, and enpower the research itself.

Figure 1 shows a typical process of performance rendering. The first stage is the preparation stage: giving a system musical scores and real performances as input, obtaining information for rendering, such as musical structure, analyzed information of performance, and rendering rules. At the second stage, giving a rendering engine the derived information in the first stage and a music set (a set of unified musical pieces for comparison) as input, then the engine generates performance as output. In the first and the second stages, in some cases, analysis and rendering are not completely automated. "Intervene manyally" in these stages means that human may correct or supplement the system's result. "Sequencer programming", input score data to a sequence software then modify properties of each note with its MIDI values, corresponds to the manual intervention in the third stage.

As the figure shows, the research of performance rendering is related to music analysis, music cognition, music performance, artificial intelligence and computer science in general. Thus in order to attain an evaluation method, wide and long range discussion will be required.

In section 2, we describe how Rencon project started and the activities of Rencon so far. In section 3, we describe the evaluation matters in Rencon. Finally in section 4, we show the plan of Rencon workshop for the coming few years and the grand target of performance rendering system research.

2 The activities

The research of performance rendering with musical expression started in 1980s. Because the research handles and realizes Kansei information in a computer
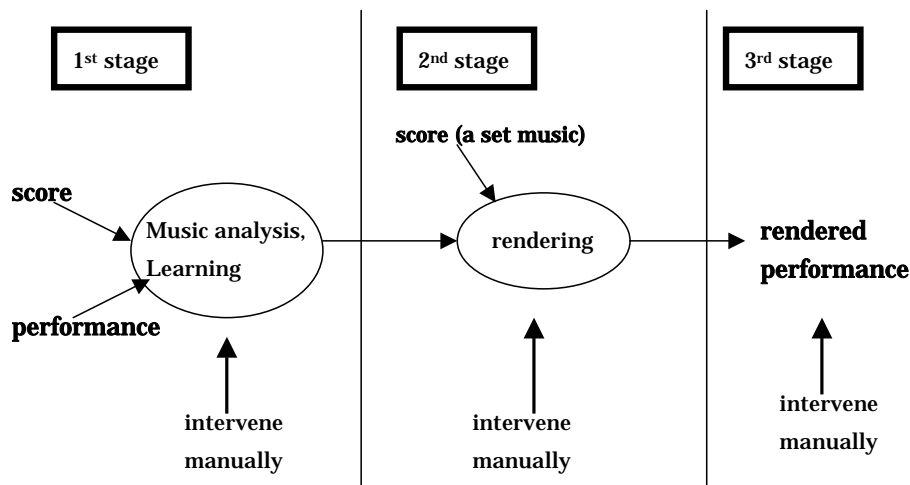
Figure 1: A typical process of performance rendering

system, it got the attention of people as well as researchers of the area. Since then we have not been able to find an appropriate method to evaluate such type of systems. In 1996, the idea of performance rendering concours is proposed for the first time (Katayose, Goto, Horiuchi, Matsushima, Murao, Shimura, Rai, and Hirata 1996). In 2000, five groups in Japan that worked on performance rendering research participated a demonstration of rendered performance and a panel discussion on the next step of performance rendering research (Hiraga, Katayose, Koike, Suzuki, Noike, and Hoshishiba 2000). At the panel disucussion session, an upsurge of having performance rendering concour appeared.

At the same year, we got a workshop fund by Nissan Science Foundation, then formed a feasibility study group consists of researchers of computer science, music, and musicians, and started periodical meetings for a year (Hiraga, Horiuchi, Murao, Takeuchi, and workshop members 2001). We decided Rencon's objective and mission as described in Section 1, also to have the long-range purpose as in Section 4. In order to actually steer Rencon as the international, continuous events, we formed a working group to handle from clerical to technical problems (Katayose, Hiraga, Hirata, and Noike 2002).

2.1 Petit Rencon

The year 2002 is the start of Rencon's century. We have two Rencons in 2002: the first Rencon as a satellite workshop of ICAD2002 (International Conference of Auditory Display). Dr. Bresin of KTH (Sweden) participated the committee. Since it is the memorable start of Rencon, the purpose is to clarify the current situation of performance rendering research. We prepared a CD-ROM including performances from all over the

world which are rendered so far besides the proceedings (CD-ROM is purchasable through the homepage of Rencon).

The second Rencon is held as a special session of FIT (Forum of Information Technology), a big joint conference of two large societies in Japan –IPSJ (Informatin Processing Society Japan) and ISS of IEICE (Information and Systems Society, a society of the Institute of Electronics, Information and Communication Engineers). As a preparation to the next year, we will have a panel discussion session where we invite a panelist who judges at constests of sequencer programming held by DTM and instrument makers as well as representatives of computer science and music area. After the panel disucussion, we will have an open-judgement including attendees from the floor and give awards to participants.

Although researchers demonstrate their music at these two Rencons, these are not concours yet: there are not a set music nor I/O interface for rendering engines. Thus we call these Rencons "Petit Rencon."

Prior to Petit Rencon, we will have a special session as a "near future challenge" in the annual conference of JSAI (Japan Society of Artificial Intelligence). Here performance rendering is treated as a design and reusability matter of multimedia contents.

2.2 Gros Rencon

We plan to let Rencon be the real concour style — giving participants a set music and presenting them I/O specification beforehand to concours from 2003 (Gros Rencon). We will have the fourth Rencon in 2004.

Though we will simulate the style of real music concours in Gros Rencon, Rencon will have its uniqueness making use of the fact that performance is ren-

dered by computer systems:

- Since automated performance does not need any practice, a set music will be proposed to participating systems the day of the Rencon. The systems are expected to generate performance at sight.

- In order to prevent a system to generate too excellent performance by generating exactly the same performance as a case performance, participants are given newly composed music. At Rencon, systems generate and compete performances of the world premier.

- Since there are many musical issues to solve for systems to generate performances, pursueing a part of music will be a good practice. For example, a set music is selected to see how a system realizes Auftakt and rendered performances are judged from only the Auftakt point of view.

3 Evaluation matters at Rencon

3.1 Evaluation viewpoints

Quantitative evaluation is acceptable to evaluate performance rendering systems as a computer system. Needless to say, the problem to apply this type of evaluation to such systems is the reliability concerning music points. As music systems, we believe evaluation by human introspection is indispensable. In order to involve such subjective evaluation to system evaluation, we should indicate concrete elements and the standards for evaluation. Through numbers of Rencon, we expect to find a point of agreement between the objective and subjective evaluations.

Rencon working group is going to prepare files for describing information of scores, their structures, and their performance data by human players. In order for these files to be disclosed on WWW, the group is designing an interface referring XML notations for music proposed so far. The interface and music information are presented to rendering engines to apply the Rencon.

3.2 Rencon keywords

The concour reflects problems in the real world. The ideas for Gros Rencon as music concours for systems described in 2.2 are to prevent possible problems listed below.

- system doping:

    If a system-generated performance is manually given betterment taking time (changing the offset time, etc.), it is not possible to evaluate the system's original ability. Manual betterment is the same as the sequencer programming in the third stage of the system (Figure 1). We call this artificial change in performance *system doping*.

- leakage and piracy:

    When information of a set music is *leaked* before the concour, rendering engines can be tuned for the set. If a system uses the same musical piece of a set music from learning performances or case performances, the generated perforamance can be more than the imitation —precisely the same performance as a human performance. Though this is not the *piracy* itself it is not the desirable situation which should be avoided.

- sight reading:

    At a concour, *sight reading*, to indicate a set music at the day, is a way to prevent system doping and leakage.

4 Future Plan

After heated discussions for a year, we came to a Rencon's long-term objective shown in Figure 2 (Hiraga, Hirata, and Katayose 2002). In a half century, performance rendered by a computer is improved to be the first winner of the real music concours, say Chopin concour.

From the system point of view, there are many interesting issues to be solved. Though Rencon's set music starts from piano pieces, we are going to extend them to many types of instruments where expressions are controlled by various information mostly in the continuous values. We will challenge the research of humanoid robot and try to integrate discrete and continuous musical information. In order to play Concerto as a soloist, the robot must have eyes to follow and understand a concudtor's move and ears to do orchestra performance.

Musicians and musicologists show their expectations to Rencon as follows:

- For composers to expressively perform their newly composed music to pass their intention in the music.

- For musicologists to confirm their hypothesis how a music theory is reflected on performance.

- For players to reflect how their performances are attractive.

- For music teachers to give many different ways of telling students to improve their musical skills.
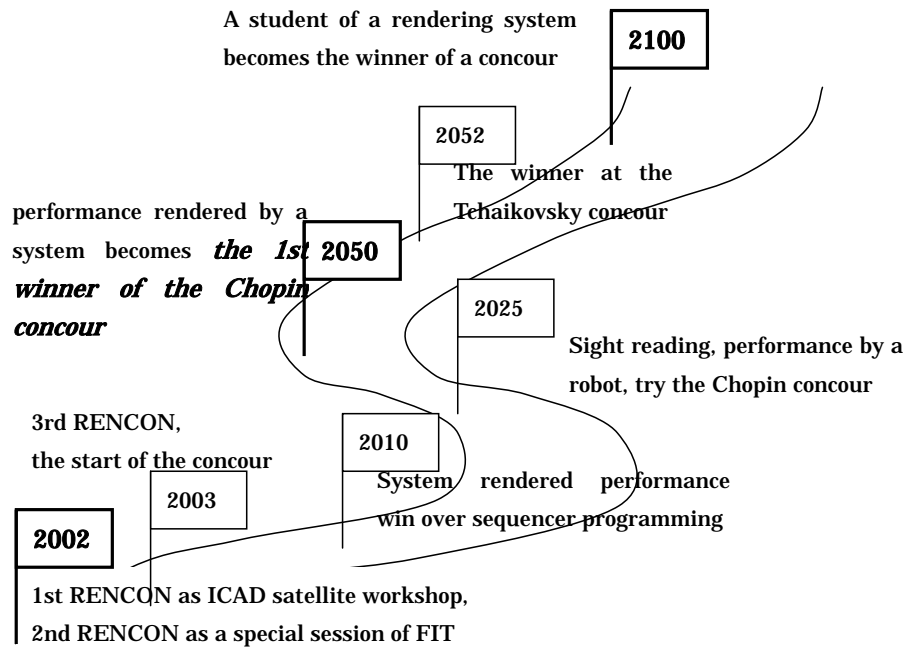
Figure 2: Rencon's century

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