Abstract—Visualization is one of the most attractive themes for us, teachers of educational institutes, to collaborate together with our students and colleagues during educational researches and cooperation with our professional/enterprise partners. This document describes some of examples we have performed together with my colleagues and then accomplished as a result by means of journal publication. Our interests have focused such themes that cover from e-Learning to Data mining. At the end of this document, our examples for visualization will be included as the references of our performances during these half decade years.

I. INTRODUCTION

Almost all the learners want to have good overview about their studies and their applications. Visualization, we understand from our experience, will be able to provide good overview with suitable abstraction and to demonstrate focused functionality even for the beginners in a relatively short period. In the case of designing e-Learning system, it is necessary to employ suitable and effective visualization approach for learners to comprehend specific topics entirely. Additionally, in the case of data mining and big data analysis, it is definitely necessary to utilize visualization techniques for the sake of users’ efficient understanding. This document will not only explain a few years’ history of our studies but also propose some kind of keywords for research triggers and hopefully hints for your ongoing projects.

II. PRACTICAL THEMES FOR VISUALIZATION

This section introduces practical research themes for visualization by means of description for our previous studies, such as e-Learning design, development of e-Healthcare system, our approach for Data mining and others.

A. e-Learning for Information Engineering

First of all, we will introduce our e-Learning system for Information Engineering education. This subsection includes the following three sub themes, such as e-Learning system for network study, scheduling algorithm and computer literacy.

1) e-Learning System for Network Study: Chiaki Kawanishi and we had developed e-Learning System for Network Study[3]. The aim of this system is to learn how to design small network topology with routers, hosts and their connection and to demonstrate how a packet transfers from host of source to one of destination based on Routing Information Table.

2) e-Learning System for CPU Scheduling Algorithm: Kei Takeichi, Kyohei Nishiyama, Koji Kagawa and we had developed e-Learning System for CPU Scheduling Algorithm[9][12]. The aim of these systems is to learn the characteristics and comparison of three typical scheduling algorithms: First-Come First-Served, The Shortest Processing Time First, and Round Robin/Time Sharing Algorithm.

3) e-Learning System for Computer Literacy/Architecture: Yoshio Moritoh, Kazuki Higashikakiuchi and we had developed e-Learning System for Computer Literacy/Architecture[2][11]. We have developed CPU simulators with Java and JavaScript for learners to understand how a computer works during utilization of our CPU simulators in a relatively short period. Especially, Shinya Hara of our Imai Laboratory, a master course student of Kagawa University, has finished developing Register-Transfer level CPU visual simulator with back trace function for learners to recognize micro-operation behavior of inner structure of CPU.

B. e-Healthcare System for University Students

It is very much useful to visualize the state of personal health data for each user’s health management. This subsection describes health screening system and e-Healthcare system in order to visualize its users’ health data.

1) Health Screening System for Personal Health Data: Eiichi Miyazaki, Hiroshi Kamano and I had designed and implemented an Automatic Health Screening System for reliable and speedup measurement of personal health data[6]. The aim of this health screening system to obtain personal health data such as blood pressure and others automatically to transfer them to the DataBase through user identification by IC Card.

2) e-Healthcare System for Health Management: Eiichi Miyazaki, Hiroshi Kamano and I had developed and managed an e-Healthcare System for ubiquitous and life-long health management[7]. Our e-Healthcare system can provide time-series of personal health data based on graph through Web
service with user identification by IC Card.

C. Data Mining for Visualization of Normally Unknown Relation

This subsection shows how to apply data mining approach into effective data calculation and determination to visualize normally unknown/hidden relation and phenomena.

1) Performance Evaluation of Line-sensor 3CCD Camera: Hirokazu Kawasaki and we had studied Performance Evaluation of Line-sensor 3CCD Camera and compared specialists determination for camera’s functionality with the results from Numerical Approach[4]. Usually, a certain specialist can detect problems of focused Line-sensor 3CCD camera’s functionality. With comparison between specialists determination and our numerical approach, it had been confirmed that the latter had obtained more efficient and smart remarks than the former.

2) Data Mining by Smartphone and Big Data Analysis for Drivers Subconscious Behavior: Hideto Kubota and we had performed data mining by smartphone and done data analysis for drivers subconscious behavior at the corner[10]. Smartphones are good devices to obtain several kinds of data so that such data obtained during car driving can be transferred to specified server through HTTP connection by means of our dedicated application software. Our data mining approach can perform supervised machine learning to analyze obtained data at the cornering in order to visualize driver’s behavior and characteristics.

3) Visualization for Hidden Relation between Published Documents and Message from Twitter: Masakazu Kyokane and we had studied visualization for normally hidden relation between published documents and message from Twitter by means of sentimental analysis[5]. After obtaining message from Twitter, each message is calculated and clustered by sentimental analysis for tweeting by our application. Relation between published documents and message with sentimental value can be statistically calculated in order to visualize normally hidden co-relation and phenomena.

D. Visualization for Collaborative Design

This subsection explains our example of visualization for collaborative design. We think collaborative design will be one of the powerful and successive strategies to acquire complementary methods and solutions effectively. The below examples are to visualize effectiveness of design collaboration.

1) Collaborative Design and its Evaluation through Kansei Engineering Approach: Masatoshi Imai and we had demonstrated Collaborative Design and its evaluation through Kansei Engineering approach in order to visualize its performance and effect for future users[1]. This is an example to utilize how to evaluate methodology for design collaboration with Kansei Engineering(namely, similar with Affective Engineering).

2) Reproductive Design Education based on Knowledge and Resource Discovery through SNS Community: Masatoshi Imai and I had confirmed and visualize Reproductive Design Education based on knowledge and resource discovery through SNS community in order to obtain its good performance[8]. This is an example to utilize SNS community for acquisition of applicative knowledge and reusable resource for design collaboration effectively and efficiently.

III. CONCLUSION

In this document, there have been some example for research themes of Visualization in order to realize practical solution for education of Information Engineering, Health Management, Data Mining and others. Description in this document may provide some kind of hints for your future studies and research challenging, we hope indeed.

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