Association des Doctorants du campus STIC

# Séminaires doctorants 9

23 janvier 2007

Actes édités par l'association des doctorants du campus STIC.

# Table of Contents

# Low Memory Cost Scan-Based Wavelet Transform for 3D Multiresolution Meshes

Anis Meftah

Laboratoire I3S, Université de Nice - Sophia Antipolis, France
mefteh@i3s.unice.fr

Meshes are a powerful tool to model complex 3D objects, thanks to their double geometrical and combinatory nature (positions of vertices and connectivity). Although many alternatives exist for surface modeling, meshes are omnipresent today and considerable efforts are made in developing the digital processing of geometry using primarily triangular meshes. The classical implementation of the wavelet transform requires the acquisition and the complete loading of the object in memory before its processing. Then, the problem of scan-based processing appears when compressing huge volumes of data using a minimum of memory resources. Indeed, a 3D mesh with a high degree of precision could have an enormous size, exceeding several million of points, which makes its processing impossible on a system with a limited memory size.

In this work we propose a scan-based coding method using a lifted butterfly filter. This method consists in carrying out a local processing of the object according to the considered 3D acquisition mode while forcing the memory cost to be minimal. The resulting wavelet coefficients are identical to the one obtained if the whole 3D object was stored in memory. Furthermore, experimental results show that the proposed method is very efficient in term of memory cost. It allows to save up to 99% of the memory required for a non scan-based implementation.

# HCI, Adaptation and Component-based Approach

Philippe Renevier

Laboratoire I3S, Université de Nice - Sophia Antipolis, France
Philippe.Renevier@unice.fr

Assistant professor for 2 years, my research area is part of Human Computer Interaction (HCI). HCI is a crossroad of many skills in computer science, in psychology and in ergonomy. An in-depth description of HCI is available on the web pages of the ACM's Special Interest Group on Computer-Human Interaction [1]. I have been studying HCI since 1998 at the CLIPS-IMAG labs. Currently, I am teaching at the Computer Science Department of Nice University and I am a member of the Rainbow team at the I3S lab.

To explain my work in a single sentence: I am working on semi-automatic software adaptation in order to provide dynamic programmable (and tangible) interfaces. In order to present my current work and purposes, I first describe my PhD contributions and the reason I why integrated the Rainbow team.

## 1 Mobile Collaborative Mixed Systems

My thesis [2] is part of software engineering and implementation of Human-Computer Interfaces. I studied Mobility, Groupware and Mixed Systems [3, 4]. In a fews words, "Mixed Systems" is a general term for Augmented Reality (*i.e.* to draw advantage of the computer capacities in the physical world), Augmented Virtuality (*i.e.* to draw advantage of the physical properties of tangible object in order to interact with the computer), *etc.* My goals were to define, to design (ergonomic and software) and to understand the use of Mobile Collaborative Mixed Systems (MCMS). Through my collaboration with psychologists-ergonomists, I defined a design notation in order to represent scenarios of the uses of the future system. This notation sums up characteristics of MCMS I identified. In particularly, scenarios are based on interaction techniques that may have to be developed. Although I described an architectural model for MCMS and developed three general interaction techniques on a platform dedicated to MCMS, my works required two specific sets of skills I am finding in the Rainbow team.

## 2 Ubiquous Computing

The interactions with computers I foresee are flexible interactions in ambient environments [5]. Computers will be anywhere at any time for users. Users will take the functionalities with integrated interfaces they need. By composing those functionalities, users will define dynamically their software. To reach such a self-adaptative degree, interactive and functionally elements must be based on an adaptation mechanism in a dynamic rune-time environment.

First, the component-based approach was the evident path to explore, and in particular WComp [6]. The WComp environment allows developers to quickly produce applications (RAD), to build dynamically-bounded applications and to reuse components (UPnP and WS encapsulation). This is the first requirement for my research goals.

Secondly, composing functional components is already known. But composing functional components with its interface is absolutely unknown. Composing components is linking it themselves. Those links are called software interaction (SI)[7]. By studying SI between functional components, we are looking for the means to assemble interaction components.

Actually, the adaptation of functional and interaction components can not only rely on SI. Consequently we are exploring the notion of profiles.

## References

1. http://acm.org/sigchi/.
2. Renevier, P.: Systèmes mixtes collaboratifs sur supports mobiles : conception et réalisation. PhD thesis, CLIPS labs, University Grenoble I, France (2004)
3. Wellner, P.: The digitaldesk calculator: tangible manipulation on a desk top display. In: UIST '91: Proceedings of the 4th annual ACM symposium on User interface software and technology. (1991) 27–33
4. Ishii, H., Ullmer, B.: Tangible bits: towards seamless interfaces between people, bits and atoms. In: CHI '97: Proceedings of the SIGCHI conference on Human factors in computing systems. (1997) 234–241
5. Weiser, M.: The computer for the twenty first century. Scientific American **265** (1991) 94–104
6. Cheung, D., Tigli, J.Y., Lavirotte, S., Riveill, M.: Wcomp: a multi-design approach for prototyping applications using heterogeneous resources. In: RSP'06: Seventeenth IEEE International Workshop on Rapid System Prototyping. (2006) 119–125
7. Blay-Fornarino, M., Charfi, A., Emsellem, D., Pinna-Dery, A.M., Riveill, M.: Software interactions. Journal of Object Technology **3** (2004) 161–180

## Notes

## Les séminaires doctorants

Les séminaires des doctorants STIC permettent aux futurs docteurs d'échanger leurs expériences dans leur travail de thèse, tant sur le plan scientifique que sur le plan professionnel et éducatif. Ces rencontres ont lieu mensuellement dans l'un des laboratoires STIC de Sophia Antipolis.

Un séminaire est l'occasion de trois à quatre interventions, dont une effectuée par un jeune permanent. Chaque intervention comporte un exposé technique d'une vingtaine de minutes et une période d'échanges et de retours d'expérience d'une dizaine de minutes.

Ces actes compilent les résumés en anglais des exposés techniques du séminaire doctorant du 23 janvier 2007.

## L'ADSTIC

L'ADSTIC est l'association des doctorants du campus sciences et techniques de l'information et de la communication de l'université de Nice Sophia Antipolis. Créée en 2004, l'ADSTIC est une association loi 1901.

Notre but essentiel est de faciliter les contacts entre les doctorants des différentes disciplines présentes sur le campus STIC, de les informer et de valoriser leur formation doctorale. L'ADSTIC se veut aussi un lien entre les doctorants passés, actuels et futurs...

Pour plus de renseignements, visitez notre site Internet : http://adstic.free.fr.