









**PROCEEDINGS** 

SOFTVIS 06 – ACM Symposium on Software Visualization

# Proceedings SOFTVIS 06

# **ACM Symposium on Software Visualization**

Brighton, United Kingdom September 04 – 05, 2006

### **Program Co-Chairs**

Margaret Burnett (Oregon State University, USA) Stephan Diehl (University Trier, Germany)

**Symposium Chair** 

Eileen Kraemer (The University of Georgia, USA)

**Proceedings Production Editor** 

Stephen N. Spencer, University of Washington

Sponsored by ACM SIGCHI, SIGGRAPH, SIGPLAN and SIGSOFT

#### The Association for Computing Machinery, Inc.

1515 Broadway New York, New York 10036

Copyright © 2006 by the Association for Computing Machinery, Inc (ACM). Permission to make digital or hard copies of portions of this work for personal or classroom use is granted without fee provided that the copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyright for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted.

To copy otherwise, to republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permission to republish from: Publications Department, ACM, Inc. Fax +1-212-869-0481 or e-mail permissions@acm.org.

For other copying of articles that carry a code at the bottom of the first or last page, copying is permitted provided that the percopy fee indicated in the code is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

#### **Notice to Past Authors of ACM-Published Articles**

ACM intends to create a complete electronic archive of all articles and/or other material previously published by ACM. If you have written a work that was previously published by ACM in any journal or conference proceedings prior to 1978, or any SIG newsletter at any time, and you do NOT want this work to appear in the ACM Digital Library, please inform permissions@acm.org, stating the title of the work, the author(s), and where and when published.

ACM ISBN:1-59593-464-2 Additional copies may be ordered prepaid from:

ACM Order Department Phone: 1-800-342-6626
P.O. Box 11405 (USA and Canada)
Church Street Station +1-212-626-0500
New York, NY 10286-1405 (All other countries)
Fax: +1-212-944-1318

E-mail: acmhelp@acm.org

ACM Order Number: 102062

Printed in the USA

# **Table of Contents**

Preface	6
Session 1	
The Clack Graphical Router: Visualizing Network Software	7
Narrative Algorithm Animation	17
Experimental Evaluation of Animated-Verifying Object Viewers for Java	27
Session 2	
Execution Patterns for Visualizing Web Services	37
Session 3	
Visualizing Live Software Systems in 3D	47
A Data-driven Graphical Toolkit for Software Visualization	57
Session 4	
Transparency, Holophrasting, and Automatic Layout Applied to Control Structures for Visual Dataflow Programming Languages	67
Taxonomy of Algorithm Animation Languages	77
Session 5	
Using Social Agents to Visualize Software Scenarios	87
Visual Exploration of Function Call Graphs for Feature Location in Complex Software Systems	95
Visualization of Areas of Interest in Software Architecture Diagrams	105
Multiscale and Multivariate Visualizations of Software Evolution	115

## **Table of Contents**

0		_
Se	ssion	ıfı

Visualizing Program Execution Using User Abstractions	125
Mondrian: An Agile Information Visualization Framework	135
Challenge Abstracts	
3D Visualisation of Code Structures in Java Software Systems	145
How Do Changes in Buggy Mozilla Files Propagate?	147
Poster Abstracts	
A Tool for Visualizing Schemas for Semistructured Data	149
A Transparent Interface to State-Space Search Programs	151
A Visualization Software for the Network Simplex Algorithm	153
Adding Procedures and Pointers to the ALVIS Algorithm Visualization Software: A Preliminary Design	155
Animation of Control Flow for Low-level Debugging	157
Drawing Activity Diagrams	159
Evaluating X3D For Use in Software Visualization	161
Evolutionary Layout of UML Class Diagrams	163
Evolutionary Layout: Preserving the Mental Map during the Development of Class Models	165
Icon Graphs: Visualizing the Evolution of Large Class Models	167
Intentional MPI Programming in a Visual Development Environment	169

## **Table of Contents**

### **Poster Abstracts**

Lightweight Visualizations for Inspecting Code Smells	171
Metaphor-Based Animation of OO Programs	173
Novel Algorithm Explanation Techniques for Improving Algorithm Teaching	175
Semantic Web Data Visualization with Graph Style Sheets  Emmanuel Pietriga	177
Softwarenaut: Cutting Edge Visualization	179
The Effect of Comparison Cueing and Exchange Motion on Comprehension of Program Visualizations	181
The Importance of Interactive Questioning Techniques in the Comprehension of Software Visualizations	183
Time Travelling Animated Program Executions	185
Towards Empirically Validated Software Architecture Visualization	187
TrustNeighborhoods in a Nutshell	189
Two-dimensional C++	191
Visual Snippet Editor	193
Visualized Adaptive Runtime Subsystems	195
WADEIn II: Adaptive Explanatory Visualization for Expressions Evaluation	197
Program Committee	
Cover Image Credits	
Author Index	203

#### **Preface**

Welcome to the third ACM Symposium on Software Visualization, held this year in Brighton, UK. In addition to our program of peer-reviewed technical papers, this year's event has a number of innovations, and we are looking forward to an interesting and action-packed event.

Our technical program consists of 14 papers, 25 interactive posters, and 2 "Challenge" presentations. Each paper was rigorously reviewed by three or more reviewers, resulting in acceptance of 36% of the submissions. We thank the members of our international Program Committee for their careful consideration and thoughtful discussions during the interactive program committee "meeting" conducted via e-mail. We also thank the additional external reviewers who contributed their expertise to this effort.

Our first innovation was with which conference to co-locate. SoftVis is a small and close-knit conference. This year, instead of co-locating as a satellite to a big conference, as in the first two years, we decided to try a different model: co-locating with other small, close-knit conferences with themes related to ours, namely the IEEE Symposium on Visual Languages and Human-Centric Computing, and the PPIG Workshop (Psychology of Programming Interest Group). We gathered as much data as we could about whether attendees at the other conferences might be attracted to SoftVis and vice versa, and after much deliberation, the SoftVis Steering Committee decided to go ahead with it. The VL/HCC Steering Committee and the PPIG Steering Committee were also in favor, and a vision was developed about how these three events could cooperate and contribute to each other.

A slightly overlapping schedule among the three conferences with some joint keynotes, a joint reception and joint tea breaks, a poster display intermingled with the joint reception, and a joint special event emerged. A unified registration process was developed. Discounts for joint registrations were figured out by all the General Chairs. John Howse, the General Chair of VL/HCC, graciously volunteered to manage the joint registration and logistics for all three events. We are very grateful to him and to all three Steering Committees for their efforts, good ideas, and willingness to be flexible.

Our second innovation was to include a SoftVis Challenge event. SoftVis has not included such an event before. Carsten Görg agreed to manage the event, and Margaret-Anne Storey s words of experience helped to give it direction. The SoftVis Challenge brings together researchers and practitioners interested in applying, comparing, and challenging their software visualization tools and approaches on software repositories for two common open source projects Mozilla (C,C++) and Eclipse (Java). We are looking forward to hearing what the selected Challenge software visualizations can reveal for these real-world projects.

Our third innovation came when the notion was put forward that a joint panel might be a good idea. This is a common device in conferences, but frankly, none of us three actually likes panels. So, we decided to instead try a special event that we thought could provide more direct benefits to attendees: a "How to Succeed at SoftVis/VLHCC Research" event. As a joint session with VL/HCC, this event will include senior researchers from both the SoftVis and VL/HCC communities giving their own tips on how to succeed at SoftVis and VL/HCC research: how to do it, how to write it, and how to transfer it effectively to industry. It will also include the audience itself, from whom additional tips that have worked for them will be shared with the others.

These innovations seem to be paying off. As of the time of this writing (two months before the event, and before the early registration deadline), the early SoftVis registrations have already surpassed last year's final total. Further, registrants are showing strong enthusiasm for this collection of conferences together: a full 50% of the SoftVis attendees also registered at VL/HCC, PPIG, or both.

Welcome to SoftVis, and to VL/HCC and PPIG as well. We hope you enjoy them and your stay in Brighton, and we look forward to your feedback on this year's innovations.

Margaret Burnett and Stephan Diehl, Program Co-Chairs Eileen Kraemer, General Chair