Evolutionary Visual Software Analytics - Presentation

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The development and maintenance of software systems involve a large number of complex processes (that could be extended for long periods of time) and people (e.g., programmers and project managers) who may be located in different countries. Therefore, people involved in these processes require tools to understand the systems, their components and the relationships established between these in time.

Understanding systems becomes particularly relevant when taking into account staff turnover in organizations and the frequent absence of technical system documentation. Therefore, a detailed study on the needs of programmers and project managers, a systematic mapping study, a detailed literature review and a survey on the use of visualization tools in the software industry and IT departments for system understanding were carried out in this thesis. Based on the results of the above activities, the definition and description on the application of Visual Analytics to Software Evolution (which was called Evolutionary Visual Software Analytics) was performed.

The validation of this process was conducted in three stages. In the first stage, an architecture was designed to verify that by following the Evolutionary Visual Software Analytics process description it is possible to design Visual Analytics tools to facilitate the understanding of the evolution of software systems. In the second stage, the architecture was validated by implementing Maleku (a tool based on this architecture). In the third stage, the usefulness and usability of Maleku in understanding the evolution of software systems was verified through various use cases, an usability study and a case study.

The final results of this study allowed us to prove that the application of Visual Analytics to Software Evolution, using the process described in this research, can contribute to software development and maintenance to facilitate the understanding of systems, and therefore the research questions of this thesis were answered and the specified objectives were met.

Keywords

Ph.D. Dissertation
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References


[Caserta 2011b] Pierre Caserta, Olivier Zendra and Damien Bodénès. 3D Hierarchical Edge bundles to visualize relations in a software city metaphor. In 6th IEEE International Workshop on Visualizing Software for Understanding and Analysis (VISSOFT), 2011, pages 1–8, 2011. 303


[Chen 2002] Chaomei Chen, Timothy Cribbin, Jasna Kuljis and Robert Macredie. Footprints of information foragers: behaviour semantics of


*TimeSeer: Scagnostics for High-Dimensional Time Series.* IEEE 
Transactions on Visualization and Computer Graphics, vol. 19, no. 3, 
pages 470–483, 2013. 49

Business Review, vol. 84, no. 1, pages 98–107, January 2006. 6

*ApiNATOMY: A novel toolkit for visualizing multiscale anatomy 
schematics with phenotype-related information.* Human Mutation, 
vol. 33, no. 5, pages 837–848, 2012. 48

Werner and Guilherme Horta Travassos. *Supporting risks in software 
project management.* Journal of Systems and Software, vol. 70, 
no. 1–2, pages 21 – 35, 2004. 10, 312

[de Souza 2007] Cleidson R. B. de Souza, Stephen Quirk, Erik Trainer and 
David F. Redmiles. *Supporting collaborative software development 
through the visualization of socio-technical dependencies.* In 
Proceedings of the 2007 International ACM Conference on Supporting 
ACM. 306

[Deelen 2007] Pieter Deelen, Frank van Ham, Cornelis Huizing and Huub 
ván de Wetering. *Visualization of Dynamic Program Aspects.* In 4th IEEE International Workshop on Visualizing Software for 
Understanding and Analysis, 2007. VISSOFT 2007., pages 39–46, 
2007. 305

*Constellation visualization: Augmenting program dependence with 
dynamic information.* In 6th IEEE International Workshop on 
Visualizing Software for Understanding and Analysis (VISSOFT), 
2011, pages 1–8, 2011. 306

[Diehl 2007] Stephan Diehl. Software visualization visualizing the structure, 
behaviour, and evolution of software. Springer Berlin Heidelberg New 
York, 2007. 11, 196, 310, 313

F. T. van Hijum and Jack van Wijk. *Comparison of Multiple Weighted


Bibliography

symposium on Software visualization, SOFTVIS ’10, pages 93–102, New York, NY, USA, 2010. ACM. 306


[Keim 2008a] Daniel Keim, Gennady Andrienko, Jean-Daniel Fekete, Carsten Görg, Jörn Kohlhammer and Guy Melancon. Visual Analytics:


[LaMantia 2008] Matthew J. LaMantia, Yuanfang Cai, Alan D. MacCormack and John Rusnak. Analyzing the Evolution of Large-Scale Software


Symposium on Software Testing and Analysis, ISSTA ’08, pages 131–142, New York, NY, USA, 2008. ACM. 43


[Migut 2011] Malgorzata Migut, Jan van Gemert and Marcel Worring. Interactive decision making using dissimilarity to visually represented


visualization: A systematic mapping study. Information and Software Technology, no. 0, pages –, 2013. 110, 303


IEEE Conference on Visual Analytics Science and Technology (VAST), pages 71 –79, oct. 2011. 9, 311


[Sun 2013b] GuoDao Sun, RongHua Liang, FuLi Wu and HuaMin Qu. A Web-based visual analytics system for real estate data. Science China Information Sciences, vol. 56, no. 5, pages 1–13, 2013. 49


[Weaver 2006] Chris Weaver, David Fyfe, Anthony Robinson, Deryck Holdsworth and Donna Peuquet. *Visual Analysis of Historic Hotel*


