

Yet Another Visualization of Repository Information

Xinrong Xie, Denys Poshyvanyk, Andrian Marcus

SEVERE Group @



Visualization of CVS Repository Information

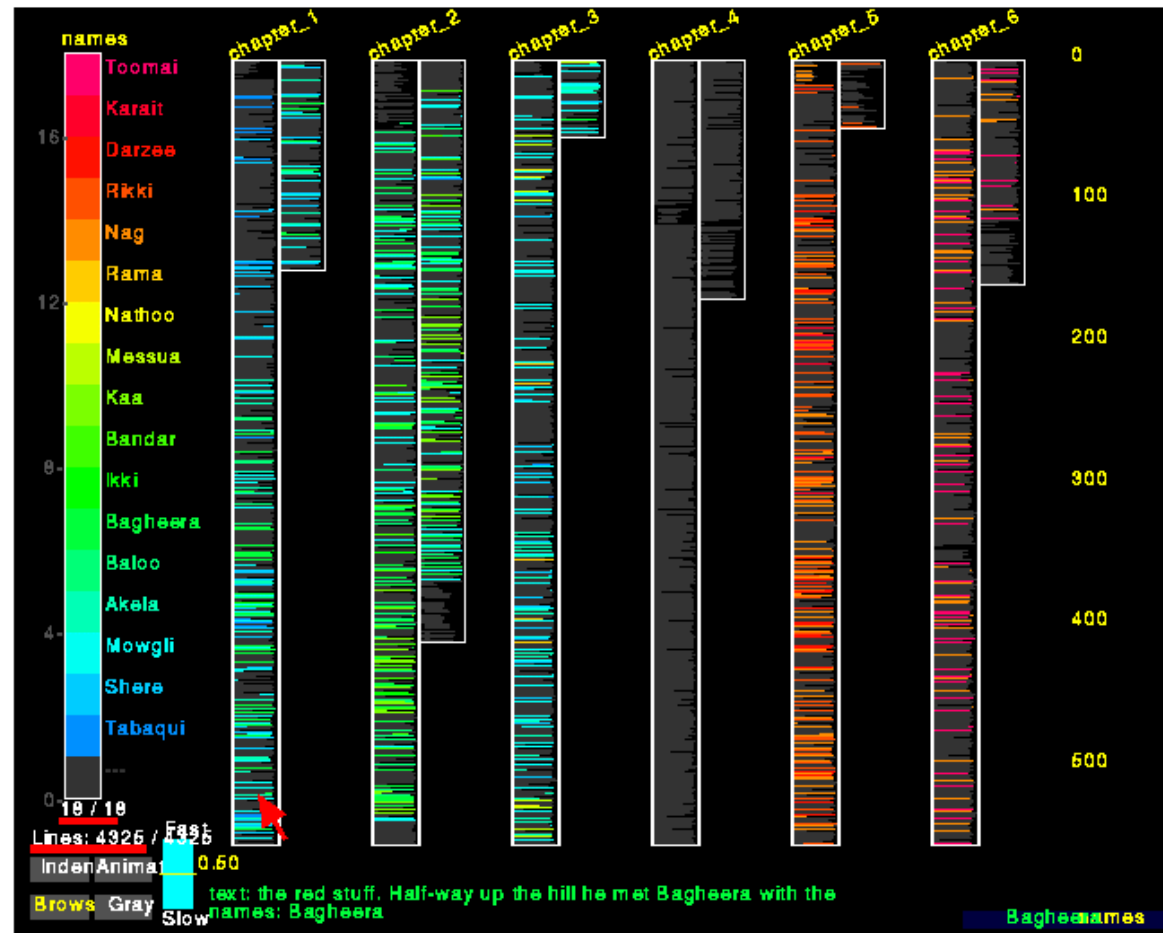
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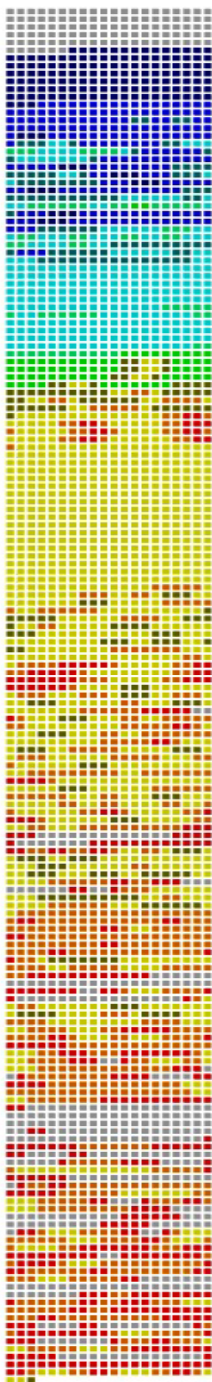
A little bit of history

1992 – SeeSoft

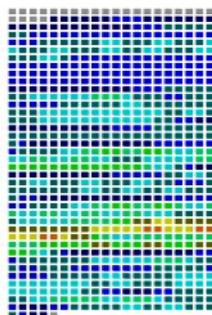


WCRE2006

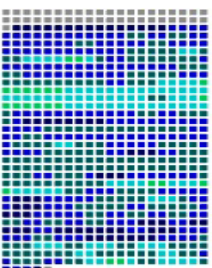
OEResultsPanel



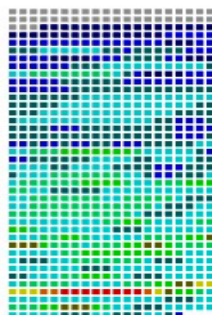
OESaveResults



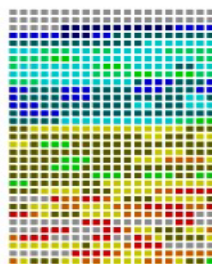
OESandaloneServlet



OEPGraph



OEMouseListener



OETreeCellRenderer



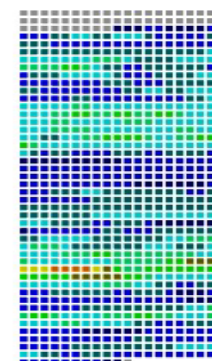
OETreeExpListener



OETreeModel



OntoCompare2Servlet



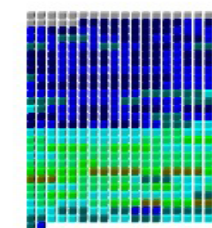
OntoCompareDetails



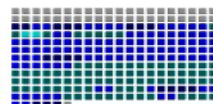
OETreeExpandListener



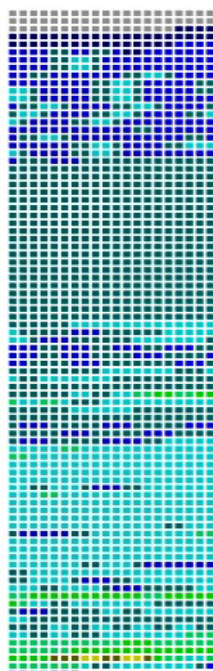
OETreeNode



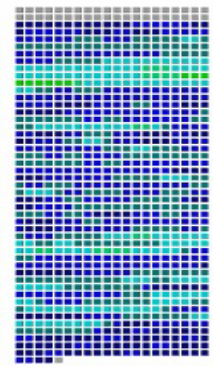
OEResultsServlet



OEInputFrame



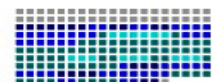
OntoCompare2



OntoConvertPageDisplay



OntoCompareEmail



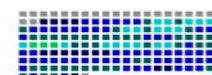
OntoCompareForm



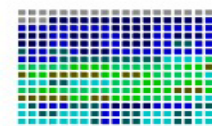
OntoInputPanel



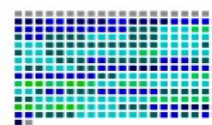
OntoCompareInput



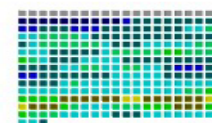
OntoConvertApp



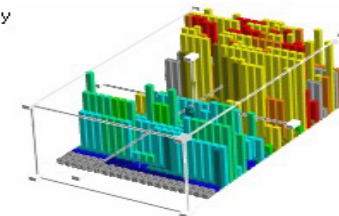
OntoCompareTree



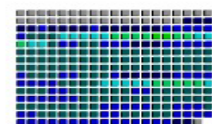
OntoCompare



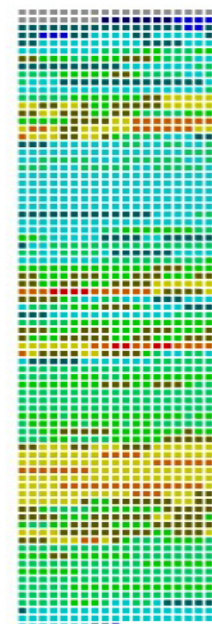
OntoConvertServeObject



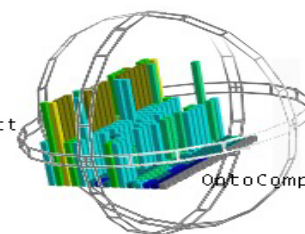
OntoConvertEmail



OntoConvert



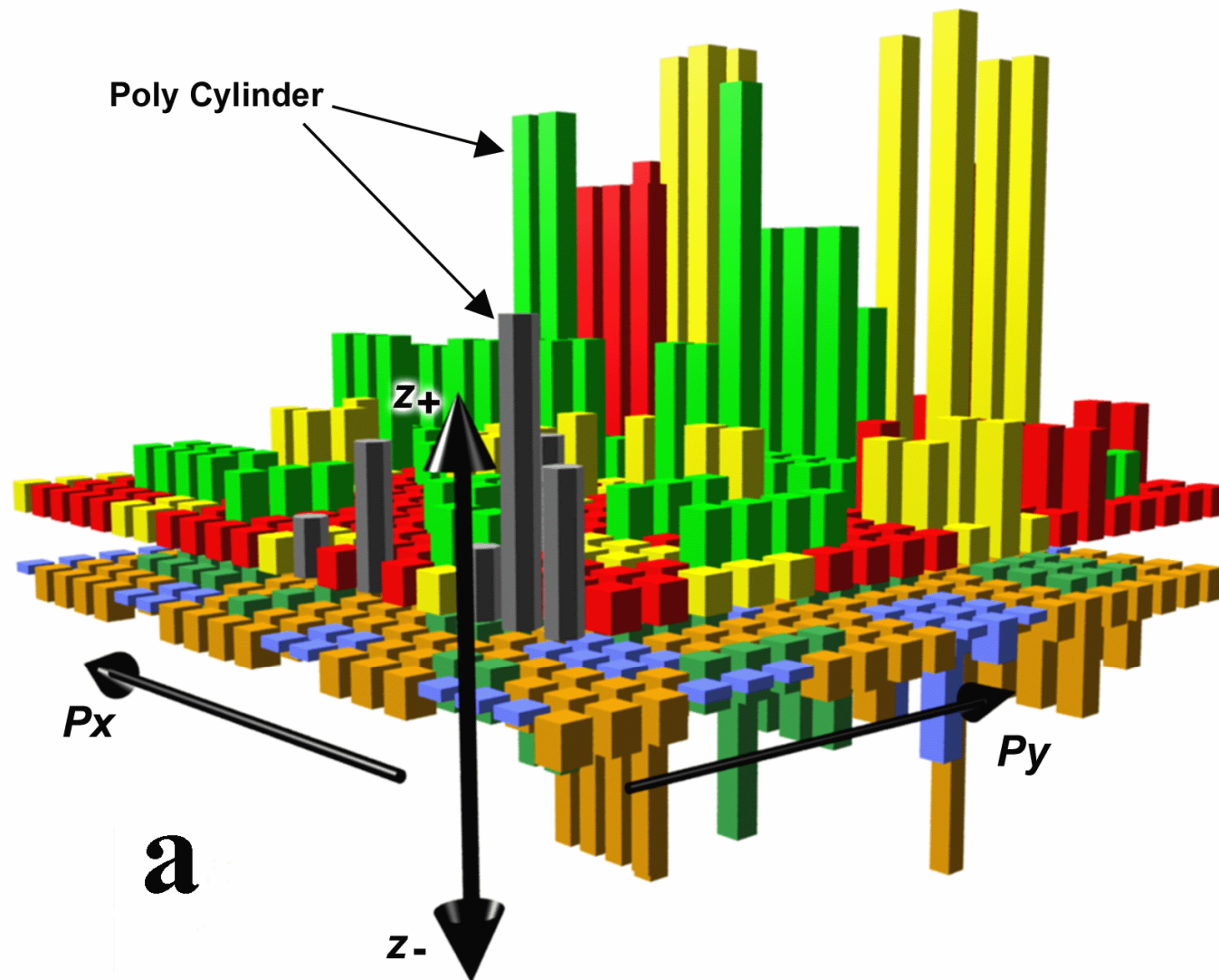
OEGraphLegend

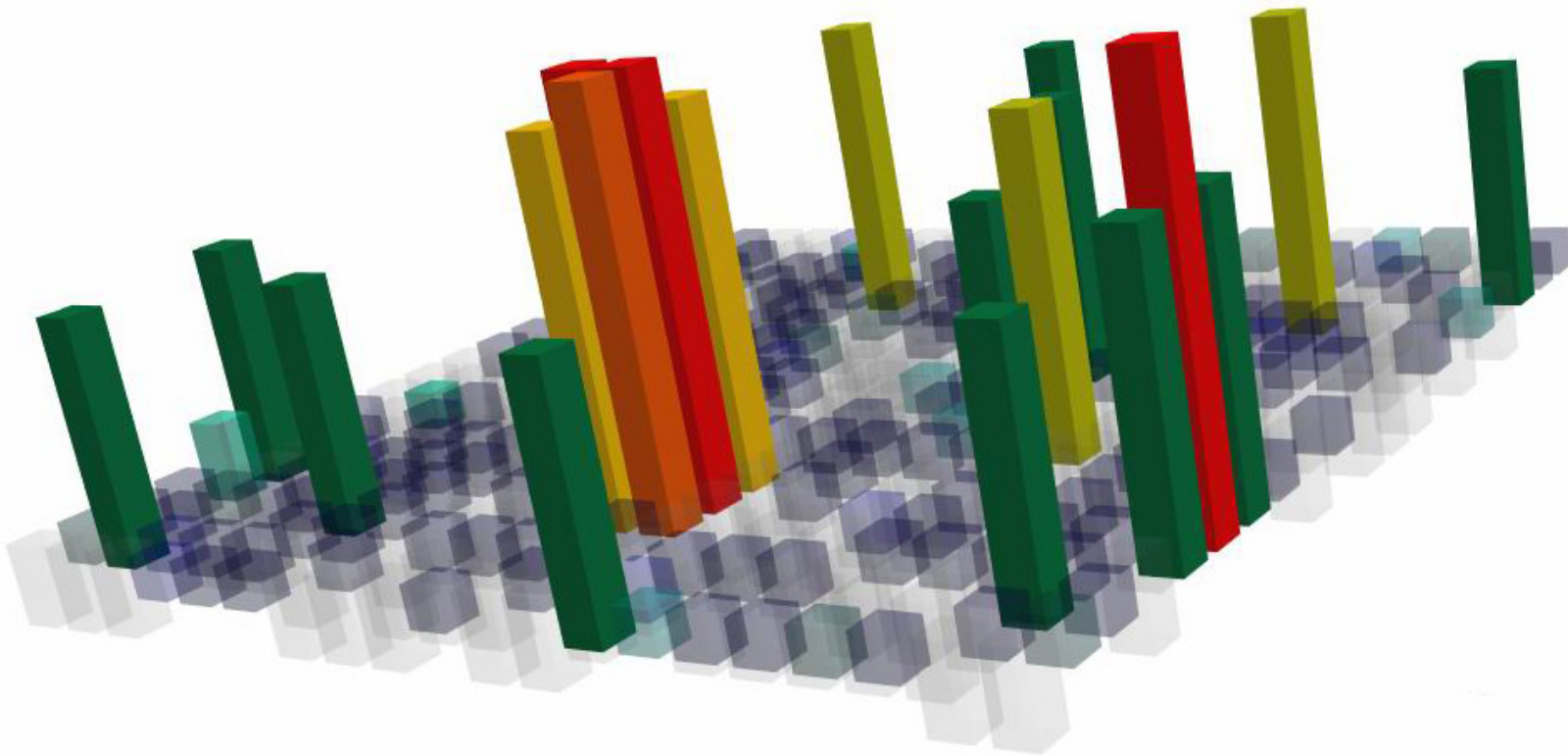


OntoCompare

Source Viewer 3D - sv3D

IWPC 2003
ICSE 2003





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sv3D principles

- Simple and abstract visual metaphors
- Ability to show a lot of data in one view
- Advanced user interaction
- Decouple from analysis
- Allow the user to define the mappings and the semantic - configurability - remember Jens Knodel on Tuesday

Mining software repositories

- Popular topic
- Important issues can be addressed with data from software repositories
- Lots of data being generated
- Need to be presented to the user. Users need to communicate the data to each other
 - Visualization - one solution

Motivation

- Comparison with Seesoft
- Ettore Merlo - IWPC 2003
- Harald Gall - IWPSE 2003
 - “ ... we plan to add more sophisticated visualization capability to enable viewing the identified relationships with 3-dimensional graphs (e.g. with **[17]** or **[22]**).”

CVS data + sv3D = cv3D

- CVS data extraction akin to Zimmerman's approach
 - No novelty or improvement here
- Visualization decoupled from data extraction
 - Other repository data can be used
- Definition of multiple views - configurability

Questions vs. tasks

1. Who has been working on the artifacts?
2. Which authors work on the same files?
3. What kind of modifications did the author make?
4. When was a modification made?
5. Why was a modification made?
6. What files do frequently change together (co-change)?
7. Which parts of the code are stable?
8. Which parts of the code change frequently?
9. How many authors worked on a release of a system?
10. How many files or lines are added or deleted?

Views

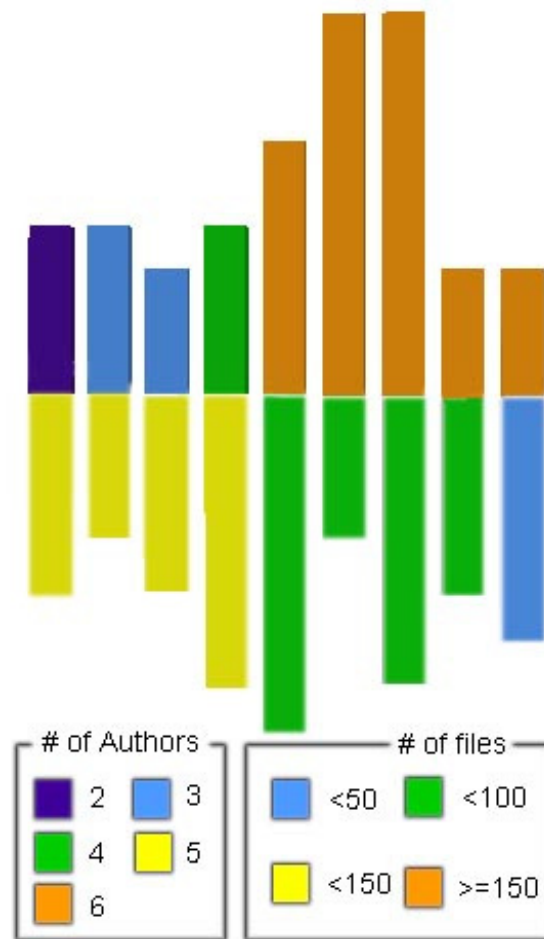
- Granularity-based views
 - System, file (class), function (method), line of text
- The view granularity is given by the lowest level artifact visualized
- Each view helps answer specific questions
- Multiple ways to create the views

Perspectives

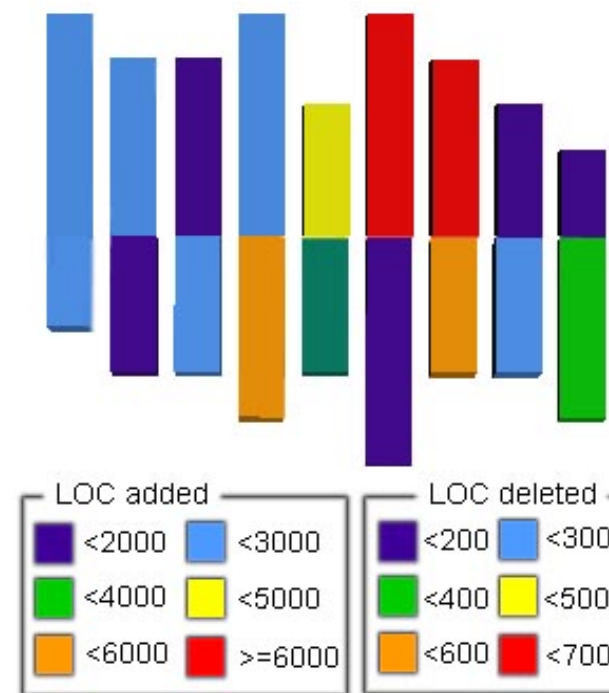
- CVS data is time dependent
- Version centric perspectives
 - One revision
 - A pair of revisions
 - Sequence of revisions

System level view

Q: 9-10



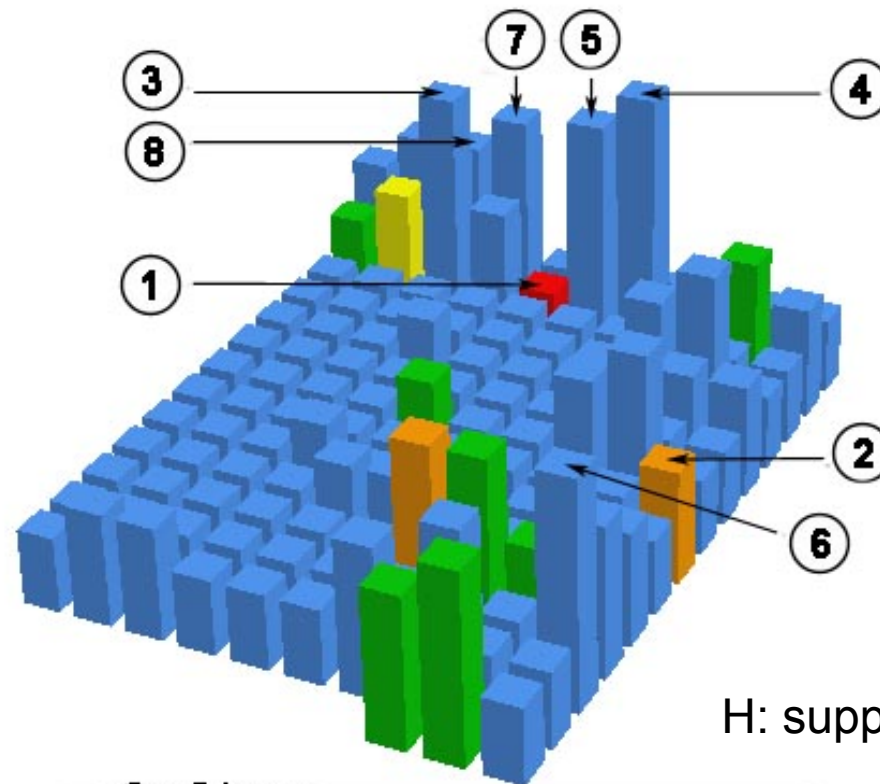
H – LOC added
D – LOC deletedx10



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File/class level view

Q: 1, 2, 4-8

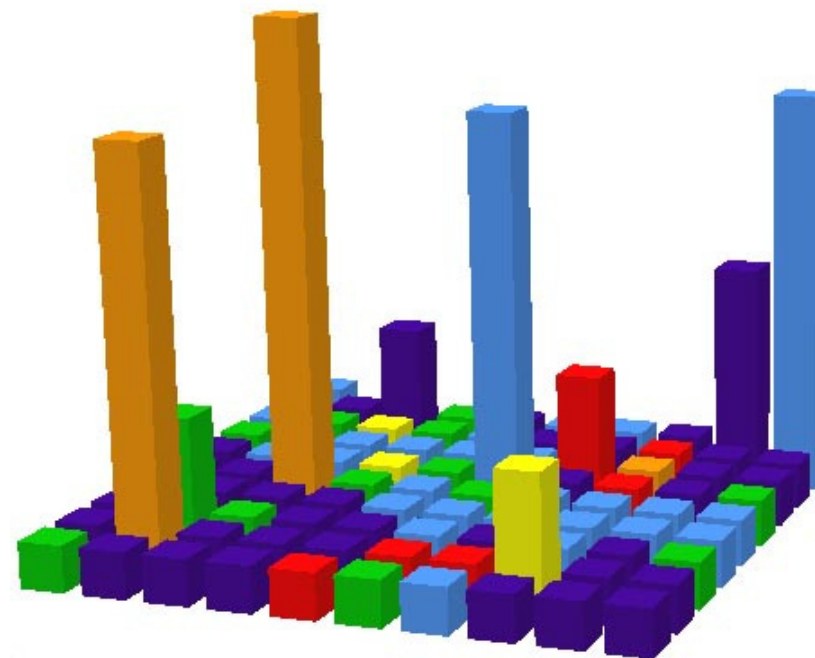


H: support for co-change



Function level view

Q: 7-8

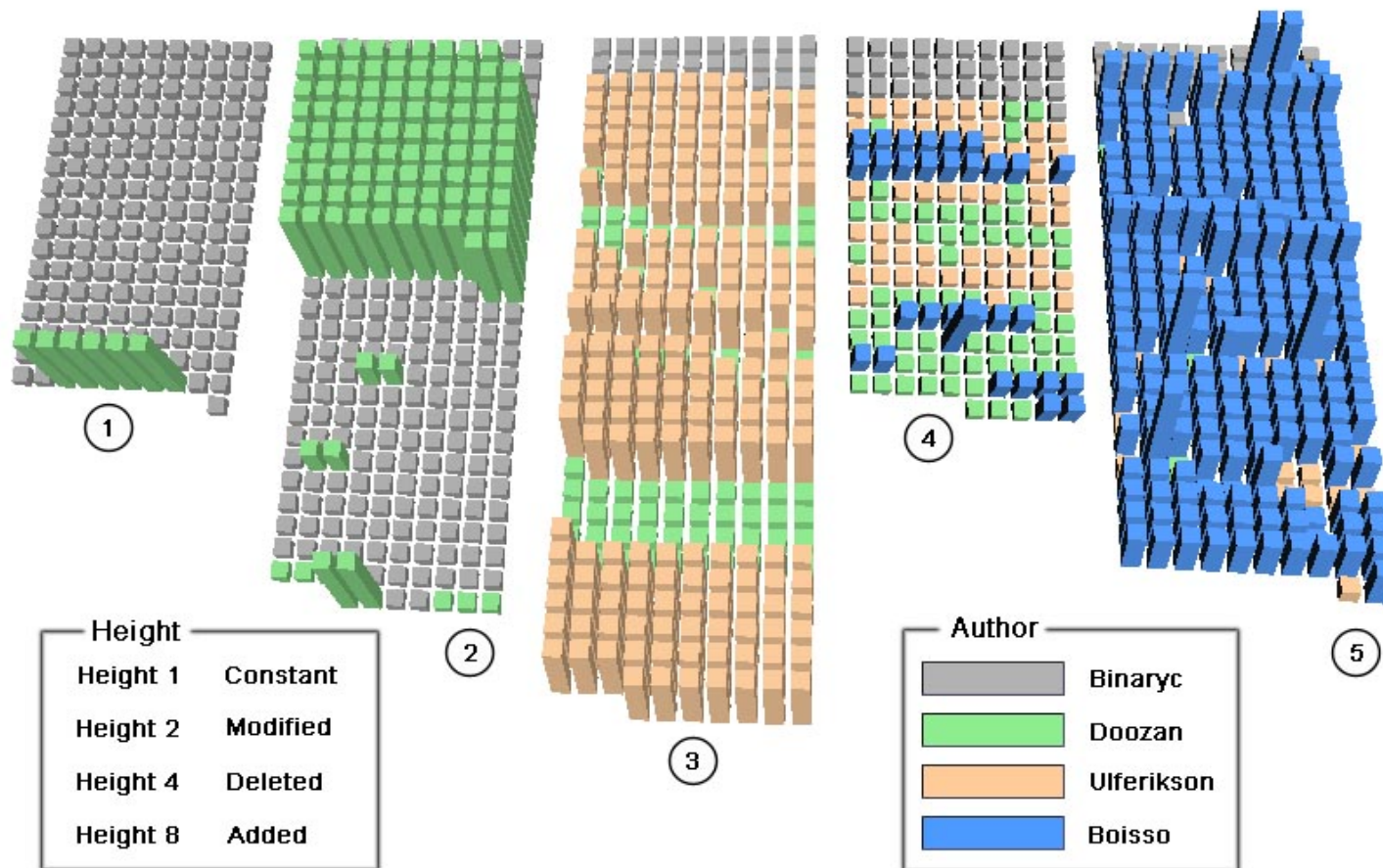


H: #of LOC changed from v1.114 to v1.115

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Line level view

Q: 3-5, 7, 8



WCRE2006

Evaluation

- Usage scenarios (example)
- Exploratory study?
- Case study?

Comparison

Views	Questions	Visual Metaphors	Tool	Mappings and data represented
System	10	Bar, Data Sheet	ADV	# of lines changed
	10	Chart	EVC	# of programs added/deleted
	10	Matrix	JRX	Area of bubble – number of changes
	9, 10	Bar	CV3	
File/ Class	1,2,7,8	Fractal	FRF	Size - # submissions per author
	1,3,4,5, 7,8,10	Graph, Text Nested Graph	XIC	Color – author name; LOC in text; Position of node – ordered by last commit date; CVS comments; Size of node - # of changes
	3,7,8	Bar	JRX	Percentage of bar - # of type of modification
	4	Matrix	JRX	Show the type of change and time in Matrix
	6	Table	ROS	Show the sorted co-change files in table
	6	Graph	CCV	Color – subsystem name, File – filled circles
	7,8	Matrix	EVM	# attributes – width of node; # methods – height of node
	4,7,8	DTF	DTF	color – # of revisions/bugs for period of time
	10	Chart	CHA	Percentage of bar - # of type of modification
	1,2,4-8,10	Bar	CV3	
Function/ Method	3,7,8	Bar	JRX	Percentage of bar - # of type of modification
	7,8	Bar	CV3	
Line	3,4,5,7,8	Text, Tooltip, Nested Graph	XIC	Show lines of source code in text; Color – time; Shows CVS comments and documentation; Size of node - # of changes
	3,7,8	PixelMap	SEE AUG	Color – author last submitted; Color – age of code
	3	PixelMap	CSS	Color – change status
	3,4,5,7,8	Bar	CV3	

Conclusions and future work

- Multiple views and combination with perspectives helps in answering more questions
- User or usability studies?
 - sv3D already was subject of usability studies for other data/task (IWPC 2005)
 - Does it worth repeating the studies?

Acknowledgements

- Contributors to sv3d:
 - Louis Feng
 - Jonathan Maletic
 - Andrey Sergeyev