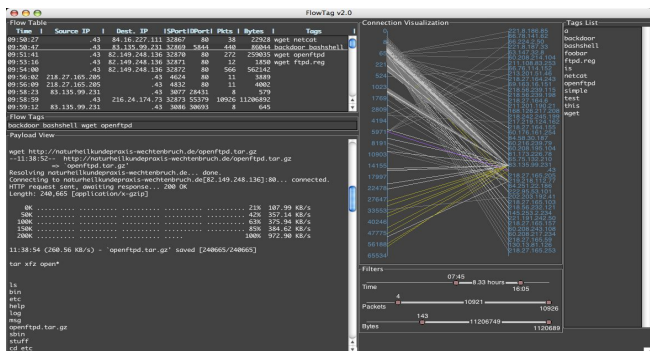


# Leveraging Interaction History for Intelligent Configuration of Multiple Coordinated Views in Visualization Tools

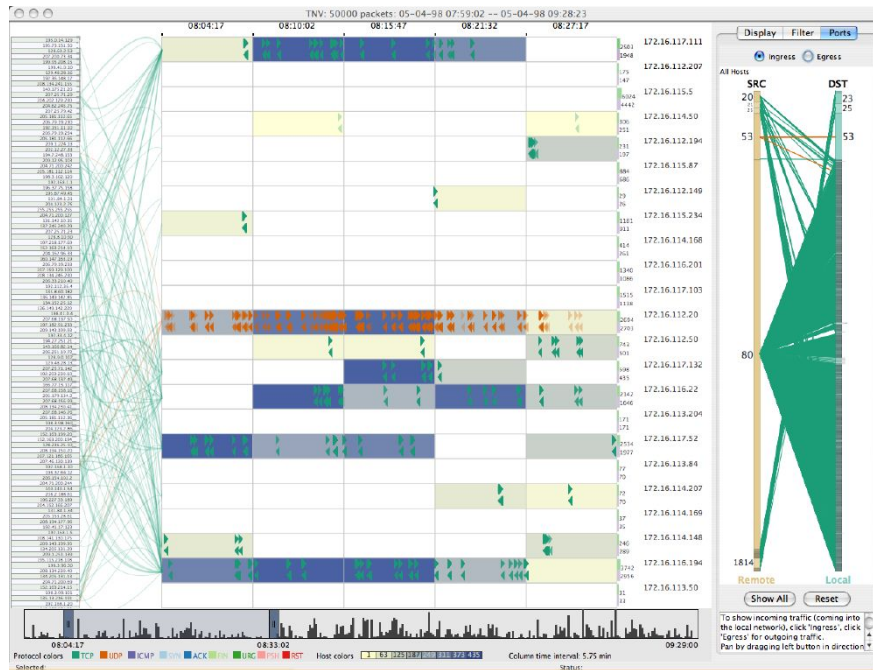
Andrew Pachuilu, Eric D. Ragan, John R. Goodall



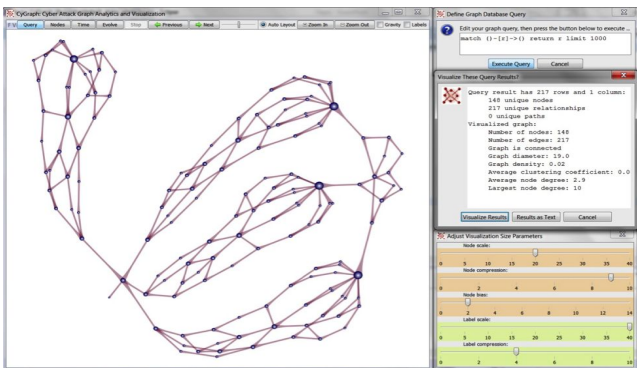
# Multiple Coordinated Views for Analysis of Network Traffic



FlowTag: Lee, Christopher P., and John A. Copeland.



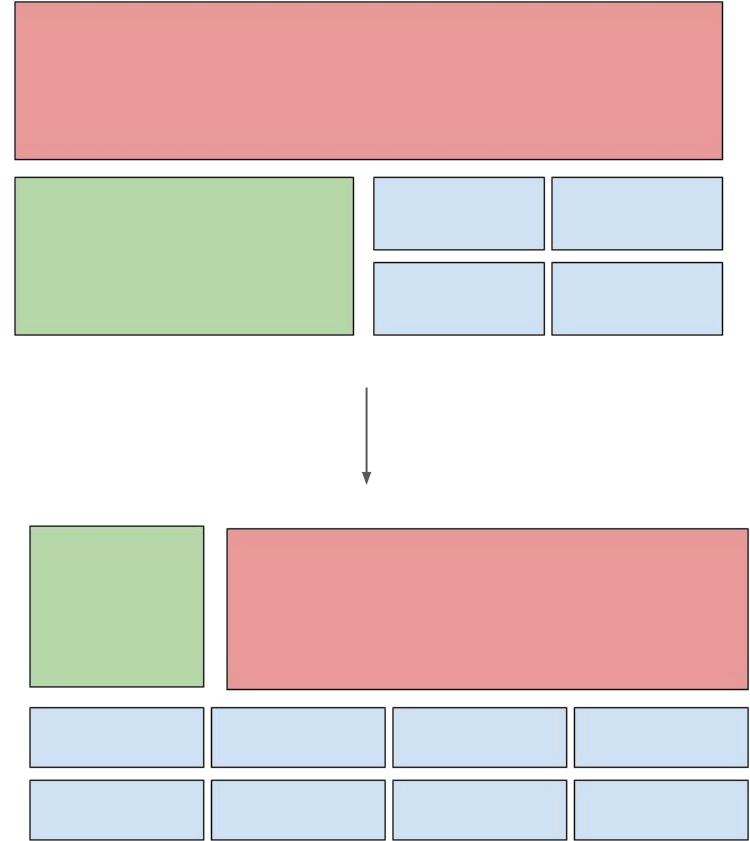
TNV: Goodall, John R., et al.



CyGraph: Noel, S., et al.

Various alterations that can be done to a multiple coordinated view

**Automating** analysis and design process could save on time spent during these tasks



# Intelligent configuration pipeline

1. Initial 'seed' visualization



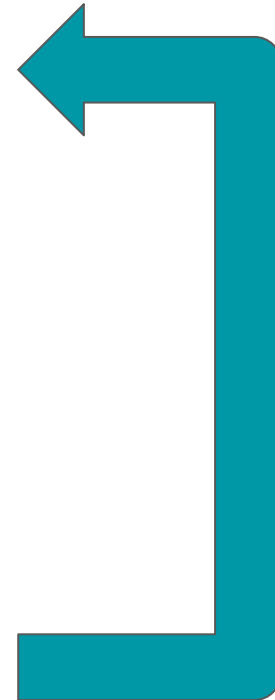
2. Collection of user interaction logs, eye tracking, and user surveys



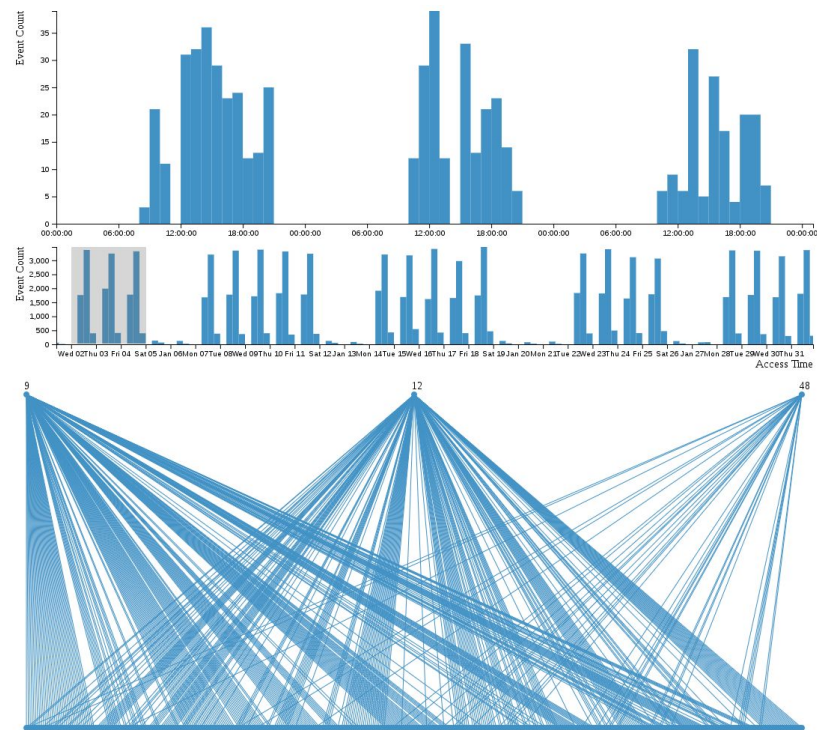
3. Application of quality metrics, machine learning, and visualization guidelines



4. Creation of reconfigured visualization



# Current work



Wednesday 2008-01-02T11:31

Day:  Hour:  Minute:

0-0	0-1	1-2	1-3	2-4	2-5	3-6	3-7	4-8	4-9	5-10	5-11
8-12	6-13	7-14	7-15	8-16	8-17	9-18	9-19	10-20	10-21	11-22	11-23
12-24	12-25	13-26	13-27	14-28	14-29	15-30	15-31	16-32	16-33	17-34	17-35
18-36	18-37	19-38	19-39	20-40	20-41	21-42	21-43	22-44	22-45	23-46	23-47
24-48	24-49	25-50	25-51	26-52	26-53	27-54	27-55	28-56	28-57	29-58	29-59

☐ no prox log ☐ prox-in-building OR prox-out-classified ☐ prox-in-classified

**Prox Info**  
Employees are REQUIRED to card into and out of the classified area. Though they may piggyback into the building. No logs are kept of employees leaving.

**Socket Info**  
25 Used for Simple Mail Transfer Protocol (SMTP). Generally for relaying emails.  
80 Used for Hypertext Transfer Protocol (HTTP). Generally used for web pages.  
8080 Popular alternative to port 80 for offering web services. Above the restricted well known service port range (ports 1-1023)

Access Time	Src IP	Dest IP	Socket	Req Size	Resp Size
2008-01-02T08:51:19-06:00	37.170.100.9	37.170.100.200	80	4363	44564
2008-01-02T08:51:54-06:00	37.170.100.9	100.70.20.78	80	34980	51597
2008-01-02T08:57:54-06:00	37.170.100.9	101.22.63.183	80	105230	35152
2008-01-02T09:07:12-06:00	37.170.100.9	107.147.135.167	80	33637	66962
2008-01-02T09:13:13-06:00	37.170.100.9	37.83.233.66	80	144713	105068
2008-01-02T09:13:14-06:00	37.170.100.9	107.174.100.157	80	44993	797224
2008-01-02T09:13:59-06:00	37.170.100.9	103.28.30.46	80	23546	42560
2008-01-02T09:14:32-06:00	37.170.100.9	37.254.15.9	80	53130	18536
2008-01-02T09:15:08-06:00	37.170.100.9	37.170.30.250	25	60912	40513
2008-01-02T09:15:22-06:00	37.170.100.9	37.170.30.250	25	52534	1280678
2008-01-02T09:17:11-06:00	37.170.100.9	102.166.83.130	80	4245	824395
2008-01-02T09:17:17-06:00	37.170.100.9	37.170.30.250	25	289444	41923
2008-01-02T09:17:35-06:00	37.170.100.9	107.225.135.159	80	45452	114306
2008-01-02T09:18:31-06:00	37.170.100.9	37.254.15.9	80	35158	343660
2008-01-02T09:23:18-06:00	37.170.100.9	37.170.30.250	25	66057	847613
2008-01-02T09:23:52-06:00	37.170.100.9	37.183.99.54	80	57513	222371

Page 0 of 38 || 615 results

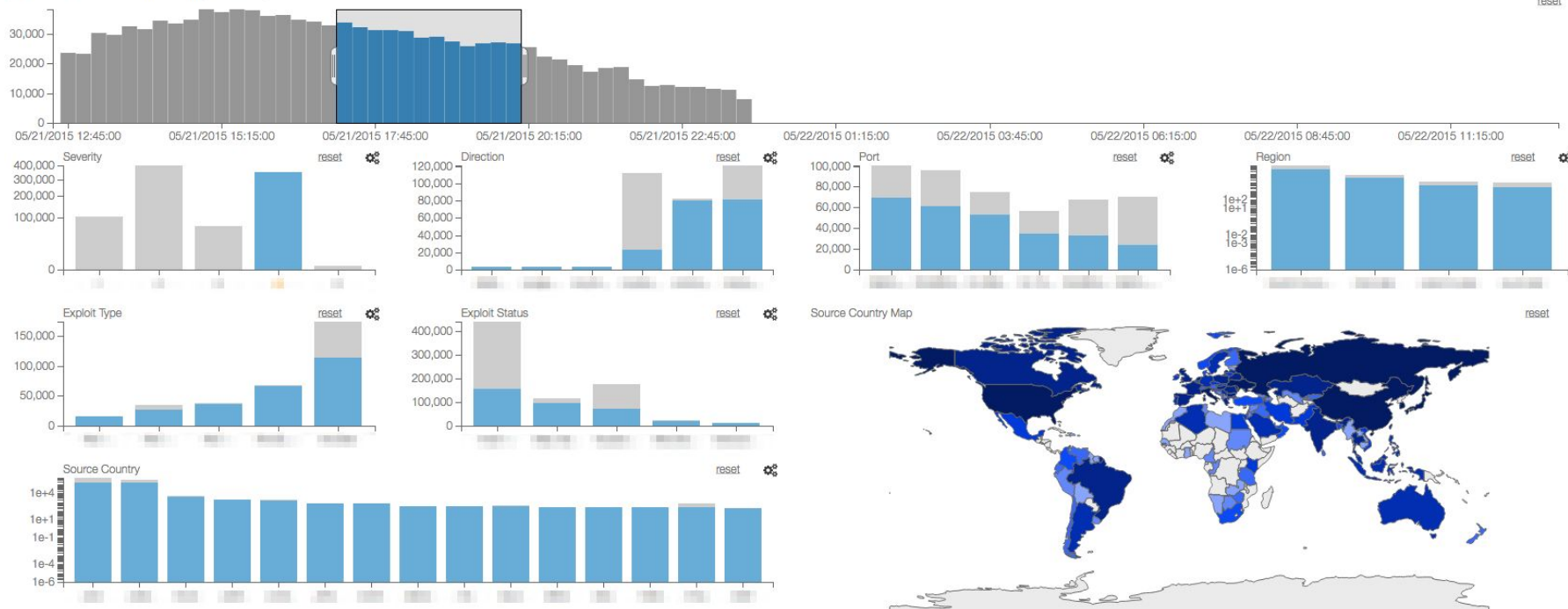
[PREVIOUS](#) [NEXT](#)

User test application for VAST 2009 MC1 dataset

# Current work

Alerts 05/21/2015 12:45:00 - 05/22/2015 12:45:00 | Interval: 15m

1 Year 3 Months 30 Days 7 Days 24 Hours



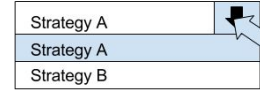
Application to explore IDS data

# Benefits of an automated, intelligent configuration process

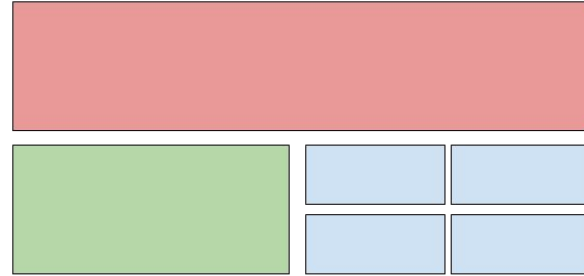
Improving visual layout

Mapping layouts to strategies

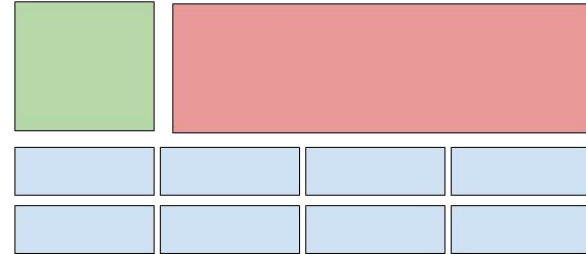
Creation of prediction models



Layout for Strategy B



Layout for Strategy A

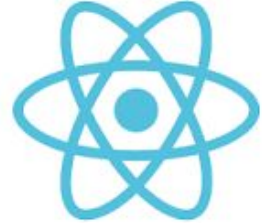


## Ongoing work

Creation of a framework to support automation of configuring new visualizations.

Analysis of data collected from user study to formulate useful metrics for the intelligent configuration.

# Creation of visualizations to understand user provenance of visualizations changing overtime





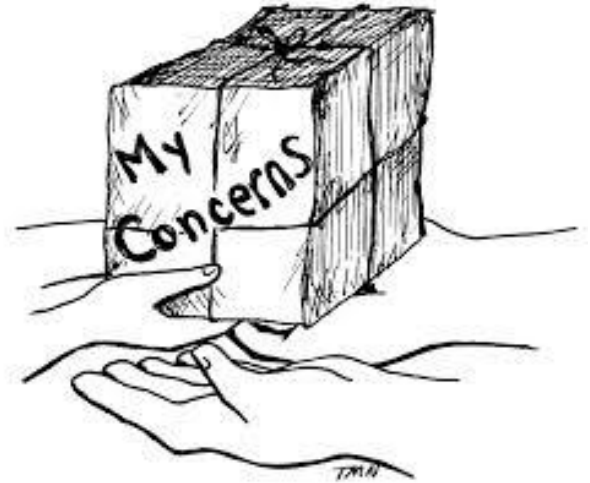
# Concerns and Challenges

When do we halt within the pipeline?

What logged user interaction data will be useful for the process?

Which machine learning techniques could prove useful for making sense of logs?

How to create visualization for analyzing the effectiveness of the framework itself?



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Oak Ridge National Laboratory



# Leveraging Interaction History for Intelligent Configuration of Multiple Coordinated Views in Visualization Tools

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