Towards Visual Analytics for Web Security Data

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MOTIVATION

Studying web security

Large-scale data collection: existing solutions
(millions of websites, distributed crawls)
⇳
Analysis tools: no comprehensive solutions
(ad hoc approaches, duplicated efforts)

Visual analytics [2]

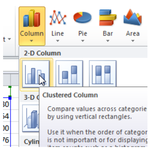
› Visualization: leverage processing power of human perception
› Interaction: encourage data exploration

\+ Analyze data & get insights › more **accurately** › more **efficiently** › on a **larger scale**
− Security analysts: unfamiliar → reluctant to adopt visualizations [1]

Goal: create tailored solution that › addresses the challenges in analyzing web security data
› facilitates visual exploration for security analysts

CHALLENGES

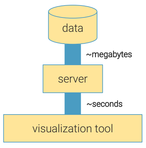
Separation of data and visualization



MySQL
mongoDB.
splunk>

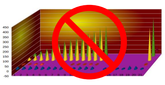
› Difficult to create visualization › Heterogeneous data

Scalability



› Data processing › Visual representation

Exploration



› Overview → details › Avoid misrepresentation

Web security data

Alexa MAXMIND PhishTank VirusTotal TREND MICRO

› Specific types/structures › Public data sources

DESIGN

Data abstraction

› Add context to data
› Transform data into standard format

Aggregation

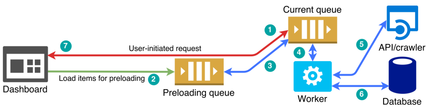
› By default & early on
› On structures in web: e.g. IP → AS

Interactive visualization

› Automated creation
› Multiple linked charts

Integration with public and collected data

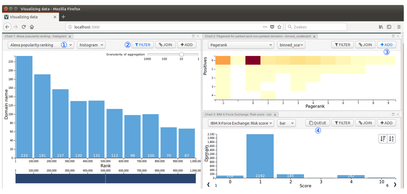
› Background data preloading
  › Public APIs › Web crawlers (e.g. DNetCrawl)
› Explore & combine interactively



CONCLUSION & FUTURE WORK

Visual analytics: beneficial to web security, if challenges are addressed

› Prototype implementation of design
› To improve: data access + analytics
› Future: release to researchers/analysts



REFERENCES

1. Fink et al., *Visualizing cyber security: Usable workspaces*. Proc. VizSec, pp. 45-56, 2009.
2. Thomas and Cook, *Illuminating the Path: The Research and Development Agenda for Visual Analytics*, 2005.

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