Graphameleon

Relational Learning and Anomaly Detection on Web Navigation Traces Captured as Knowledge Graphs

Resource @ TheWebConf 2024

Lionel Tailhardat, Benjamin Stach, Yoan Chabot, Raphaël Troncy

Orange & EURECOM

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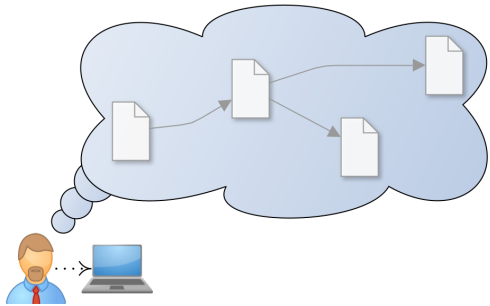
Context and Motivations: from Web Navigation to Traces Analysis



Scenario	Web navigation session
Browsing	General search loop scheme
Traces analysis	Persona dependent

Web user	Green deal, privacy
Platform eng.	Resource allocation, performance
Security analyst	Malicious activity detection

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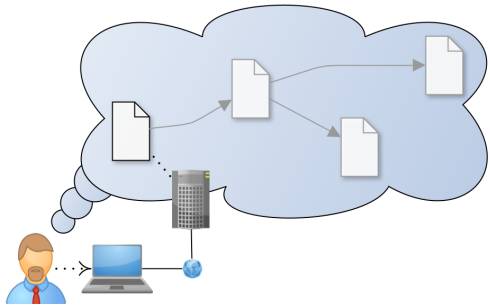

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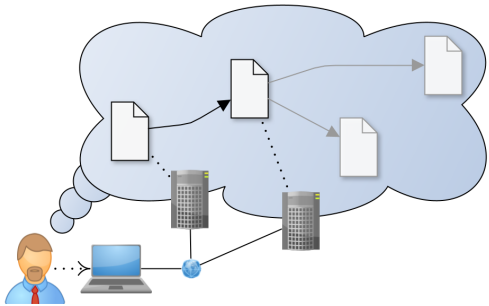

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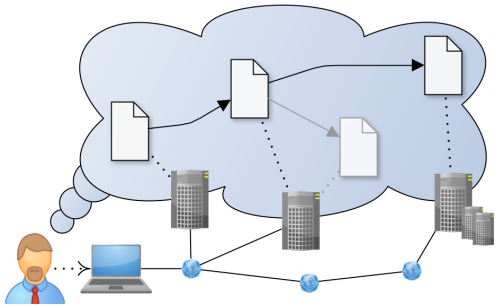

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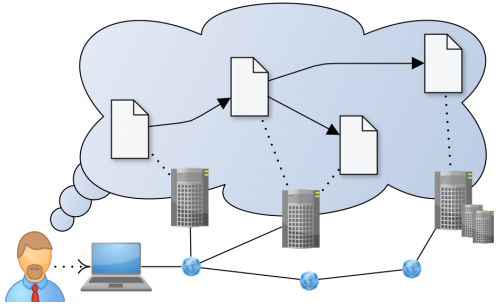

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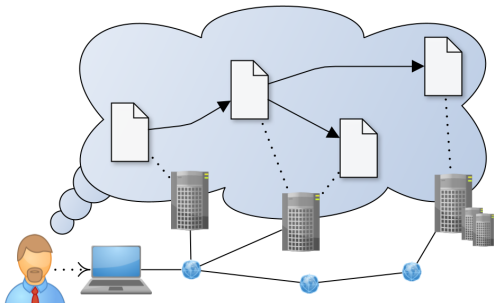

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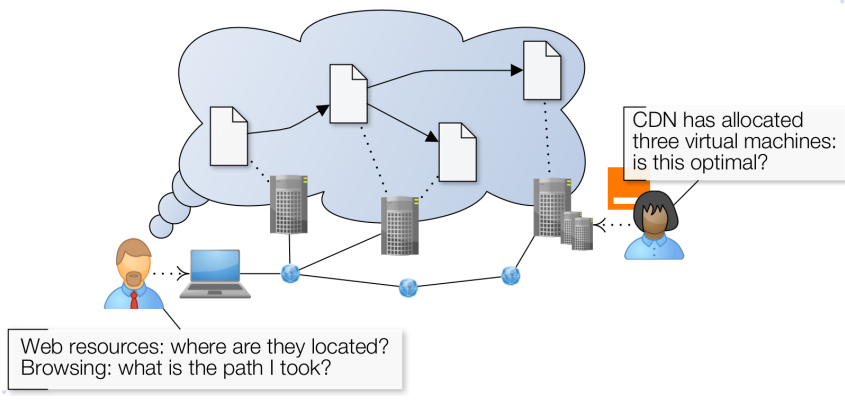

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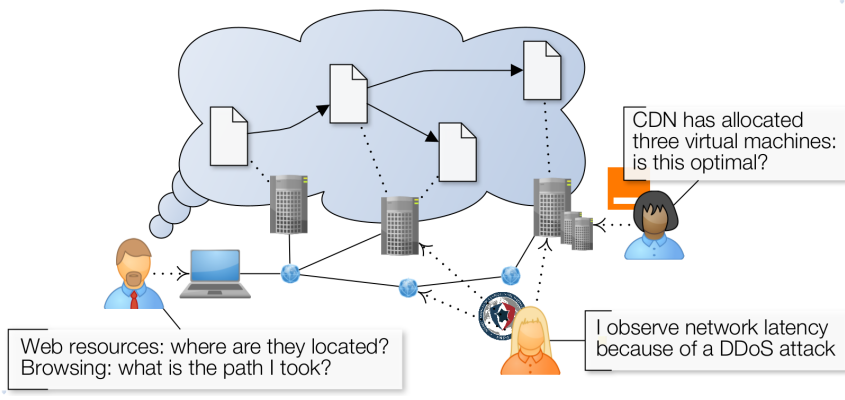

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Contextualizing User Actions within the Network Topology?

Web navigation traces What knowledge do traces provide about the structure and dynamics of the network in relation to user activities?

Behavioral model How can we learn a model that takes into account both user activities and network structure?

Challenges

1. Data collection of network and user actions data
   - Encrypted network traffic
   - Private application logs
   - Improper formatting of the data
2. Knowledge representation and reasoning
   - Non obvious cause or purpose of an activity in traces
   - Multiple levels of interpretation of an activity
   - Expert knowledge useful for interpretation stored in third party knowledge bases

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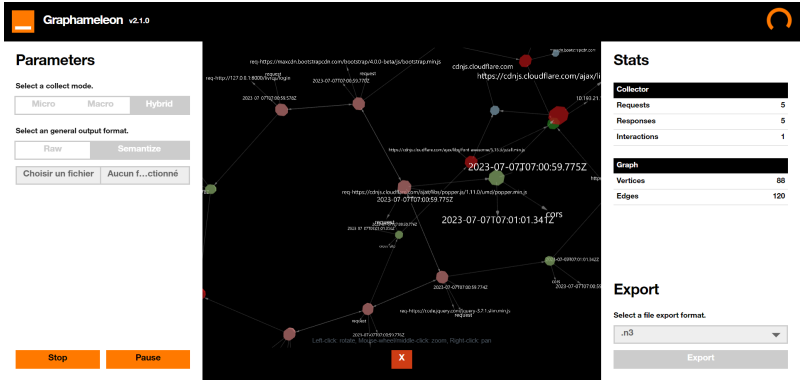
The Graphameleon Web extension



Traces Live capture at the browser level of...

- Network requests
- User interactions

Output RDF Knowledge Graph using the UCO ontology

Experiments
- Website complexity clustering
- Navigation trace classification

Applications
- Web cartography
- Network behavior analytics
- Anomaly detection

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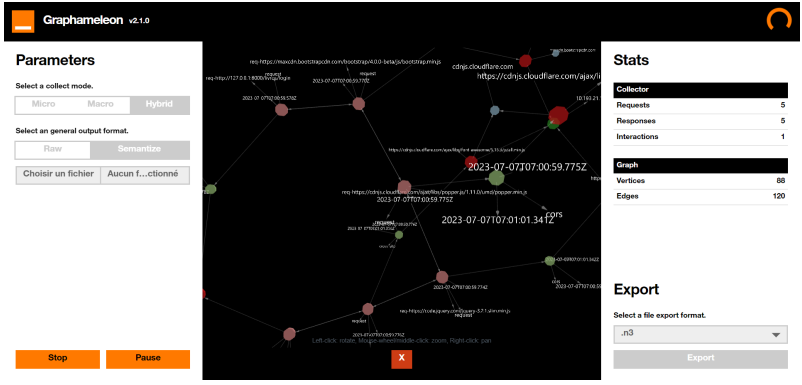

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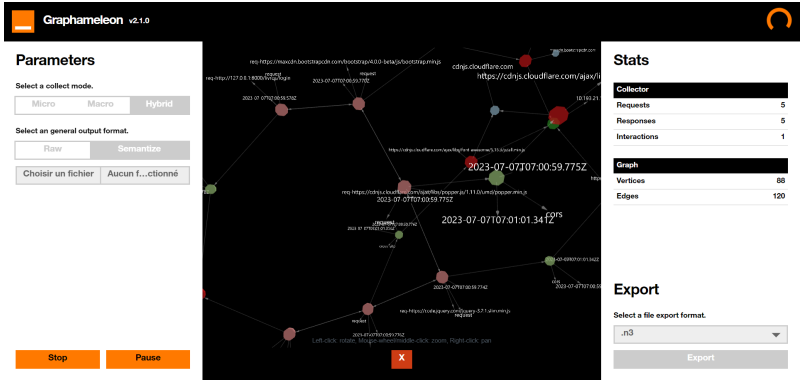

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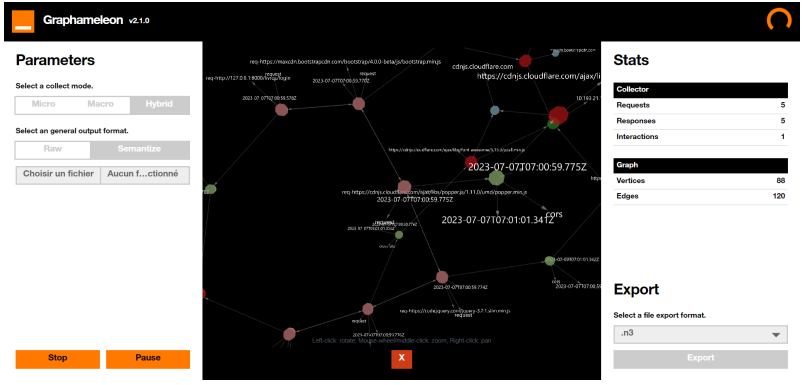

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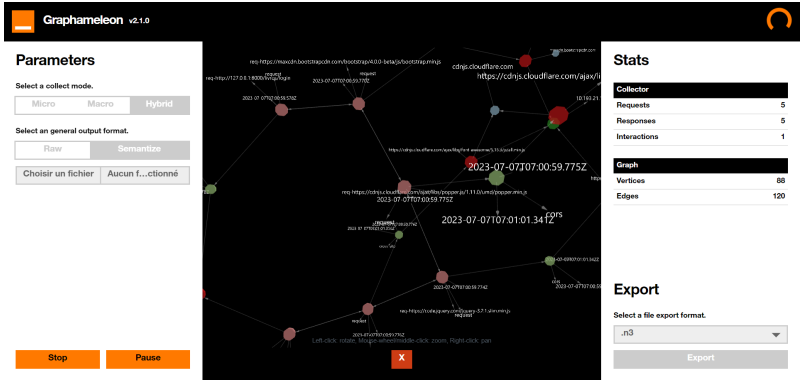

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Paper

Lionel TAILHARDAT, Benjamin STACH, Yoan CHABOT, and Raphaël TRONCY. 2024.

Graphameleon: Relational Learning and Anomaly Detection on Web Navigation Traces Captured as Knowledge Graphs.

https://doi.org/10.1145/3589335.3651447

Code repository

The Graphameleon Web extension

https://github.com/Orange-OpenSource/graphameleon

The Graphameleon dataset

https://github.com/Orange-OpenSource/graphameleon-ds