Experience Constructing the Artifact Genome Project (AGP): Managing the Domain's Knowledge One Artifact at a Time

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Agenda

• Introduction
• Previous Work
• Impact (professional & academic)
• AGP System Design
• Vetting Process
• Data Usage and Analysis
• Demo
• Lessons Learned
• Future Work
Artifacts

• “Information or data created as a result of the use of an electronic device that shows past activity.”
  - The Scientific Working Group on Digital Forensics (SWDGE), 2015

• Examples:
  • Registry keys
  • Logs
  • Headers
Artifacts – Continued

• Important to locate and decode
  • May indicate things that content itself may not, such as that a suspect did access a particular document or used a certain program to view an image
• Forensic tools serve to indicate that artifacts potentially exist
  • Do not contribute to establishing and maintaining artifact knowledge
  • Do not explicitly provide in-depth information about the makeup of artifacts
Related/Previous Work

- Forensic Artifact Analysis
  - Supervisory Control and Data Acquisition (SCADA): Denton et al. (2017), Senthivel et al. (2017), Ahmed et al. (2017)
  - Smart Watches: Baggili et al. (2015), Ricci et al. (2016)
  - Drones: Clark et al. (2017)
Related/Previous Work – Continued

- Schemas and Ontologies
  - Cyber Observable Expression (CybOX): Barnum et al. (2012), Casey et al. (2015)
  - Structured Threat Information eXpression (STIX): Barnum (2014)
  - Digital Forensic Analysis eXpression (DFAX): Casey et al. (2015)
- Attempts at an Artifact Database
  - ForensicArtifacts.com
  - Artifact Exchange (Magnet Forensics)
Curated Forensic Artifacts (CuFAs)

• Work from Harichandran et al. (2016)
  • Acknowledged the lack of a standardized definition and ontological model for artifacts and the challenges associated with this
• Results of this preliminary work:
  • A proposal of a more concrete and unified definition, as well as a new name: Curated (digital) Forensic Artifact (CuFA)
  • An ontological model was designed for the curation of artifacts- establishing a set of procedures and requirements for an object to be considered a CuFA
  • Presented a way to implement the ontology with CybOX to create an organized and searchable database
**CuFA Model**

Harichandran et al., 2016
AGP & Contributions

• Started in 2014, launched in 2017
• Crowd-sourcing initiative encouraging digital forensic professionals to share results relating to Curated Forensic Artifacts (CuFAs)
• Aspires to create a fundamental map of digital forensic artifacts
• Contributions
  • Largest vetted freely available digital forensics artifact platform
  • Primary implementation of CuFA
  • Catalyzes community-based artifact collection
  • Share design choices and lessons learned from building and maintaining
Professional Impact

• Make accessible various types of digital artifacts
  • Can search for artifacts one has not encountered before, saving time in an investigation

“A database of artifacts vetted by a community of examiner could prove useful in digital forensic investigations. As a Digital Forensic Examiner with the St. Louis County Police Department we are tasked with trudging through over a thousand pieces of evidence a year. If one of those pieces of evidences has artifacts we are searching for, it'd be very helpful to have a resource instead of finding it on our own. Additionally, if it is a new program with new artifacts that we find, to put that information out to the community and assist other examiners is very fulfilling.” Digital Forensic Examiner, St. Louis County Police Department
Professional Impact – Continued

• Allows practitioners to keep up-to-speed with new devices and applications
• Can be incorporated into scripts to be used with current tools
• Increase cooperation within the digital forensic community
  • Friendly competition
  • Tagging
  • Communication
Academic Impact

• Students have been the main contributors of artifacts
  • UNH partnered with the University of Texas at San Antonio in the fall of 2017
  • AGP was implemented in a University of New Haven class in the fall of 2017, which helped surpass the 1000 artifact mark
  • Have conducted their own research to discover, sanitize, and upload new artifacts
  • For some it has provided a source of income while studying

• Provides hands-on experience and knowledge building
  • Better prepares them for a career in digital forensics by developing job-ready skills
AGP Architecture
User Vetting Process
Artifact Vetting Process
# Data Usage & Analysis

## User/System Statistics

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## Artifacts

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Data Usage & Analysis – Continued

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Data Usage & Analysis – Continued

• By tracking what users share and search for:
  • Helps understand:
    • What’s trending in terms of research and investigative interests
  • Helps create a fundamental archive of digital forensic artifacts
  • We could scientifically study artifacts overtime
Demo - AGP Website

https://agp.newhaven.edu/
Experience Creating AGP

- Practitioners want access to a curated artifacts platform
- Some digital forensic practitioners can be hesitant in sharing artifacts
- Academia is a good place for curating digital forensics artifacts
Future Work

• More collaborations with academic institutions
• Possibly hire more artifact diggers
• Add educational modules
• Develop forensic tool plugins that utilize AGP artifacts
• Explore mechanisms for automating artifact discovery
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