Digital Forensics (IY5609 / IY4609 / IY3609) Summative Assessments – CW1 & CW2 Organization & Guidance

Dr Christian Weinert

Academic Year 2023/24

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Reminder: Record Your Attendance!

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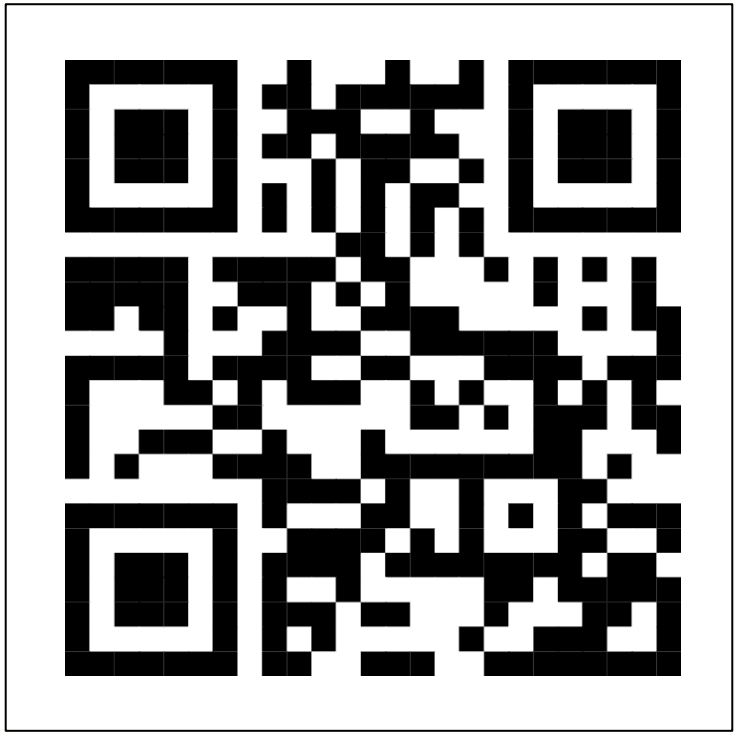

CW1 Organization

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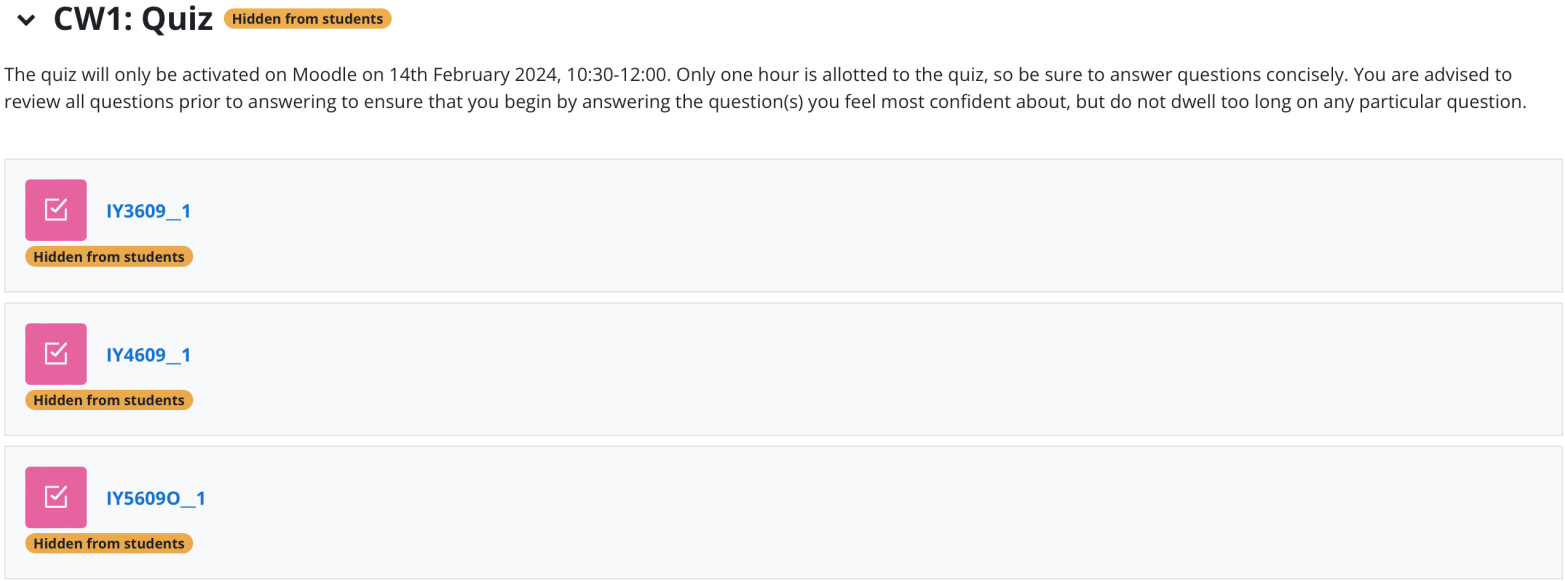
Date & Time

- Date: **Wednesday, 14th of February 2024**
- Time:
- 09:00 - 10:00: We will have a regular lecture for one hour
- 10:00 - 10:30: Break
- 10:30 - 12:00: The Moodle quiz will be available. Within this time frame, you have **one hour** to complete the quiz, **D&N adjustments** will be automatically considered.

If you bring a suitable mobile device, you can stay in the lecture hall to work on the quiz. In this case, make sure **beforehand** that your device is **sufficiently charged**, and the **network connection is working**. Alternatively, you can use the break to relocate to one of the PC labs on campus or go home if you live close by.

Moodle Setup



Make sure to select the quiz that corresponds to the **module code for which you are registered** as there will be slight differences in the assessment.

CW2 Organization

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Key Data

Deadline: 4th of April 2024, 2pm

Submission: **one PDF** document via Moodle in the **correct submission folder** for your module code

The target (and soft maximum) length of the paper is:

- IY3609: 2000 words
- IY4609: 3000 words
- IY5609: 4000 words

Assignment Sheets

CW2 - IY3609 (V1)

CW2 - IY4609 (V1)

CW2 - IY5609 (V1)

To be updated and approved for 23/24!

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Information Security Group
School of Engineering, Physical and Mathematical Sciences
Year 2022-23

Approved coursework for: **IY3609 – Digital Forensics**

CW Assignment: Summative Coursework 2 of 2 (Term Paper)

Word Count: maximum 2000 words (penalties will apply if you exceed this - do not repeat the questions in your submission)

Scope

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Introduction

The term paper is meant to be an **essay** typically taking the form of a **literature review**

No original work is sought (although this is not ruled out entirely), but similar to an original research paper, a literature review benefits from one or two **clear and concise research questions**

- This will help *select* and *filter* articles, chapters, and conference contributions for their relevance to answering the question at hand – otherwise it is very easy to get sidetracked

Choice of Topic

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You should choose your own topic satisfying the following constraints:

- Topics must be immediately **relevant to Digital Forensics**, i.e., either **directly related** to material covered, or **immediately adjacent** to it
- Material covered **should not overlap substantially** with what is already presented in lecture materials
- A reasonably **narrow focus** is advisable – even if this is intended as a literature survey, technical depth and analysis is required, rather than merely a summary of results

Referencing

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Referencing and Citations

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In any academic writing, good referencing is important

- Where arguments are being reproduced, or results summarized, accompany this with a reference, even if the same source has been cited previously: Citing a source once and relying on it in several places is not adequate
- Citation styles vary, but should be sufficient to easily find the source
- You can use **LaTeX** (with BibTeX or Biber), Endnote etc. – use of a citation manager is advisable if only as a dry run for larger pieces of work later
- Recommendation is to use the ACM (e.g., [Hamacher et al., 2022]), IEEE (e.g., [23]) or "alpha" (e.g., [HKST22]) citation style; when using BibTeX, this is formatted automatically. Example entry in list of references:

[HKST22] Kay Hamacher, Tobias Kussel, Thomas Schneider, and Oleksandr Tkachenko: "PEA: Practical Private Epistasis Analysis Using MPC". In *27. European Symposium on Research in Computer Security (ESORICS'22)*, pp. 320–339, Springer, 2022.

Literature Sources

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Meta Collections

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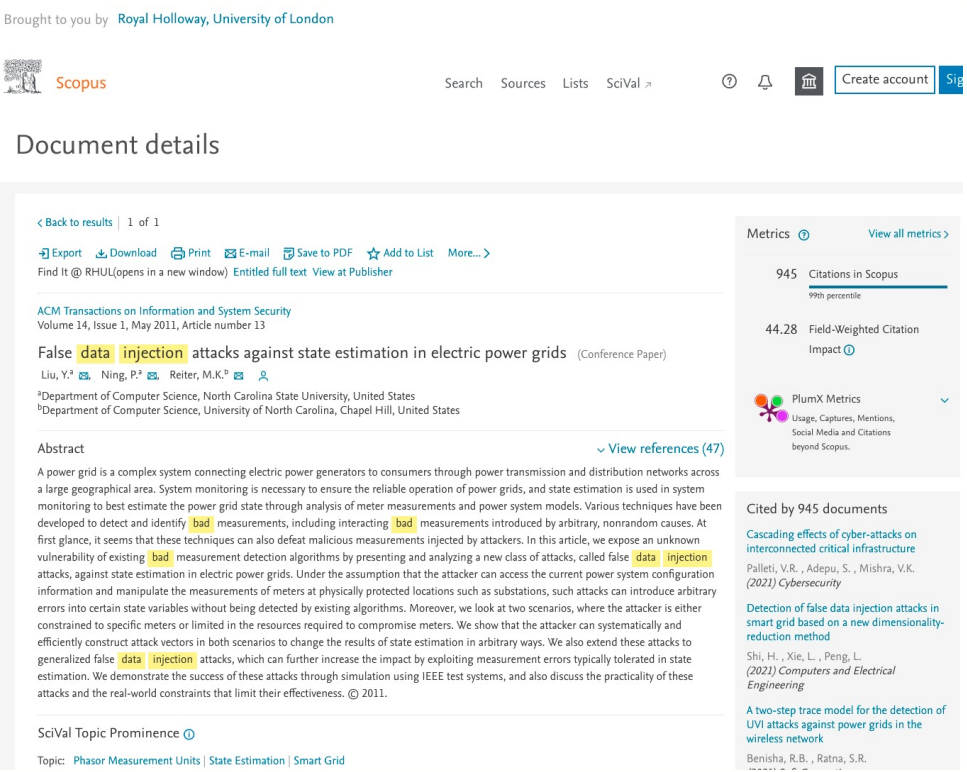
- **Scopus**: Partially hand-curated database including material from other (paywalled) publishers. Allows forward and backward tracing of citations
- **DBLP**: Curated database of journals and conferences in most areas related to computer science, usually very clean meta-data. Free to access, but links to sources require permission (usually via College/UoL subscriptions)
- **Google Scholar**: Collects papers found outside paywalls by crawling, contains plenty of duplicates and citation counts are unreliable at best

Examples (1) – Scopus Search



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ACM Transactions on Information and System Security
Volume 14, Issue 1, May 2011, Article number 13

False data injection attacks against state estimation in electric power grids (Conference Paper)

Liu, Y.[a] Ning, P.[a] Reiter, M.K.[b]

[a]Department of Computer Science, North Carolina State University, United States
[b]Department of Computer Science, University of North Carolina, Chapel Hill, United States

Abstract View references (47)

A power grid is a complex system connecting electric power generators to consumers through power transmission and distribution networks across a large geographical area. System monitoring is necessary to ensure the reliable operation of power grids, and state estimation is used in system monitoring to best estimate the power grid state through analysis of meter measurements and power system models. Various techniques have been developed to detect and identify bad measurements, including interacting bad measurements introduced by arbitrary, nonrandom causes. At first glance, it seems that these techniques can also defeat malicious measurements injected by attackers. In this article, we expose an unknown vulnerability of existing bad measurement detection algorithms by presenting and analyzing a new class of attacks, called false data injection attacks, against state estimation in electric power grids. Under the assumption that the attacker can access the current power system configuration information and manipulate the measurements of meters at physically protected locations such as substations, such attacks can introduce arbitrary errors into certain state variables without being detected by existing algorithms. Moreover, we look at two scenarios, where the attacker is either constrained to specific meters or limited in the resources required to compromise meters. We show that the attacker can systematically and efficiently construct attack vectors in both scenarios to change the results of state estimation in arbitrary ways. We also extend these attacks to generalized false data injection attacks, which can further increase the impact by exploiting measurement errors typically tolerated in state estimation. We demonstrate the success of these attacks through simulation using IEEE test systems, and also discuss the practicality of these attacks and the real-world constraints that limit their effectiveness. © 2011.

SciVal Topic Prominence

Topic: Phasor Measurement Units | State Estimation | Smart Grid

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945 Citations in Scopus
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44.28 Field-Weighted Citation Impact

PlumX Metrics
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Cited by 945 documents

Cascading effects of cyber-attacks on interconnected critical infrastructure
Palleti, V.R. , Adepu, S. , Mishra, V.K.
(2021) Cybersecurity

Detection of false data injection attacks in smart grid based on a new dimensionality-reduction method
Shi, H. , Xie, L. , Peng, L.
(2021) Computers and Electrical Engineering

A two-step trace model for the detection of UVI attacks against power grids in the wireless network
Benisha, R.B. , Ratna, S.R.

Sources of Literature – Selected Publishers

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- **SpringerLink**: Not all publications are accessible via RHUL/UoL subscriptions electronically, but, e.g., most LNCS conference proceedings and many journals are
- **ScienceDirect**: Not all publications are accessible via RHUL/UoL (covers many disciplines)
- **IEEE Xplore:** Most material available, not all publications are at the same quality level
- **ACM Digital Library:** Complete archive of Computer Science publications back to 1958
- **arXiv:** Not a publisher as such, but will hold both pre-prints and some original work across mostly physics, mathematics, and computer science, no paywall
- **Cryptology ePrint Archive:** Preprint archive for cryptographic research, no paywall

Examples (2) – ACM DL Article View

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RESEARCH-ARTICLE

False data injection attacks against state estimation in electric power grids

Authors: Yao Liu, Peng Ning, Michael K. Reiter Authors Info & Affiliations

Publication: ACM Transactions on Information and System Security • June 2011 • Article No.: 13 • https://doi.org/10.1145/1952982.1952995

780 5,093 | eReader | PDF

ACM Transactions on Information and...
Volume 14, Issue 1
← Previous Next →

Abstract
References
Index Terms
Comments

Abstract

A power grid is a complex system connecting electric power generators to consumers through power transmission and distribution networks across a large geographical area. System monitoring is necessary to ensure the reliable operation of power grids, and *state estimation* is used in system monitoring to best estimate the power grid state through analysis of meter measurements and power system models. Various techniques have been developed to detect and identify bad measurements, including *interacting bad measurements* introduced by *arbitrary, nonrandom* causes. At first glance, it seems that these techniques can also defeat

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Title	Source	Rank
Digital Forensics, Security and Law. Journal	CORE2020	C
IEEE Transactions on Information Forensics and Security	CORE2020	A
International Journal of Electronic Security and Digital Forensics	CORE2020	C

Plagiarism

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Defining (and Avoiding) Plagiarism

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Consider for example the IEEE Publications Board definition of **plagiarism**:

> *"… the use of someone else's prior ideas, processes, results, or words without explicitly acknowledging the original author and source"*

Copying results (duplication of text, even with minor alterations) without acceptable attribution

- Can be detected automatically in part, but still surprisingly prevalent

Plagiarism includes:

- Not quoting passages taken directly => appropriate references are required in addition
- Paraphrasing without proper references
- Use of arguments, data, or evidence from other authors without references

Exact citation standards and conventions do vary by field – what is acceptable but sloppy in one area may be considered plagiarism elsewhere

Structure

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Structuring the Paper

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A term paper is relatively short and hence will not have a very elaborate internal structure, but will be broadly along the following lines:

1. Introduction
2. Background (optional)
3. Problem Areas (one or several, depending on questions)
4. Discussion and Analysis
5. Conclusions
6. List of References
7. Appendices (if any)

Questions?

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Remember the Deadline (4th of April 2024)