AN ANALYSIS OF PREREQUISITES FOR ARTIFICIAL INTELLIGENCE / MACHINE LEARNING-ASSISTED MALWARE ANALYSIS LEARNING MODULES

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Mahmoud Abdelsalam

Maanak Gupta

Sudip Mittal

Portia Pusey

SIX MODULES, LECTURE, BACKGROUND/TECHNICAL READINGS/VIDEOS, LABS WITH APPROPRIATE DATA SETS

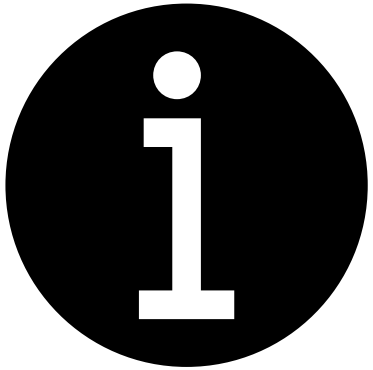
- Cyber Threat Intelligence (CTI) and malware attack stages,
- Malware knowledge representation and CTI sharing
- Malware data collection and feature identification,
- AI assisted malware detection
- Malware classification and attribution
- Advanced malware research topics and case studies

CONTEXT

- 3 Workshops at conferences
- Coursework in three institutions
- Practicing Professionals
- Educators
- Undergraduate and Graduate Students

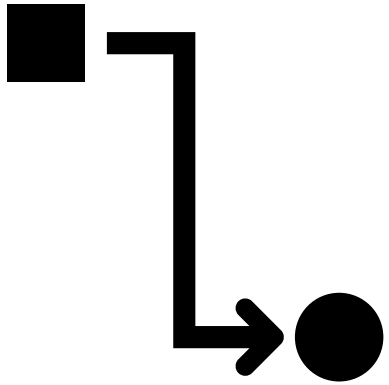
LEARNING SCIENCE

New Modules

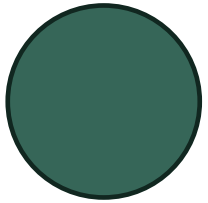


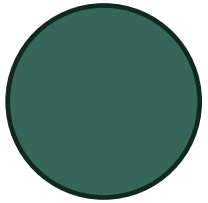
Relatively New Field

PREREQUISITES IN WELL-DEFINED DOMAINS



Sequential





Nonsequential

CONFERENCE WORKSHOPS

- “The major factor that hindered my understanding is my lack of knowledge about machine learning.”
- “I'm a complete newcomer to A.I. and Malware Analysis. I also doubt my ability to work with scripts.”

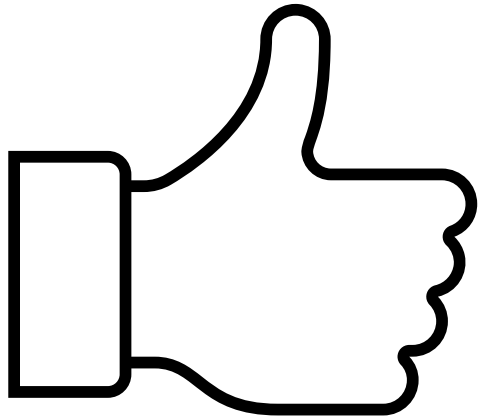
LEARNER CONFIDENCE METHODOLOGY

Asked learners what they already know about a topic before teaching. This enables instructors to address competency gaps while they are teaching the modules.

Conducted checks for understanding and recorded learner responses. We used this information to refine the resource document provided to learners.

TRENDS

- Less experience learners used extra resources.
- More students who took Introduction to Machine Learning needed resources than students who took Introduction to Cybersecurity courses.
- But when looking at both ML and Cyber intro classes, there were 9 students who took both intro courses and did not use resources. There were 6 ML intro course takers who used resources. Three of those had also taken intro to cyber courses.
- The five of the six students who used extra resources, had perfect scores on modules. One of the students who used extra resources earned 50%



SELF EFFICACY = CONFIDENCE

GOOD INSTRUCTIONAL PRACTICE

- 1. Assess prerequisite knowledge
- 2. Have students work in teams
- 3. Provide supplementary resources
- 4. Use Classroom Assessment Techniques

QUESTIONS?

- Maanak Gupta: Department of Computer Science Tennessee Technological University, mgupta@tntech.edu
- Sudip Mittal: Department of Computer Science & Engineering Mississippi State University, mittal@cse.msstate.edu
- Mahmoud Abdelsalam: Department of Computer Science North Carolina Agricultural and Technical State University, mabdelsalam1@ncat.edu
- Portia Pusey: Researcher, edrportia@gmail.com