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Knowledge Discovery and Rule Mining-based Explainable AI modeling can Enhance Today's Cybersecurity World

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ABSTRACT.

The talk demonstrates that knowledge discovery and rule-mining based AI modeling rather than other black-box solutions in the broad area of AI can enhance today's cybersecurity world, particularly in terms of automation, intelligent-decision making and human interpretation with explainability. Recent advances in artificial intelligence (AI) such as data science (DS) modeling and machine learning (ML) techniques, have drastically changed how we analyze data and use the extracted knowledge for automation and intelligent decision-making in various real-world application domains, including cybersecurity applications. Although several black-box modelling techniques have strong computing capabilities, human understandable explanations and trustworthiness are the key issues in deploying responsible AI-based models to solve security problems. Thus, developing more transparent and human interpretable AI models could be more effective for cybersecurity solutions, particularly for cyber analysts. To support this statement, in this talk, we explore rule-based transparent, intelligent and explainable AI modeling where patterns or useful knowledge are discovered from cyber data in the broad area of cybersecurity and AI. Overall, the talk covers:

1. Traditional AI vs Explainable AI for cybersecurity solutions

2. Knowledge discovery and rule generation based on knowledge-driven approaches and data-driven approaches, i.e., extracting insights from data, and their hybridization.

3. Selected real-world applications and research issues.

Reference Books:

Iqbal H. Sarker. *AI-driven Cybersecurity and Threat Intelligence: Cyber Automation, Intelligent Decision-Making and Explainability, Springer Nature, Switzerland, 2024 [In Press]*

Iqbal H. Sarker et al. *Context-Aware Machine Learning and Mobile Data Analytics: Automated Rule-based Services with Intelligent Decision-Making, Springer Nature, Switzerland, 2021.*