Intelligent Cybersecurity Services and Management: Concepts, AI-based Modeling, Research Issues and Directions

Iqbal H. Sarker (✉ msarker@swin.edu.au)

Swinburne University of Technology

Survey paper

Keywords: Cybersecurity, artificial intelligence, machine learning, natural language processing, expert system, cyber-attacks, cyber anomaly, security modeling, intrusion detection, cyber threat intelligence

Posted Date: October 7th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-87788/v1>

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Abstract

Artificial intelligence (AI) is one of the major technologies in this Fourth Industrial Revolution, which aims to function in an intelligent manner in various application domains, e.g., intelligent cybersecurity management. Popular AI techniques that include machine learning and deep learning methods, natural language processing, the concept of knowledge representation, and knowledge or rule-based expert systems, can be used to intelligently tackle today's diverse cybersecurity problems according to the needs. Based on these AI techniques, in this paper, we aim to present a comprehensive view on \textit{AI-driven cybersecurity} in terms of concepts, extracting security insights, and eventually security intelligence modeling that can play significant role to solve various cybersecurity tasks such as identifying malicious activities, predicting cyber-attacks, access control, intrusions or anomaly detection etc. Thus, the concept of AI-based security modeling could make the cybersecurity computing process more intelligent and automated than the traditional ones. Based on our study, finally, we highlight several \textit{research issues and future directions} within the area of AI-driven cybersecurity. Overall, the ultimate goal of this paper is to serve as a reference point and guidelines for the cybersecurity professionals as well as the researchers in this work domain, particularly from the technical point of view.

Full Text

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Figures

Figure 1

A structure of a cybersecurity expert system modeling. expert cybersecurity This figure shows the structure of an expert cy-bersecurity system modeling.