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HEPS control system network traffic detection with deep learning techniques

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The High Energy Photon Source (HEPS) is a low-emittance synchrotron radiation-based light source located in suburban Beijing. The HEPS control system encompasses both the accelerator and the beamlines. The system design principles incorporate industrial standards, a global timing system, and modular subsystems. The development of effective cybersecurity techniques for the HEPS control system is critical for enabling scientific exchange, ensuring adequate access for remote participation, and maintaining reliable equipment control, particularly in light of the increasing number of cybersecurity threats.
Network traffic detection is a vital method for identifying network attacks. In this presentation, we introduce a deep learning-based network traffic detection method for the HEPS control system. First, the HEPS control system network traffic is collected and divided into sessions using five-tuple segmentation. Second, the traffic is converted into grayscale images which reflect the intrinsic characteristics of the traffic. Finally, these images are input into the deep learning algorithm to train the control system network traffic detection model, allowing for the automatic learning of original network traffic features without manual efforts. The proposed approach is evaluated using four commonly used metrics, and the results demonstrate that our method can effectively detect network traffic for the HEPS control system.

Footnotes

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