

应用

基于DCA的数据融合方法研究

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摘要:

树突状细胞算法 (Dendritic Cell Algorithm, DCA) 是一种受固有免疫系统细胞启发所提出的人工免疫系统算法, 通常用于入侵检测和异常检测。DCA在计算机网络、无线传感器网络、实时嵌入式系统和机器人等方面展开应用, 取得较高的检测率, 具有良好应用前景。本文提出了基于DCA的数据融合 (DCA based Data Fusion, DCADF) 模型, 描述了模型的系统结构, 给出了利用模型解决实际问题的一般过程, 并将DCADF模型与数据融合系统一般模型进行比较, 从系统结构和功能以及系统特性等方面比较了两种模型的共性和差别, 分析了DCADF模型的特征, 指出了DCADF模型的独特特性以及可能的使用场景。通过内网SYN Flood攻击主机检测实验对模型进行仿真验证, 仿真结果表明DCADF模型具有可行性, 为数据融合研究提供了一种新的方法和思路。

关键词: 人工免疫系统; 树突状细胞算法; 数据融合; 异常检测

DCA based Data Fusion Method

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Abstract:

As a novel artificial immune system algorithm, DCA is an innate immune system cells heuristic algorithm generally used in intrusion detection and anomaly detection. DCA has been used in computer network, wireless sensor network, real-time embedded system and robotics. The algorithm get high detection rate. DCA is showing promise in these fields. DCA is designed by imitating the function of dendritic cell. Dendritic cells posses the capability of information sampling, information processing, information fusion and information analyzing. DCA also has the capability of data fusion. This paper proposes a DCA based data fusion model, the DCADF model. The system architecture and components of the model is presented. The general process to solve practical problem with DCADF model is described. The DCADF model is compared with common data fusion model. The system architecture and functions, and the characteristics of DCADF model are analyzed. The common characteristics and differences of the two models are explained. Possible application scenarios are introduced. The proposed data fusion method is applied to intranet SYN Flood attacking host detection experiments, the attacking host is successfully detected. The results of the simulation show that the model is viable. This paper provides a new method and idea for data fusion.

Keywords: artificial immune system dendritic cell algorithm(DCA) data fusion anomaly detection

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