A Deep Auto-Encoder based Approach for Intrusion Detection System

Fahimeh Farahnakian, Jukka Heikkonen
Department of Future Technologies, University of Turku, Turku, Finland
fahime.farhnakian@utu.fi, jukka.heikkonen@utu.fi

***Abstract*—One of the most challenging problems facing network operators today is network attacks identification due to extensive number of vulnerabilities in computer systems and creativity of attackers. To address this problem, we present a deep learning approach for intrusion detection systems. Our approach uses Deep Auto-Encoder (DAE) as one of the most well-known deep learning models. The proposed DAE model is trained in a greedy layer-wise fashion in order to avoid overfitting and local optima. The experimental results on the KDD-CUP'99 dataset show that our approach provides substantial improvement over other deep learning-based approaches in terms of accuracy, detection rate and false alarm rate.**

***Keyword*— Intrusion detection systems, deep neural networks, stacked autoencoders, unsupervised learning, anomaly detection**

.

Fahimeh Farahnakian received her PhD degree from the University of Turku, Finland in 2016. Currently she is working as a postdoctoral researcher at the University of Turku, Finland. Her research interests include machine learning, neural networks, deep learning, big data, autonomous system and cloud computing. She is a member of IEEE and is a frequent reviewer for research journals.

Jukka Heikkonen has been a professor of computer science of University of Turku since 2009. His research is related to machine learning and probabilistic and information theoretical modelling applied in wide varying application domains. He has worked at top level research laboratories and Center of Excellences in Finland and international organizations (EU, Japan) and has led many international and national research projects