Cairo University

COMPROMISED NODE DETECTION USING HIERARCHICAL FUZZY LOGIC AND FEATURE REDUCTION

By

Ahmed Shawki Bayoumi Abu Daia

A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
In
Computer Engineering

FACULTY OF ENGINEERING
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Under the Supervision of

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Title of Thesis:

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Key Words:
Wireless Attacks; Network Attacks; Hierarchal Fuzzy Logic; FURIA Fuzzy Logic; Particle Swarm Optimization (PSO); Machine Learning

Summary:

This research proposes a hierarchal fuzzy logic system used for detecting the compromised or attacked nodes in wireless networks. The proposed system is composed of three hierarchal layers and each layer composed of concrete components built using the Fuzzy Unordered Rule Induction Algorithm (FURIA) fuzzy logic. The Particle Swarm Optimization (PSO) technique is used at the data preprocessing phase to reduce the significant features number. We used NSL-KDD dataset for the training and evaluation phases, and the WEKA is the environment used for experiments.

Acknowledgments

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Dedication

I dedicate this thesis to the sake of Allah my Creator and my Master; messenger Mohammed (peace be upon him); the soul of my father who continued to learn, grow and develop me and who has been a source of encouragement and inspiration to me throughout my life; my mother may Allah protect and save her; my dearest wife, Tayseer, for her endless support and motivation, constant encouragement, limitless giving and great sacrifice, helping me accomplish my degree; and my beloved daughters: Rital, and Loujin, whom I can't stop loving them. To all my beloved family, the symbol of love and giving; my friends who encourage and support me; and All the people in my life who touch my heart.

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