

MASTER OF SCIENCE IN ENGINEERING SCIENCE

CLASSIFICATION AND ANALYSIS OF LOW PROBABILITY OF INTERCEPT RADAR SIGNALS USING IMAGE PROCESSING

Christer N. E. Persson-Lieutenant Colonel, Swedish Air Force

B.S., Swedish National Defence College, 1999

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Advisors: Phillip E. Pace, Department of Electrical and Computer Engineering

D. Curtis Schleher, Department of Information Science

The characteristic of low probability of intercept (LPI) radar makes it difficult to intercept with conventional signal intelligence methods, so new interception methods need to be developed. This thesis initially describes a simulation of a polytime phase-coded LPI signal. The thesis then introduces a method for classification of LPI radar signals. The method utilizes a parallel tree structure with three separate "branches" to exploit the image representation formed by three separate detection methods. Each detection method output is pre-processed and features are extracted using image processing. After processing the images, they are each fed into three separate neural networks to be classified. The classification output of each neural network is then combined and fed into a fourth neural network performing the final classification. The outcome of testing shows only 53%, which might be the result of the image representation of the detection methods not being distinct enough, the pre-processing/feature extraction not being able to extract relevant information, or the neural networks not being properly trained. The thesis concludes with a brief discussion about a suitable method for image processing to extract significant parameters from a LPI signal.

KEYWORDS: Signal Processing, Image Processing, LPI, LPI Radar Signals, Classification

