Lucerne University of Applied Sciences and Arts

Thesis Title

subtitle

Bachelor Thesis

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Acknowledgments

Thanks to my family, relatives and friends for all the support given to finish this thesis.

Abstract

The content of your thesis in brief.

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List of Acronyms

HSLU — Lucerne University of Applied Sciences and Arts
CWW — Computing with Words
NN — Neural Network

1 Introduction

This chapter provides an overview of the thesis topic.

1.1 Problem Statement

The Tor network is widely considered secure, but theoretical studies demonstrate that timing analyses and traffic correlation attacks can compromise user anonymity. However, practical investigations under controlled, local conditions are lacking.

1.2 Motivation

Understanding the practical implications of de-anonymization attacks is crucial for developing effective countermeasures. This thesis examines Website Fingerprinting attacks and the effectiveness of traffic padding defenses.

2 Literature Review

This chapter reviews existing research on Tor anonymization, website fingerprinting attacks, and traffic analysis techniques.

3 Methodology

This chapter describes the research approach and methods used in this thesis.

3.1 Phase 1: Shadow Setup

Tor network configuration using tornettools, Wikipedia mirror cloning, and wget2 client setup.

3.2 Phase 2: Baseline Data Collection

Packet capture and feature extraction from client nodes, WF classifier training and evaluation.

3.3 Phase 3: Circuit Padding Activation

Configuration of Tor's built-in padding mechanisms at various levels and corresponding data collection.

3.4 Phase 4: Comparison and Analysis

Comparative analysis of detection rates with and without padding, overhead measurement, and trade-off quantification.

4 Results

Presentation of findings from each experimental phase.

4.1 Baseline WF Attack Results

Results without padding countermeasures.

4.2 Circuit Padding Impact

Analysis of how circuit padding affects detection rates.

4.3 Performance Overhead

Measurement of bandwidth and latency impacts.

5 Discussion

Critical analysis and interpretation of results, limitations, and practical implications.

5.1 Limitations

Discussion of Shadow simulation limitations compared to real-world scenarios.

5.2 Ethical Considerations

Reflection on ethical aspects of the research.

Bibliography

A Appendix

Additional materials go here.