Master Thesis

Optimization of Neural Network

Author:
Martin Bulín MSc.

Supervisor:
Ing. Luboš Šmídl Phd.

A thesis submitted in fulfillment of the requirements for the degree of Engineer (Ing.)

in the

March 21, 2017

Declaration of Authorship

I, Martin Bulín MSc., declare that this thesis titled, "Optimization of Neural Network" and the work presented in it are my own. I confirm that:

- This work was done wholly or mainly while in candidature for a research degree at this University.
- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.
- Where I have consulted the published work of others, this is always clearly attributed.
- Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work.
- I have acknowledged all main sources of help.

Signed:

Date:

"*Look deep into nature, and then you will understand everything better.*"

A. Einstein

UNIVERSITY OF WEST BOHEMIA

Abstract

Faculty of Applied Sciences

Department of Cybernetics

Engineer (Ing.)

Optimization of Neural Network

by Martin Bulín MSc.

abstract text...

Acknowledgements

acknowledgements text...

Contents

List of Figures

List of Tables

List of Abbreviations

AI	**A**rtificial **I**ntelligence
ANN	**A**rtificial **N**eural **N**etwork

Chapter 1

Introduction

Introduction text...

1.1 State of the Art

State of the art text... (Rosenblatt, 1958) (Reed, 1993)

1.2 Thesis Objectives

Thesis objectives text...

1.3 Relation to the State of the Art

Relation to the state of the art text...

1.4 Thesis Outline

Thesis outline text...

Chapter 2

Methods

Methods intro text...

2.1 Network Pruning

Network pruning text...

2.2 Network Building

Network design text...

2.3 Minimal Network Structure

Minimal network structure text...

2.4 Graphical User Interface

Graphical user interface text...

2.5 Speech Data Classification

Speech data classification text...

Chapter 3

Results

results text...

3.1 Evaluation Data

Evaluation data text...

3.1.1 XOR

XOR data...

3.1.2 MNIST

MNIST data... (LeCun and Cortes, 1998)

3.1.3 PHONES

PHONES data...

3.2 Results of Network Pruning

Results of network pruning text...

3.3 Network Building Experiments

Network building experiment text...

3.4 Neural Network Demystified

Neural network demystified text...

3.5 Results of Speech Data Classification

Results of speech data classification text...

Chapter 4

Discussion

Discussion text...

4.1 Methods Recapitulation

Methods recapitulation text...

4.2 Comparison of Results

Comparison of results text...

Chapter 5

Conclusion and Outlook

Conclusion text...

Outlook text...

Bibliography

[1] Frank Rosenblatt. “The perceptron: A probabilistic model for information storage and organization in the brain”. In: *Psychological Review* 65 (1958), pp. 386–408.

[2] R. Reed. “Pruning Algorithms - A Survey”. In: *IEEE Transactions on Neural Networks (Volume:4 , Issue: 5)* (Sept. 1993), pp. 740–747. URL: http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=248452.

[3] Yann LeCun and Corinna Cortes. *The MNIST database of handwritten digits*. 1998. URL: http://yann.lecun.com/exdb/mnist/.

Appendix A1

Structure of the Workspace

Appendix A2

Implementation

Appendix A3

Code Documentation