Exploiting parallel neural networks for automatic recognition of characters and mathematical symbols

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Summary of the Thesis

The goal of this graduation thesis is to develop an automatic Optical Character Recognition (OCR) system specifically tailored for scientific text in order to assist blind and visually impaired persons during their studies.

The thesis is composed of five chapters, each of them dealing with different aspects.

Chapter 1 is the introductory. The chapter is subdivided into three parts. Part one describes the OCR software development nowadays, part two describes the goal of this thesis, and part three is the brief introduction of the following chapters.

Chapter 2 is the overview about the artificial neuron network. The chapter consists of four parts. Part 1 focuses on how a single neuron works, and part 2 introduces how a neuron network works. Part 3 describes the learning paradigms for the artificial neuron network, and focuses on the supervised learning. Part 4 is about the Back Propagation method used in this thesis for training the neuron networks.

Chapter 3 describes the procedures of training each single neuron network with the MatLab. This chapter is subdivided in to three part. Part one focuses on the creation of the data set which are the image files including alphabetical characters, Greek characters, and the mathematical symbols. Part two looks at training six different neuron networks with the data set created before. Part three focuses on testing the trained neural network, and improving the performance of it.

Chapter 4 concentrates on the parallel neural networks. Part 1 focuses on the strategy for evaluating the result from each neural network and choose the optimal one

as the outcome of the OCR. Part 2 concentrates on the implementation of this strategy in MatLab.

Conclusions are drawn in Chapter 5. The development of the OCR, which is embedded with six neuron networks, focuses on the scientific-text recognition with the accuracy 95%.