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SINGAPORE

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EE7207 Neural Networks & Deep Learning

Assignment 1 Report

MSc in Electrical and Electronic Engineering

Yan Ziming

G2507084J

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1 Introduction

The report introduces the process of classification with RBF neural network. The RBF contains three layers: input layer, hidden layer, and output layer.

The key obstacle during the development is the selection of parameters, like Gaussian width (σ) and hidden layer neuron number. I used different methods to deal with these difficulties, such as SOM, Kmeans, and nonlinear optimization apart from basic process.

Briefly, I divided my design into two parts: (1) basic method to develop basic RBF (2) improve parameters with backpropagation. The final result reflect positive improvement.

2 RBF Neural Network Frame

2.1 Input Layer

The input layer of RBF is different from normal neural network, it just transmit the training data vector $\mathbf{x} = [x_1, x_2, \dots, x_n]^T$ to the hidden layer. In this stage, no mathematical transformations or learning processes occur.

2.1.1 Data Analysis

The datasets are provided as static files, namely *data_train.mat*, *data_test.mat* and *label_train.mat*; therefore, manual partitioning of training and testing sets is not required.

Data Information:

Parameter	Training Data	Testing Data
Number of Samples (n)	301	50
Number of Features (m)	33	33
Distribution (IQR)		
Categories	2	2

2.1.2 Preprocessing

2.2 Hidden Layer

2.2.1 Kmeans

2.2.2 SOM

2.3 Output Layer

3 Results Analysis

4 Check & Improvement

5 Conclusion