

Neural Networks and Fuzzy Systems (2017)

Part 1: Breast cancer classification using Neural Network Approach

Objectives

Your aim is to develop a neural network for the classification of breast cancer and submit a project report, in addition to your developed Matlab code, to provide appropriate discussion for the problem, the methodology, the solution, the results and the future work. The report must be a word-processed document and should be no longer than 2000 words in total. Your report should provide enough information for someone else to implement your neural network and to understand the capability of your developed neural network for breast cancer classification.

Design Problem

Problem statement

You will download the data from the UCI Machine Learning dataset repository for the development of a classification system using Neural Networks. You need to select one neural network method or combine multiple methods to improve the classification rate.

Dataset

We use a dataset available at UCI Machine Learning dataset repository. The dataset is available at <http://archive.ics.uci.edu/ml/datasets/Breast+Cancer+Wisconsin+%28Original%29>

Effort required

The coursework is worth 50% of the module marks. Great effort should be made towards developing the Matlab package as well as the report writing-up. A demonstration of the Matlab software will take place within the lab sessions leading up to the deadline.

Deadline for submission of report

The report must be submitted through **LMS** before **5.00 pm Tuesday 28th Nov 2017.**

Report structure

Your report (about 2000 words) should contain the information listed below.

- **Cover Page:** Title, author, affiliation of the author, date, and abstract
- **Introduction:** A brief overview of the problem, frequently formulated to attract the reader's interest.
- **Background:** Here you are required to provide an overview about breast cancer classification and neural network models to demonstrate your understanding. Then, you can describe similar approaches and systems, or you can introduce basic concepts that are necessary for understanding the later material.
- **Main Part:** This section contains description of the methodology you developed, justifications for design decisions, the system architecture, and/or some interesting

implementation techniques. Discussion of some targeted methods for solving the specific problem will be mostly encouraged.

- **Experimental Results and Analysis:** You need to present your training process on the training set and provide independent testing on the training data and the testing data. The performance of your model (e.g. classification rate and training speed) should be reported and critically evaluated and discussed. Several neural networks could be evaluated through simulation. Your discussion should be supported by useful evidence or experimental results.
- **Bibliography and Citations:** It is imperative that whenever you make reference to a fact of some sort, you cite an authoritative source for that fact; most frequently, these sources will be scientific articles.

Marking Scheme:

Marking criteria for software development (The weights for the Matlab demonstration is 20%)

Criteria	A: 70%+	B:60-70%	C:50-60%	D: 40-50%	E: <40%
Software Structure (7%)	Software with clearly structure and detailed annotations.	Software with understandable structure, and useful annotations.	Software with reasonable structure, and some annotations.	Software was structured, with a few annotations.	Difficult to understand the software structure, with few annotation
Software Performance (13%)	Excellent performance for testing	Good performance for testing	Satisfactory performance for testing	Reasonable Performance for testing	Unsatisfactory performance

Marking criteria for report (The weights for the report is 30%)

Criteria	A: 70%+	B:60-70%	C:50-60%	D: 40-50%	E: <40%
Presentation, Background, literature. [6%]	Considerable readings and independent thoughts.	Insightful and appropriate survey	Key taught theories are discussed in an appropriate manner.	Appropriate discussion of the taught content but some key aspects missed.	Inaccurate or inappropriate content/theory.
Quality of reasoning [12%]	Critical analysis and clear conclusions of literature, showing development of new idea and methodology.	Good development shown in summary of arguments based on theory/literature	Evidence of findings and conclusions grounded in theory/literature.	Limited evidence of findings and conclusions supported by the literature and theory.	Unsubstantiated/invalid conclusion, based on generalisations only.
Clarity and quality of report [12%]	Excellent clarity of expression. Consistently professional/academic writing style.	Thoughts and ideas clearly expressed.	Content structured. Language mainly fluent.	Meaning apparent but language not always fluent.	Unclear expression. Grammar and spelling poorly.