

Assignment 5.1: Perceptron Applications

Name: Bryan Paul de Leon

Section: CPE32S3

Title: **Prediction of Heart Disease using Multilayer Perceptron Neural Network**

Author: **Sonawane, Jayshril; Patil, D. R.**

Date of Publication: **February 27, 2014**

Title of Publication: **International Conference on Information Communication and Embedded Systems (ICICES2014)**

Answer the following:

- 1) What is the problem being solved in the research
 - Diagnosis is a process that is dictated by pre-existing clinical data and is influenced by the experience of the medical practitioner to an extent. However, there is a rapid need for automating this process, as the traditional process is often costly and time consuming.
 - The early detection of the onset of the disease is imperative to the survival of a patient, but due to the complexity of processes involved there is a delay regarding the detection and ultimately the treatment of patients.
- 2) What is the proposed solution of the author
 - In order to solve the problems stated by the author, a multilayer perceptron architecture was implemented, which featured back-propagation as its main training algorithm.
- 3) How did the author solve the problem? Provide a summary of the methodology.
 - The author first trained the model using a dataset from the Cleveland Heart Disease Database, which contains 303 records, and 13 attributes that directly influence the likelihood of developing heart diseases. The dataset was then split into two sets wherein 70% of the data was used for training the model, and the remaining 30% used for testing.
 - The performance of the model was then evaluated using three parameters, that being Sensitivity, Specificity, and Accuracy. A neural network consisting of 20 neurons in the hidden layer proved to be the most accurate out of all the iterations tested.
- 4) Provide the summary of the results
 - The author ran a series of tests wherein the number of nodes in the hidden layer were modified to find out which is the most accurate. They proceeded to test the accuracy using 5, 10, 15, and 20 neurons present in the hidden layer, and it concluded with 20 neurons having the best accuracy out of all the iterations. An accuracy of 98.58% was recorded.
- 5) What is the conclusion of the author, and provide your own recommendations.
 - The authors concluded that their model was able to predict which patients were most likely at risk of developing heart diseases with an accuracy of 98.58%.
 - However, they could have tested the model with 25 neurons or more to see if the accuracy will improve drastically.

Title: **Intelligent Analysis of Students' Performance in Nigerian Schools: A Multi-Layer Perceptron-Based Prediction**

Author: **Samuel Alu, Esther; Olanrewaju, Rashidah Funke; Obiniyi, Afolayan; Liman, Muhammad Dahiru**

Date of Publication: **August 16, 2023**

Title of Publication: **2023 9th International Conference on Computer and Communication Engineering (ICCCCE)**

Answer the following:

- 6) What is the problem being solved in the research
 - The decline of student performance despite Government spending in the education sector raises concern, which directly affected the decision of parents to switch from public schools to private schools.
- 7) What is the proposed solution of the author
 - In order to determine why the performance of students from public schools is declining, a deep learning model was developed to evaluate the performance of students in senior secondary schools in Nigeria. This is done in order to know which facilities to improve.
- 8) How did the author solve the problem? Provide a summary of the methodology.
 - To solve the problem, a deep learning model was developed and trained using datasets from schools in the Nasarawa state, the dataset featured 3543 records and 28 attributes which most notably included subjects, test scores, availability of equipment, teacher_to_student_ratio, availability of electricity, etc, as well as the target variable which is the student grade denoted as pass or fail. These are then used to predict a likelihood of a student passing or failing
 - Two models were deployed, the predictive model and a model that will extract the important features. Keras Framework was used for the predictive model and Scikit-learn for the implementation of the Random Forest.
 - The author then proceeded to clean the dataset by filling in the missing records and removing the unnecessary columns.
- 9) Provide the summary of the results
 - Evaluating the relationship between different variables, the authors found out that more students failed from public schools as compared to private schools. Furthermore, the availability of facilities did indeed have an effect on the performance as less students passed from public schools.
- 10) What is the conclusion of the author, and provide your own recommendations.
 - In conclusion, the author used a predictive model in order to evaluate the weight of various attributes to the performance of students, a random forest was then implemented to extract which features are most important for the evaluation.
 - Furthermore, it was found out that the rate of failing was higher in public schools due to the lack of amenities and facilities, which should prompt immediate actions from the government.

