Artificial Neural Networks to Estimate Processed Cheese

Niveditha Thomas
Department of Electrical and Computer Science Engineering, NRI Institute, Bombay
Corresponding Author: sridharece@gmail.com

To Cite this Article
Niveditha, "Artificial Neural Networks to Estimate Processed Cheese", Journal of Computational Intelligence and Secure Systems of Artificial Intelligence, Vol. 01, Issue 01, May 2025, pp:09-12.

Abstract*: Cascade multilayer artificial neural network models were created in order to estimate the processed cheese that was being stored at 7-8 degrees Celsius. Mean square error, RMS, and coefficient of determination were among the metrics used to compare the prediction power of the built models. The created model, which showed an exceptional agreement between the actual and anticipated datum, demonstrates that multilayer cascade models can estimate the shelf life of processed cheese.*

Keywords*: Cascade, ANN, AI, Processed Cheese, Shelf Life*

I. Introduction

An artificial neural network is a system which resembles how the biological neural networks operate. Although computing technology has drastically been changing in the recent past, there are certain jobs that cannot be done by a program that is made for a standard microprocessor. But still, it is possible to implement a neural network as the software, and this implementation will have both advantages and disadvantages. One of the other characteristics of ANNs is that even though, they seem to have complicated systems, neural networks, in fact, have simple structures. This is because there are various ANN architecture that will require different algorithm.

ANNs have been some of the most recent technologies used in signal processing nowadays. Neural networks are typically applied in the area of engineering as nonlinear adaptive filters and pattern classifiers. An ANN, just like its biological predecessor, is an adaptive system; therefore, all the parameters are modified as it is being utilized and employed in the resolution of the issue at hand. This is what we call the training phase. A methodical procedure is used to develop an ANN step by step, so as to optimize a criterion known as the learning rule. For these networks, the input/output training data is very vital as it conveys the Information that is to be used in order to detect the operating point [1].

This type of networks has numerous layers of the computational unit, and in most cases, they are connected feed-forward. Between each neuron of one layer and neurons of the next layer, there are directed connections. The units of such networks utilize sigmoid function as the activation function for a great number of applications. The most popular algorithm that is used to learn in multilayer networks is backpropagation that calculates a predefined value of error-function by comparing the output values to the true solution.

II. Models of Cascades

Quite unlike feedforward networks, cascade models include a weight link joining each layer to the subsequent layers as well as between the input and each of the layers. Even though feedforward networks with two layers possess the capability of learning nearly any input-output relation feedforward networks with higher number of layers could be capable of learning complex relationships quickly. Cascade forward networks are formed by newcf function. For example, a three-layer network consists of layer 1 and 2, layer 2 and 3 and layer 1 and 3 connections. In addition, all the three layers of the three-layer network are linked to input. The network may learn the intended association quicker due to additional connections [3].

Shelf-life studies could be undertaken by product producers in order to gain vital details, which they are going to utilize to ensure that even after production, consumers can get high quality products for a good period of time. Recent accelerated research [4] using artificial neural networks have been completed since the process in the lab is too time-consuming and cannot be speedy enough.

III. Review of the Works

Cascade neural networks and probabilistic neural networks models were developed. The effective acceptability sensory score was the outcome changes, while the input elements were tyrosine, peroxide value, free fatty acids, moisture, and titratable acidity. MSE, RMS, and to find Coefficient signal errors were used to compare the future performance of the built models. This model with a single hidden layer and 15 neurons outperformed the others in determining the shelf life of cakes, according to an evaluation of the best results from each model [5].

The shelf-life of instant coffee drinks was predicted using a variety of linear regression models and radial basis artificial neural engineering. Input factors included viscosity, sediment, color and appearance, and flavor; the output variable was the total acceptability sensory score. The multiple linear regression model outperformed the radial basis model in the study that projected the shelf life of instant coffee drinks [3].

IV. Material and Method

In order to anticipate the sensory quality of a sterilized drink with a coffee flavor, artificial intelligence (AI) models of cascade feedforward backpropagation and forward were created [2]. According to Leno Voogt, when comparing the two neural network models for forecasting the sensory quality of a sterilized drink with an instant coffee taste, the feedforward model outperforms the cascade forward artificial intelligence model. Models for categorizing the shelf life of sterile beverages with instant coffee flavors have been published [1].

Radial basis (perfect fit) and radial basis (fewer neurons) models based on artificial neural networks were developed to estimate the shelf life of cakes covered with almonds. The models were then contrasted with one another. Regarding the product's shelf life, both of the generated models yielded fairly accurate estimates [2]. An intriguing finding from comparing the two models was that, when multiple trials were conducted with the same spread being constant in both models, the output findings were identical. This suggests that ANN computing models are a practical, efficient, and potent alternative to costly, time-consuming, laboratory-based techniques for shelf life testing.

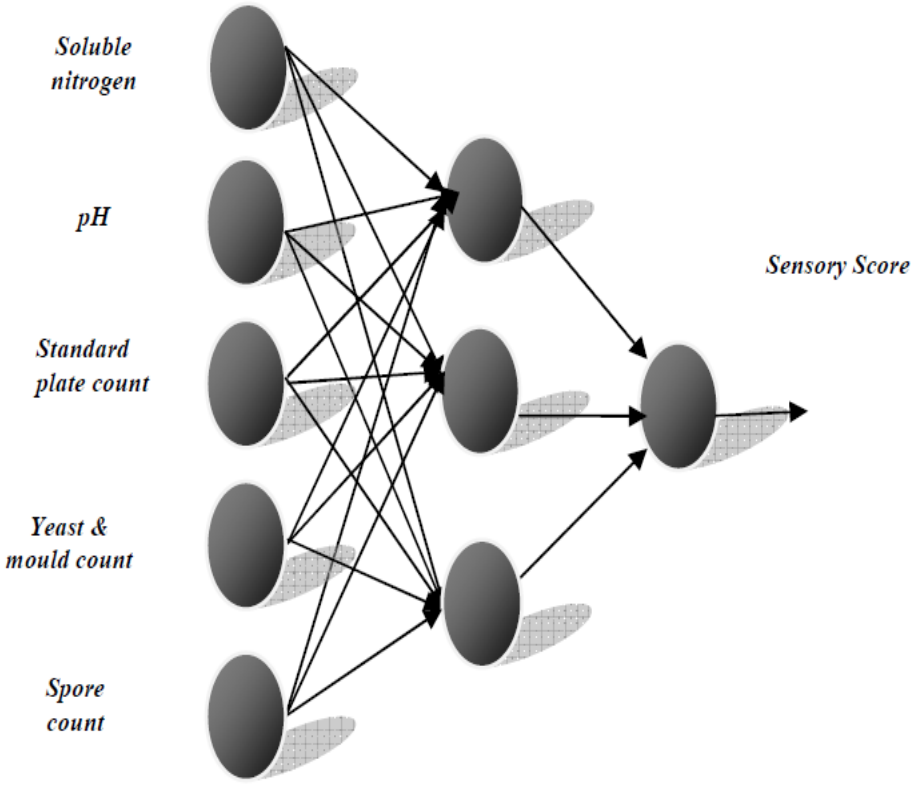

Fig 1: ANN Models Input and Output

V. Results and Analysis

Multiple hidden layers were used to train the ANN, and the output layer's transfer function was experiments, while the hidden layers was sigmoid.

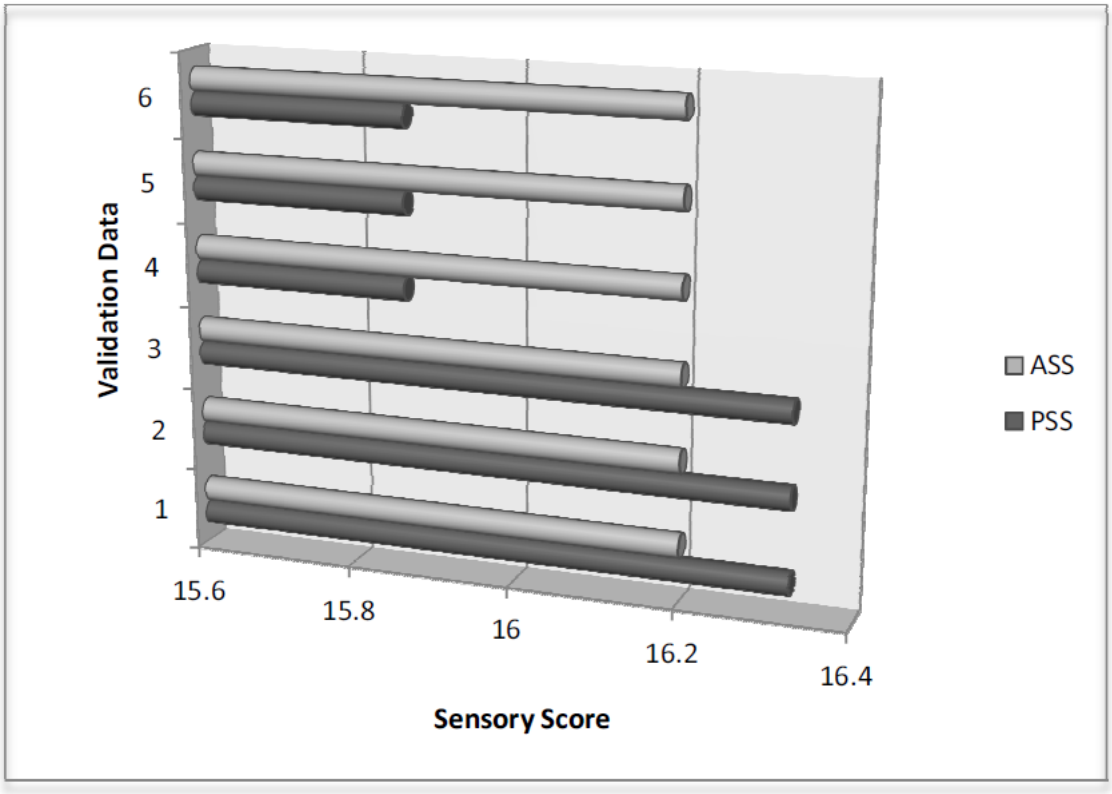

Fig 2: PSS and ASS comparison model

VI. Conclusion

Cascade multilayer ANNs were created for the estimate of cheese held at temperatures between 10 and 13^0 degrees Celsius. The sensory score was the outcome variable, whereas the soluble standard plate count, yeast & mold count, and spore count were the input parameters. The study's findings showed a high determination coefficient and a significant connection between the actual and projected values, confirming that the proposed cascade multilayer ANN models performed better than the existing models when analyzing non-linear multivariate data. According to the study, the multilayer cascade model performed admirably when it came to shelf life estimation.

References

[1] Srikanth Iyengar and Shang Lee Chei. "XZ-YZ-Source Technology Inverter SMPS". Springer Proceedings Ind. Appl. 2013; 32(5): 210–218.

[2] Hugh Man, Diesel, Shang Chie and Naresh Kumar. "Computational Intelligence in Pulse width modulation of Z-source inverters". IEEE Trans. Control Power Systems. 2015; 22(8): 12–22.

[3] J Liu, J Hu, and L Xu. "Dynamic modelling and analysis of Z-source converter—Derivation of ac small signal model and design-oriented analysis". IEEE Trans. Power Electron. 2007; 22(5): 1786–1796.

[4] Chie Lee and Yadav Kumar. "An Matrix Converter using Array System in Power Electronics in Communication Systems". Springer Conference in Hindustan University, Chennai, VOL. 2, NO. 3, March 2009

[5] Saritha, Srikanth, Subhakar and Sunitha, "A Process control system using Fuzzy in Industrial Applications using Thyristors in power electronics for PMSG",". Elsevier 2011. China, 7 – 9, January 2012.

[6] Niharika, Lakshman Reddy and Shanchie, "A Novel of MIMO concepts in wireless relay networks in Space Time and Space Frequency in achieve diversity", " IEEE Conference Proceedings on Innovative Research in Communication Systems (IRCS), International Conference. vol. 2, pp. 67 – 75, January. 2010

[7] John Diesel, Shang Chee and Cooper Lee, "Implementation of Fuzzy using Artificial Intelligence in Standalone Grid system for On and OFF modes Using Renewable energy sources using PMMC Technology', "Springer Proceedings on Green Energy on World environmental Day", IEEE conference proceedings held at Madras University, on the 20tt Century. pp.10-19, 2020

[8] Sumit Goyal and G.K. Goyal, "Application of artificial neural engineering and regression models for fore casting shelf life of instant coffee drink. *International Journal of Computer Science Issues*, vol.8(4), no. 1, pp.320-324,2011.

[9] Sumit Goyal and G.K. Goyal, "Cascade and feedforward backpropagation artificial neural networks models for prediction of sensory quality of instant coffee flavoured sterilized drink," *Canadian Journal on Artificial Intelligence, Machine Learning and Pattern Recognition*, vol.2(6), pp.78-82, 2011.

[10] Sumit Goyal and G.K. Goyal, "Development of neuron based artificial intelligent scientific computer engineering models for estimating shelf life of instant coffee sterilized drink," *International Journal of Computational Intelligence and Information Security*, vol.2(7), 4-12, 2011.