Neural network (NN) is a part of machine learning and Artificial Intelligence (AI) which is widely used as object identification and classification model. CBIR has an important role in extracting features as information contained in an image and is used for image search. Algorithms in NN and CBIR, both of which are widely applied in various AI applications. In this research, NN and the feature extraction algorithm in CBIR were adopted and developed into a software prototype "identification of fish freshness based on gill color features using the Neural Network method". The research method is divided into six stages. The first stage is the acquisition of gill images using freshwater fish, namely Oreochromis niloticus, Cyprinus carpio, and O. mossambicus. The gill imagery was taken for 15 hours, with an interval of 3 hours after death. The second stage, pre-processing: automatic cropping of the image to obtain information on the gill area. The third stage, the feature extraction process uses a 3-dimensional HCL color space which is quantized in three formats into 240, 360, and 480 color feature bins. Based on the analysis of the obtained 3-dimensional matrix, it is necessary to process data reduction by taking Hue, Croma, and Luminance which contribute to the color distribution value. The result of the color feature data is reduced to 144, 180, and 288 which is followed by the process of forming a color bin feature database. The fourth stage is the formation of a classification model through a learning process using 27 Neural Network architectures with 120 training images. The fifth stage: the classification model of the learning of the Neural Network provides the highest accuracy of 91.67%. The Neural Network architecture that produces the highest accuracy is used at the testing stage using 30 test images. The sixth stage model testing phase produces the highest accuracy of 93.33%. The architecture that produces the highest accuracy in the learning and testing process is then used for the prototype testing phase of fish freshness identification. The prototype testing phase was carried out using 50-gill images, the test results resulted in an accuracy of 94% with an average identification time of 0.1102 seconds.

Keywords: Content-Based Image Retrieval (CBIR), Color Feature Extraction, Fish Gills, Neural Network