

Applying Multiplicative Weight Update to Skin Cancer Classifiers

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Abstract : This study deals with using Multiplicative Weight Update within artificial intelligence and machine learning to create models that can diagnose skin cancer using microscopic images of cancer samples. In this study, the multiplicative weight update method is used to take the predictions of multiple models to try and acquire more accurate results. Logistic Regression, Convolutional Neural Network (CNN), and Support Vector Machine Classifier (SVMC) models are employed within the Multiplicative Weight Update system. These models are trained on pictures of skin cancer from the ISIC-Archive, to look for patterns to label unseen scans as either benign or malignant. These models are utilized in a multiplicative weight update algorithm which takes into account the precision and accuracy of each model through each successive guess to apply weights to their guess. These guesses and weights are then analyzed together to try and obtain the correct predictions. The research hypothesis for this study stated that there would be a significant difference in the accuracy of the three models and the Multiplicative Weight Update system. The SVMC model had an accuracy of 77.88%. The CNN model had an accuracy of 85.30%. The Logistic Regression model had an accuracy of 79.09%. Using Multiplicative Weight Update, the algorithm received an accuracy of 72.27%. The final conclusion that was drawn was that there was a significant difference in the accuracy of the three models and the Multiplicative Weight Update system. The conclusion was made that using a CNN model would be the best option for this problem rather than a Multiplicative Weight Update system. This is due to the possibility that Multiplicative Weight Update is not effective in a binary setting where there are only two possible classifications. In a categorical setting with multiple classes and groupings, a Multiplicative Weight Update system might become more proficient as it takes into account the strengths of multiple different models to classify images into multiple categories rather than only two categories, as shown in this study. This experimentation and computer science project can help to create better algorithms and models for the future of artificial intelligence in the medical imaging field.

Keywords : artificial intelligence, machine learning, multiplicative weight update, skin cancer

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