

Mathematical Approach in Image Classification using Regression

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Abstract: *This study presents a comprehensive evaluation of logistic regression in contrast to a hybrid model combining VGG16 with logistic regression for image classification tasks. The research findings illuminate a striking performance disparity between these two approaches, shedding light on the profound impact of integrating deep learning techniques into image classification. The transition from logistic regression to the VGG16-based hybrid model marks a notable turning point in our investigation. The VGG16 architecture, renowned for its prowess as a feature extractor, showcases an impressive 53.33% surge in accuracy compared to the conventional logistic regression model. This substantial leap underscores the model's capacity to decipher complex image characteristics that elude traditional statistical methods. Furthermore, precision, a crucial metric in classification tasks, experiences a substantial 53% augmentation when adopting the VGG16 hybrid approach. This enhancement signifies the hybrid model's ability to minimize false positives, making it particularly valuable in scenarios where precision holds paramount importance. Equally noteworthy is the substantial 54% improvement observed in both recall and F1-score, emphasizing the VGG16 hybrid model's remarkable capacity to identify and retrieve a higher proportion of true positives while maintaining a balance between precision and recall. This not only amplifies the model's ability to correctly classify images but also mitigates the risk of overlooking relevant instances. These compelling findings underscore the critical role of deep learning, specifically convolutional neural networks (CNNs), in the realm of image classification. The utilization of CNNs, exemplified by the VGG16 architecture, emerges as a game-changer, enabling the capture of intricate image features and patterns that traditional logistic regression struggles to discern. Generally, this study advocates for the integration of advanced deep learning techniques, like VGG16, in image classification endeavors. The substantial performance gains witnessed in accuracy, precision, recall, and F1-score reinforce the pivotal role of convolutional neural networks in enhancing the effectiveness of image classification tasks. By harnessing the power of deep learning, we unlock new horizons in image analysis, paving the way for more accurate and efficient classification systems.*

Keywords: CNN, Logistic Regression, Supervised Learning, VGG16

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