UNDERGRADUATE THESIS

CLASSIFICATION OF CHICKEN MEAT FRESHNESS USING COLOR AND TEXTURE FEATURE FUSION WITH BAYESIAN OPTIMIZATION CROSS VALIDATION ON LIGHTGBM

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SURABAYA

2026

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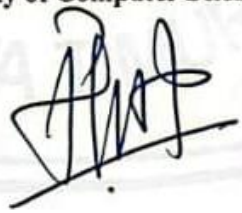

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ABSTRACT

Student Name / ID	:	Agatha Diani Putri Saka / 22081010094
Thesis Title	:	Classification of Chicken Meat Freshness Using Color and Texture Feature Fusion with Bayesian Optimization Cross Validation on LightGBM
Thesis Advisor	:	1. Dr. Faisal Muttaqin, S.Kom, M.T 2. Fetty Tri Anggraeny, S.Kom. M.Kom

This study evaluates the effect of Bayesian Optimization on the performance of the LightGBM algorithm for classifying chicken meat freshness from digital images. The research process included dataset preparation, image resizing to 256 × 256 pixels, data augmentation, Region of Interest (ROI) extraction, and data splitting using ratios of 80:20, 70:30, and 60:40. Feature extraction was performed using three feature combinations, namely HSV-GLCM, HSV-LBP, and HSV-GLCM-LBP. These features were then used as inputs for both the standard LightGBM model and the optimized model. Chicken meat samples were categorized into three classes: fresh, less fresh, and rotten. Model effectiveness was measured using accuracy, precision, recall, F1-score, and AUC. The experimental results indicate that the optimized LightGBM model generally produced better classification results than the standard model. The highest performance was obtained from the HSV-GLCM-LBP feature combination with an 80:20 data split, achieving an accuracy of 90.15%, precision of 90.18%, recall of 90.15%, F1-score of 90.09%, and AUC of 0.9707. The findings demonstrate that combining color, texture, and local texture information provides a more representative feature set for chicken meat freshness classification. Under the same feature configuration, the standard LightGBM model achieved an accuracy of 86.01%, indicating a performance improvement of 4.14% after optimization. The best performing model was also integrated into a web based application capable of automatically predicting chicken meat freshness from uploaded images. Overall, Bayesian Optimization effectively improved LightGBM performance and supported the development of an automated freshness classification system.

Keywords : LightGBM, Bayesian Optimization, Classification, Chicken Meat Freshness, Feature Extraction

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Surabaya, June 09 2026

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