

ABSTRAK

Paru-paru merupakan salah satu organ vital yang berperan penting dalam proses pernapasan manusia. Beberapa penyakit seperti pneumonia, tuberkulosis, dan bronkitis dapat mengganggu fungsi paru-paru secara signifikan. Diagnosis berbasis citra rontgen masih menghadapi tantangan, terutama karena proses identifikasi yang masih bersifat manual dan subjektif. Oleh karena itu, diperlukan metode otomatis yang dapat membantu klasifikasi penyakit paru-paru secara akurat. Pada penelitian ini, dikembangkan sistem klasifikasi berbasis fitur tekstur menggunakan metode *Gray Level Co-occurrence Matrix* (GLCM) dan metode *Linear Discriminant Analysis* (LDA). GLCM digunakan untuk mengekstraksi fitur tekstur seperti kontras, korelasi, energi, dan homogenitas dari 300 citra rontgen paru. Metode LDA kemudian diterapkan untuk klasifikasi penyakit paru-paru dari hasil yang diperoleh metode GLCM. Total data yang digunakan dalam penelitian ini adalah 300 citra rontgen paru-paru dengan empat kategori: Normal, Pneumonia, Tuberkulosis, dan Bronkitis. Evaluasi menggunakan akurasi, *precision*, *recall*, dan *F1-score*. Hasil evaluasi menunjukkan akurasi tertinggi pada tuberkulosis sebesar 80%, diikuti bronkitis 66,7%, pneumonia 53,3%, dan normal 46,7%, dengan akurasi keseluruhan sebesar 61,67%. Tuberkulosis menunjukkan performa terbaik dengan *precision* 63,16%, *recall* 80,00%, dan *F1-score* 70,59%. Kelas Normal memiliki *precision* tertinggi 70,00% namun *recall* terendah 46,67% dan *F1-score* 56,00%. Kelas Bronkitis memiliki *precision* 58,82%, *recall* 66,67%, dan *F1-score* 62,00%. Kelas Pneumonia memiliki *precision* 57,14%, *recall* 53,33%, dan *F1-score* terendah yaitu 55,17%.

Kata Kunci : Penyakit Paru-Paru, *Gray Level Cooccurrence Matrix*, Klasifikasi, *Linear Discriminant Analysis*

ABSTRACT

The lungs are one of the vital organs that play a crucial role in the human respiratory process. Diseases such as pneumonia, tuberculosis, and bronchitis can significantly impair lung function. Image-based diagnosis using X-rays still faces challenges, particularly due to the manual and subjective nature of the identification process. Therefore, an automated method is needed to assist in the accurate classification of lung diseases. In this study, a texture feature-based classification system was developed using the Gray Level Co-occurrence Matrix (GLCM) method and Linear Discriminant Analysis (LDA). GLCM was used to extract texture features such as contrast, correlation, energy, and homogeneity from 300 lung X-ray images. The LDA method was then applied to classify lung diseases based on the results obtained from GLCM. A total of 300 lung X-ray images were used in this study, divided into four categories: Normal, Pneumonia, Tuberculosis, and Bronchitis. The evaluation using accuracy, precision, recall, and F1-score showed that tuberculosis achieved the highest accuracy at 80%, followed by bronchitis at 66.7%, pneumonia at 53.3%, and normal cases at 46.7%, with an overall accuracy of 61.67%. Tuberculosis performed best with 63.16% precision, 80% recall, and a 70.59% F1-score. The normal class had the highest precision at 70% but the lowest recall at 46.67% and an F1-score of 56%. Bronchitis showed 58.82% precision, 66.67% recall, and a 62% F1-score, while pneumonia had 57.14% precision, 53.33% recall, and the lowest F1-score of 55.17%.

Keywords : *Lung Diseases, Gray Level Co-occurrence Matrix, Classification, Linear Discriminant Analysis*