

# Perancangan sistem pengenalan wajah menggunakan Support Vector Machine (SVM), Logistic Regression, Multi-Layer Perceptron (MLP), Gaussian Naive Bayes, K-Nearest Neighbour (KNN), Decision Tree (DT), dan Convolutional Neural Network (CNN) = Development of face recognition system using Support Vector Machine (SVM), Logistic Regression, Multi-Layer Perceptron (MLP), Gaussian Naive Bayes, K-Nearest Neighbour (KNN), Decision Tree (DT), and Convolutional Neural Network (CNN)

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## Abstrak

Dunia digital khususnya image processing berkembang seiring waktu berjalan dikarenakan kebutuhan masyarakat dan pentingnya keamanan sistem berbasis digital. Salah satu teknologi yang sangat mengalami kemajuan pesat adalah pengenalan wajah (face recognition) menggunakan artificial intelligence. Wajah seseorang yang sudah terdaftar di dalam database akan dikenali oleh sistem untuk keperluan validasi atau verifikasi. Di dalam penelitian ini dirancang sistem pengenalan wajah (face recognition) menggunakan algoritma machine learning dan Principal Component Analysis (PCA) sebagai pereduksi dimensi. Pengujian dilakukan dengan menggunakan beberapa metode, yakni: Support Vector Machine (SVM), Decision Tree (DT), K-Nearest Neighbour (K- NN), Logistic Regression (LR), Multi-Layer Perceptron (MLP) dan Convolutional Neural network (CNN). CNN berfokus pada layer dan tidak memerlukan reduksi dimensi, sehingga hasilnya lebih akurat. Model machine learning yang digunakan untuk classifier selain CNN adalah standar/default, sedangkan CNN menggunakan arsitektur LeNet-5, dengan dropout rate sebesar 0.25. Training dilakukan selama 60 epoch dengan loss function crosscategorical entropy, optimizer Adam, dan batch size sebesar 20. Data masukan adalah citra wajah berukuran  $64 \times 64 \times 1$  yang diperoleh dari dataset olivetti faces. Akurasi tertinggi metode PCA, SVM, maupun LR sebesar 91.25%, sementara akurasi terbaik CNN mencapai 98.75%. Selain akurasi, pemakaian confusion matrix dan classification report digunakan untuk menguji performa metode yang ada melalui evaluasi model klasifikasi.

.....The digital world, especially image processing, is evolving due to the needs of society and the importance of digital-based system security. One of the technologies that are rapidly progressing is face recognition using artificial intelligence. The system will recognize a person's face already registered in the database for validation or verification purposes. A face recognition system was designed using machine learning algorithms and Principal Component Analysis (PCA) as dimension reduction in this study. Testing is conducted using several methods: Support Vector Machine (SVM), Decision Tree (DT), K-Nearest Neighbour (K-NN), Logistic Regression (LR), Multi-Layer Perceptron (MLP) and Convolutional Neural network (CNN). CNN focuses on layers and does not require dimensional reduction to increase the accuracy of the result. The machine learning model used for classifiers other than CNN is standard/default settings, while CNN uses the LeNet-5 architecture, with a dropout rate of 0.25. The training was conducted for 60 epochs with loss function cross-categorical entropy, optimizer Adam, and batch size of 20. Input data is a  $64 \times 64 \times 1$  facial image obtained from the Olivetti faces database. The highest accuracy of PCA, SVM and LR methods was 91.25%, while CNN's best accuracy reached 98.75%. In addition to accuracy, the use of

confusion matrix and classification report is used to test the performance of existing methods through the evaluation of classification models.