

INTISARI

Indonesia dikenal sebagai negara kepulauan dengan banyak biodiversitas perikanan, baik ikan air tawar maupun ikan air laut. Ikan air tawar menjadi salah satu komoditas penting karena banyak dibudidayakan sebagai sumber pangan perekonomian masyarakat. Teknologi deep learning berbasis *Convolutional Neural Network* (CNN) dapat digunakan untuk mengklasifikasikan objek berdasarkan pola warna dan bentuk pada citra digital. Penelitian ini bertujuan untuk membangun dan mengimplementasikan metode CNN untuk klasifikasi 10 jenis ikan air tawar berbasis warna yaitu, lele, nila, mas, gurame, bawal, bandeng, sepat, gabus, tawes, dan betok.

Perancangan sistem dilakukan melalui beberapa tahapan meliputi pengumpulan data, preprocessing data, perancangan model CNN, pelatihan model, pengujian model, dan evaluasi sistem. Dataset diperoleh dari dua sumber yaitu dataset online dan dokumentasi pribadi, kemudian dikombinasikan menjadi dataset gabungan. Tahapan *preprocessing* meliputi resize citra menjadi ukuran 128x128 piksel dengan 3 kanal RGB, normalisasi piksel, dan augmentasi data berupa rotasi, flipping, dan zoom. Model CNN dibangun menggunakan beberapa *convolution layer*, *pooling layer*, dan *fully connected layer* dengan optimizer Adam dan loss function categorical crossentropy.

Berdasarkan Hasil penelitian menunjukkan bahwa sistem mampu melakukan klasifikasi jenis ikan air tawar berdasarkan pola warna dan bentuk tubuh ikan dengan performa yang baik. Evaluasi model dilakukan menggunakan *accuracy*, *precision*, *recall*, *F1-score*, dan *confusion matrix*. Pada dataset pribadi diperoleh akurasi terbaik sebesar 95%, dataset online sebesar 97%, dan dataset gabungan sebesar 93%. Sistem juga dapat menampilkan hasil prediksi berupa gambar ikan, label klasifikasi, dan nilai probabilitas melalui antarmuka pengguna (GUI). Penelitian ini menunjukkan bahwa metode CNN dapat digunakan untuk klasifikasi ikan air tawar berbasis citra digital.

Kata Kunci : Klasifikasi ikan, *CNN*, citra digital, *deep learning*.

ABSTRACT

Indonesia is known as an archipelagic country with abundant fishery biodiversity, including freshwater and marine fish. Freshwater fish are one of the important commodities because they are widely cultivated as a source of food and community economy. Deep learning technology based on Convolutional Neural Network (CNN) can be used to classify objects based on color patterns and shapes in digital images. This study aims to build and implement a CNN method for the classification of 10 types of freshwater fish based on color images, namely catfish, tilapia, carp, gourami, pomfret, milkfish, climbing perch, snakehead fish, tawes, and betok fish.

The system design was carried out through several stages including data collection, data preprocessing, CNN model design, model training, model testing, and system evaluation. The dataset was obtained from two sources, namely online datasets and personal documentation, then combined into a merged dataset. The preprocessing stage included image resizing to 128×128 pixels with 3 RGB channels, pixel normalization, and data augmentation in the form of rotation, flipping, and zooming. The CNN model was built using several convolution layers, pooling layers, and fully connected layers with the Adam optimizer and categorical crossentropy loss function.

The results showed that the system was able to classify freshwater fish types based on the color patterns and body shapes of the fish with good performance. Model evaluation was conducted using accuracy, precision, recall, F1-score, and confusion matrix. The best accuracy results obtained were 95% for the personal dataset, 97% for the online dataset, and 93% for the combined dataset. The system was also able to display prediction results in the form of fish images, classification labels, and probability values through a Graphical User Interface (GUI). This study shows that the CNN method can be used for freshwater fish classification based on digital images.

Keywords: fish classification, CNN, digital image, deep learning.