

**ESTIMASI BERAT BADAN SAPI PADA GAMBAR MONOKULAR
MENGUNAKAN FITUR BERBASIS RASIO TUBUH DAN *FULLY CONNECTED
NEURAL NETWORK* (FCNN)**

SKRIPSI

Diajukan sebagai syarat untuk memperoleh gelar Sarjana Komputer
Program Studi Ilmu Komputer



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2025**

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Sebuah skripsi yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Sarjana
Komputer pada Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam

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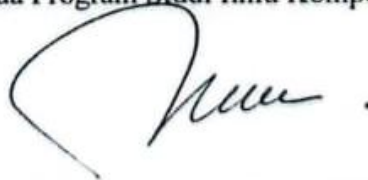


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LEMBAR PERNYATAAN

Dengan ini, saya menyatakan bahwa skripsi berjudul “Estimasi Berat Badan Sapi pada Gambar Monokular Menggunakan Fitur Berbasis Rasio Tubuh dan *Fully Connected Neural Network* (FCNN)” beserta seluruh isinya merupakan hasil karya saya sendiri. Saya tidak melakukan penjiplakan maupun pengutipan dengan cara yang melanggar etika keilmuan yang berlaku di lingkungan akademik. Atas pernyataan ini, saya bersedia menerima segala risiko atau sanksi jika di kemudian hari ditemukan pelanggaran terhadap etika keilmuan atau adanya klaim dari pihak lain terkait keaslian karya ini.

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KATA PENGANTAR

Puji syukur kami panjatkan ke hadirat Allah SWT atas segala rahmat, hidayah, dan karunia-Nya yang telah melimpahkan berkat-Nya sehingga penulis dapat menyelesaikan skripsi yang berjudul “Estimasi Berat Badan Sapi pada Gambar Monokular Menggunakan Fitur Berbasis Rasio Tubuh dan *Fully Connected Neural Network* (FCNN)” ini sebagai salah satu persyaratan untuk memperoleh gelar Sarjana Ilmu Komputer pada Program Studi Ilmu Komputer Universitas Pendidikan Indonesia.

Penulis menyadari bahwa skripsi ini masih memiliki kekurangan. Oleh karena itu, penulis membuka diri terhadap kritik dan saran yang membangun sebagai bahan perbaikan di masa depan. Semoga skripsi ini dapat memberikan manfaat di bidang teknologi informasi dan manajemen pengetahuan, serta menjadi referensi bagi penelitian selanjutnya.

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Penulis

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MENGUNAKAN FITUR BERBASIS RASIO TUBUH DAN *FULLY CONNECTED
NEURAL NETWORK* (FCNN)**

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ABSTRAK

Estimasi berat badan sapi dari data visual menawarkan alternatif tanpa kontak terhadap metode penimbangan tradisional, dengan potensi meningkatkan efisiensi dan kesejahteraan hewan dalam manajemen peternakan. Penelitian ini mengeksplorasi pendekatan tiga tahap yang meliputi segmentasi siluet sapi dari citra RGB, ekstraksi fitur berbasis rasio melalui *image processing*, dan regresi menggunakan *Fully Connected Neural Network* (FCNN). *Mask* hasil segmentasi digunakan untuk menghasilkan fitur berbasis rasio, sementara integrasi dengan fitur *Histogram of Oriented Gradients* (HOG) juga dievaluasi melalui arsitektur paralel. Model segmentasi menunjukkan performa tinggi dengan nilai MIoU sebesar 0.96, menegaskan keandalannya dalam mengekstraksi siluet sapi. Namun, tahap regresi menghasilkan performa terbatas, di mana model FCNN terbaik tanpa HOG mencapai RMSE 31.82 kg, MAPE 16.51%, dan R^2 0.247. Perbandingan dengan beberapa model *baseline* sederhana menunjukkan hasil yang sebanding, dengan regresi linear sedikit lebih baik, sehingga mengindikasikan keterbatasan utama berasal dari fitur yang digunakan, bukan dari arsitektur model. Penelitian selanjutnya disarankan untuk mengeksplorasi representasi fitur yang lebih informatif, seperti fitur jenis ras sapi, representasi visual langsung dengan CNN, atau fitur morfologi tubuh yang lebih detail guna meningkatkan akurasi estimasi berat sapi berbasis citra.

Kata kunci: *Fully Connected Neural Network (FCNN), Estimasi Berat Sapi, Computer Vision, Machine Learning*

CATTLE WEIGHT ESTIMATION FROM MONOCULAR IMAGES USING BODY RATIO-BASED FEATURES AND FULLY CONNECTED NEURAL NETWORK (FCNN)

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ABSTRACT

Estimating cattle body weight from visual data offers a contactless alternative to traditional weighing methods, with the potential to improve efficiency and animal welfare in farm management. This study explores a three-stage approach consisting of cattle silhouette segmentation from RGB images, ratio-based feature extraction through image processing, and regression using a Fully Connected Neural Network (FCNN). Segmentation masks were used to generate ratio-based features, while integration with Histogram of Oriented Gradients (HOG) features was also evaluated through a parallel architecture. The segmentation model achieved high performance with an MIoU of 0.96, confirming its reliability in extracting cattle silhouettes. However, the regression stage yielded limited performance, with the best FCNN model without HOG reaching an RMSE of 31.82 kg, MAPE of 16.51%, and R^2 of 0.247. Comparisons with several simple baseline models showed comparable results, with linear regression performing slightly better, indicating that the primary limitation lies in the features used rather than the model architecture. Future research is recommended to explore more informative feature representations, such as cattle breed, direct visual representations using CNN, or more detailed morphological body features to improve image-based cattle weight estimation accuracy.

Keyword: *Fully Connected Neural Network (FCNN), Cattle Weight Estimation, Computer Vision, Machine Learning*

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