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Weight and body size estimation of Sistani cattle using machine vision technology

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Abstract

The aim of this project was to estimate the body weight and body dimensions of Sistani cattle using machine vision technology. For this purpose, the Sistani cattle were weighed and their biometric information was recorded within a year monthly on Zahak station. At weightings, digital images were taken from the lateral view of cattle with a fixed distance of 2 meters, using the canon camera. Using Graphical Unit Interference of MATLAB software the digital images were initially preprocessed, the necessary changes were made on the photos, and then the required features were extracted from images by designing an appropriate algorithm.

The extracted features were introduced as inputs to the ANN and after training the ANN, an appropriate model was designed to predict the weight and body dimensions of the animals.

The 15 effective features such as EquivDiameter, MajorAxisLength, MinorAxisLength, BoundingBox, ConvexArea, FilledArea, Area, Perimeter, and the number of white pixels of image (NNZ) which had a significant correlation with the weight and body dimensions of the Sistani cattle ($p < 0.01$) were used to design the neural networks. The results showed that by using artificial neural network and image processing, the body dimensions of the Sistani cattle including body length, shoulder height, back height, and chest girths were estimated with accuracy of 0.98, 0.97, 0.97 and 0.98 percent, respectively. The accuracy of the final model to estimate the Sistani cattle weight using artificial neural network model and digital image processing was 0.97. The overall results of the present study showed that the image processing technology had an appropriate potential to use in biometric studies and Sistani cattle weight estimation instead of the current conventional measuring methods.

Key words: Artificial Intelligence, weight estimation, Biometry, Sistani cattle.