135

Unique animal photo-identification with siamese neural networks

Wild animal conservation measures are taken on the basis of animal population parameters such as abundance, survival and birth rate, produced through individual animal identification (ID). Traditional methods include tagging, marking, and manual identification of photos, but these methods can be time-consuming and in some cases invasive. However, non-invasive approaches can exploit photographs of species with unique characteristics to carry out individual identification. This research work builds a photo-identification model that can reliably match photographs of the same individual based on unique characteristics. The model is a combination of a segmentation model and a photo-matching classifier. The segmentation model is a convolutional neural network that takes an image with one or multiple individual animals as input and produces the region of each animal conveying individual-specific characteristics. The photo-matching model is a siamese neural network that takes two images produced by the segmentation model and utilizes individual-specific and latent characteristics to predict the probability that a pair of images originates from the same individual (a match). Unique individuals are then generated from the obtained matches. The developed model focuses on humpback whale, bottlenose dolphin, and harbour seal datasets as case studies.