Siamese neural networks applied to the photo-ID of fish individuals in a public monitoring system

Nuria Gómez-Vargas[1]
[1]Instituto de Matemáticas de la Universidad de Sevilla (IMUS), 41012 Seville, Spain
ngvargas@us.es

Alexandre Alonso-Fernández[2], **Rafael Blanquero**[1], **Luis T. Antelo**[2]
[2]Instituto de Investigacións Mariñas (IIM-CSIC), 36208 Vigo, Spain

Abstract. Individual recognition is critical to track population changes in order to assess environmental impacts, and monitoring should be addressed through minimally invasive tools. For this, we propose photo-identification via Deep Learning. Nevertheless, accruing enough samples to train these models might be difficult to achieve. We develop a siamese network that discriminates fish individuals and overcomes the data scarcity problem. We applied the procedure to pictures of the endangered species *Raja undulata*. Our model achieved a 70% accuracy over the test set including recaptures. Siamese networks are not only powerful within the context of Few-Shot Learning in closed-set identification problems but also when considering new incoming individuals, improving the current public monitoring program of the target species.

Keywords: deep learning; few-shot learning; monitoring systems; photo-identification

References

[1] Chicco, D.: Siamese neural networks: An overview. Artificial Neural Networks, 73-94 (2021)

[2] Torrey, L. et al.: Transfer learning. In Handbook of research on machine learning applications and trends: algorithms, methods, and techniques, 242-264 (2010)

[3] Xian, Y.: Learning from limited labeled data- Zero-Shot and Few-Shot Learning (2020)