Health & Welfare

R&D collaboration to explore using AI to count sea lice

19 May 2022

By Responsible Seafood Advocate

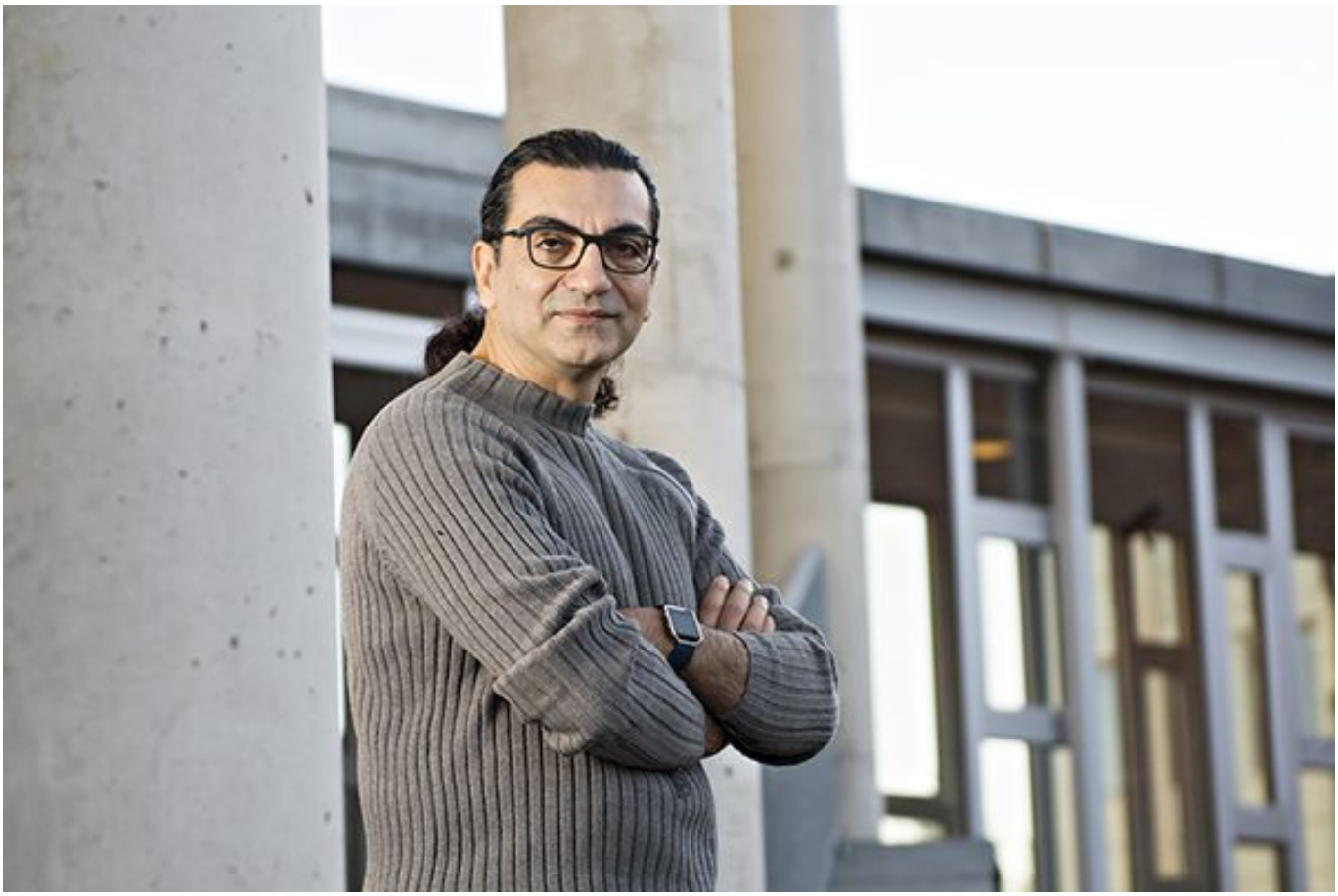
Project aims to improve accuracy of selecting resistant fish for breeding purposes

The Danish Technological Institute (https://www.dti.dk/) (DTI), a non-profit focused on high technology solutions, and **Benchmark Genetics (https://bmkgenetics.com/)**, a world leader in breeding and genetics on Atlantic salmon, tilapia, shrimp and lumpfish, are collaborating on a research and development (R&D) project that involves using artificial intelligence (AI) to count sea lice. The goal is to improve the accuracy of selecting resistant fish for breeding purposes.

Currently, to assess the degree of resistance of Atlantic salmon to sea lice, breeding companies count the number of parasites on each fish following a period of infection. But this process has challenges.

“This is a laborious and time-consuming process involving many people needed to count the lice manually,” wrote the partners in a press release. “However, this process can now change, thanks to [this new collaboration]. By taking photos of each fish and using artificial intelligence (AI) to analyze images in real-time, the work obtained an accurate number of lice infections per animal.”

The imaging technology uses a combination of a half-circular light-dome (CSS dome light HPD2-400FC) and a 5-megapixel monochrome camera to take an image of each salmon. The high-power



The Danish Technological Institute and Benchmark Genetics are exploring the use of artificial intelligence (AI) to count sea lice on salmon. Pictured: Hooman Moghadam, research scientist at Benchmark Genetics Norway AS.

light dome has three individual triggered colour diodes: red (622 nm), green (525 nm) and blue (470 nm). The mono-camera takes one picture at each wavelength, and then images are post-processed using the developed AI.

“It was found that this imaging system provides the user with the best visibility and contrast between the lice and the fish,” said the partners. “The algorithm uses a deep learning segmentation model based on a multiple convolutional network architecture U-net image model, initially developed for biomedical image segmentation.”

The AI model is trained to segment the sea lice and salmon. After image segmentation, the sea lice are filtered and counted. By repeating this process and automatically augmenting the image appearance in various ways, the model learns the shape and becomes robust against varying fish and lice sizes, image angles, illumination variations and so forth.

A helping hand to lend: UK aquaculture seeks to broaden its horizons

Aquaculture is an essential contributor to the world food security challenge, and every stakeholder has a role to play in the sector's evolution, delegates were told at the recent Aquaculture's Global Outlook: Embracing Internationality seminar in Edinburgh, Scotland.

Global Seafood Alliance

"The training dataset is created by manually marking pixels with lice in the image," said the partners. "The model can then compare its results against the training dataset and gets trained. The bigger the training dataset, the more accurate the algorithm can detect lice. The model's performance improvement is verified by keeping a subset of the annotated data for model validation."

Once the new technology is implemented, Benchmark Genetics expects to gain a higher quality of the phenotypic datasets and improve the precision in selecting the best breeding candidates for resistance to sea lice.

Follow the *Advocate* on Twitter @GSA_Advocate (https://twitter.com/GSA_Advocate)

Author

RESPONSIBLE SEAFOOD ADVOCATE

editor@globalseafood.org (mailto:editor@globalseafood.org)