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## Automatic Detection of Destruction and Freshness in Anchovy (*Engraulis ringens*) Using Informal Photos

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In the fishing industry, maintaining the quality of fish such as the Peruvian anchovy (*Engraulis ringens*), used primarily for fishmeal and oil, is critical. The condition and freshness of the fish directly influence production outcomes and the final product's quality. Traditional methods for assessing fish freshness, though precise, are often too costly and time-consuming for frequent application. This study introduces a novel method using convolutional neural networks (CNN) to estimate the freshness of Peruvian anchovy from informal photos taken by fishermen using mobile phones or cameras. Initially, the CNN model was trained to identify not only the fish and krill but also damaged organs and blood. This identification process is crucial as the physical integrity of the fish affects the cooking process: the less intact the fish upon entering the factory, the different the cooking approach should be. Therefore, real-time measurements of fish wholeness, freshness, and the amount of krill entering the production are essential. The CNN model is designed to automatically classify the freshness of the fish by analyzing images for key indicators such as eye clarity, skin texture, and color, and to address the challenge of krill contamination —small crustaceans frequently mixed with anchovy catches. The model distinguishes between krill, anchovy, and levels of destruction such as blood, which is vital for accurate freshness evaluation. Preliminary results show a strong correlation between the CNN predictions and traditional laboratory measurements, indicating that this approach can significantly streamline freshness assessments, reduce costs, and improve response times in production decisions. This technology has the potential to transform quality control in the anchovy fishing industry, enhancing both efficiency and economic viability.

### Type of presentation

Talk

### Classification

Mainly application

### Keywords

image processing, fish freshness, convolutional neural networks

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