Species Identification of Skates and Rays

Developments in AI and Image Recognition

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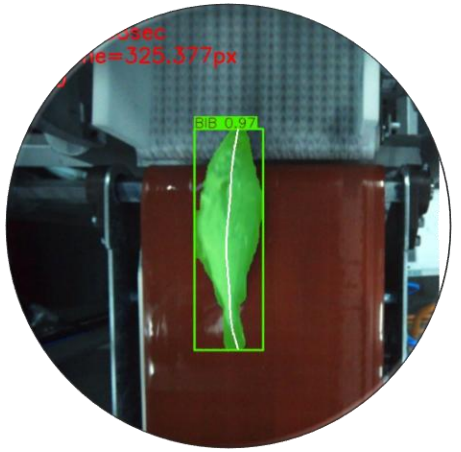
Introduction & Context

- Skates and rays play an important role in marine ecosystems and fisheries management, yet species-level identification on board remains a challenge.
- Many species look very similar.
- Crew often lack detailed taxonomic expertise.
- Sorting is done under time pressure.
- Misidentifications are common: affects whole flow from data collection to advice and sustainable management decisions.
- At ILVO, we focus on AI and image recognition to address this issue.

ILVO

AI Research at ILVO Marien

- Objective ILVO Marien AI research team:
  - To develop tools and expertise to automate data collection on board of a fishing vessel, that are currently manual, slow, or error-prone.
- Wide range of machine vision applications for the fisheries sector:
  - Species identification and classification of catches.
  - Tracking and measurement of individual specimens.
  - Automatic age determination using calcified structures (e.g. otoliths).
  - Quality assessment using hyperspectral technology.
  - Synthetic data generation to improve model robustness and address data gaps.



ILVO

Focus on Catch Identification

- Main focus: catch identification.
- ILVO Marien is partner in several Horizon 2020 projects addressing monitoring challenges:
  - Reducing bycatch of sensitive species.
  - Improving data for stock assessments.
  - Enabling more efficient and objective monitoring.
- Testing and refining technology under real-life conditions.

OptiFish

Marine Beacon
MONITORING & ELIMINATION OF BYCATCH OF ENDANGERED & CONSERVED SPECIES IN THE NE & HIGH SEAS ATLANTIC REGION

EVERYFISH

SYNFISH

VISIM

ILVO

VISIM: Autonomous Camera

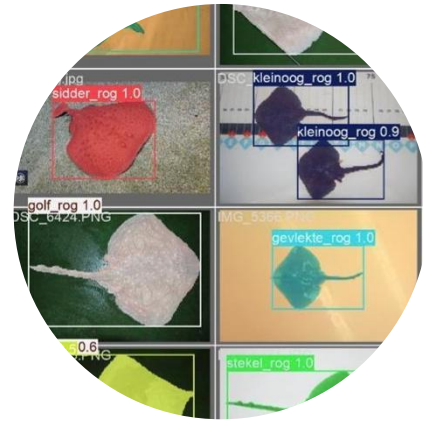
- EMFAF-funded project.
- ILVO developed an autonomous camera system installed above sorting belt on board vessels.
- Automatically collects images of the catch.
- AI models detect and classify species.
- Future: integrate output into scientific workflows and dashboards (*Vistools* (EMFAF Funded)).

Medegefinancierd door de Europese Unie

VISIM

ILVO

Marine Beacon (EU Horizon)



- Focus on Elasmobranchii.
- Species-level ID is difficult, even for experts.
- Two complementary models:
  - Onboard camera model for sharks and rays.
  - Mobile model in Mofi app (developed by Anchorlab).
- Builds on Rayscan app dataset (valuable for training).

Mofi
Mobile fisheries log

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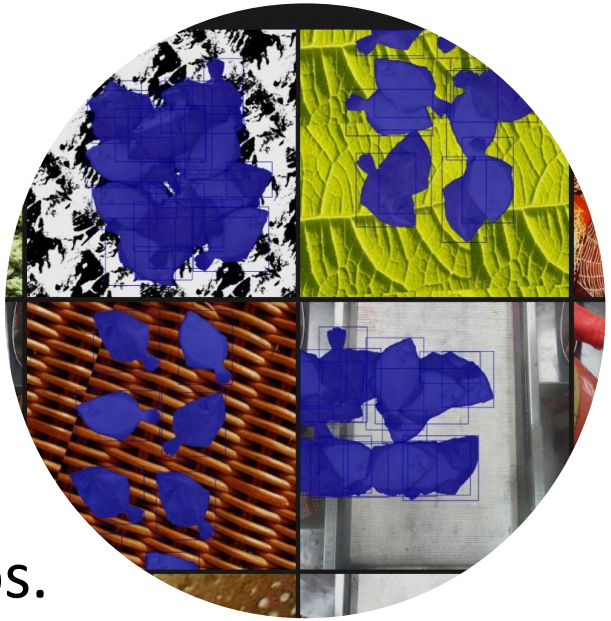
Broader Impact

- AI contributes at multiple levels:
  - Scientific: reliable, consistent species-level data.
  - Policy: stronger basis for management decisions.
  - Operational: reduced workload and errors.
  - Practical: user-friendly apps and dashboards.

Looking Ahead

- Next steps:
  - Further integration of autonomous systems.
  - Expand models to more species, including ETP species.
  - Combine visual with other data streams (e-logbooks, sensors).
  - Use synthetic data for rare species and complex scenarios.
  - Integrate the data streams and results from AI systems with trials on precision fisheries



Conclusion

- Skates and rays case shows AI-powered recognition can be a game changer for monitoring.
- Linking cameras with apps enables faster, more accurate data collection.
- Supports sustainable, evidence-based management of marine resources.

Thank you
Questions?

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