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Artificial Intelligence and the fisheries sector

There is a growing need in fisheries science and management for larger amounts of data and highly trained experts, in which digitalisation and Artificial Intelligence (AI) should play a central role.

Main observations

The **AI-related legal analysis in fisheries** found that there is no explicit reference to AI systems in the most relevant EU fisheries legislation, but there are references to digitalisation that could include AI systems. The most relevant fisheries legislation is drafted in a way that enable the use of AI systems. The broad-ranging nature of the **Artificial Intelligence Act (AIA) proposal** makes its application to the fisheries sector straitforward. Several third countries are considering AI methods for further automation of Electronic Monitoring systems.

The review of **AI techniques in fisheries** revealed that **Machine Learning (ML)** approaches have been used to automate biological sample processing. ML has been applied after image analysis and on acoustic data to count and measure organisms, research on catch classification by species and sizes using AI has increased. ML is being applied to automatically classify or determine fishers' behaviour.

Knowledge-based and expert systems have been applied to early warning systems and marine spatial planning, traditional rule-based expert systems have been mainly applied in data-limited situations.

Statistical approaches, Bayesian estimation, search and optimization methods are not traditionally considered AI, but can be integrated into AI systems, some of the uses identified are applied to stock assessments and species distribution models. Fishing vessels could improve energy efficiency and reduce their CO_2 footprint by using AI systems.

The study

reviews the main applications of Artificial Intelligence (AI) systems in fisheries and identifies current challenges for fisheries that have the potential to be dealt with through AI.

As regards **seafood in all of the supply chain**, AI shows promising uses for traceability and seafood product

integrity. Limited data generation and collection is the main barrier, the processing industry is starting to use AI systems in automation processes, AI proofs-of-concept have been developed in the field of logistics, and, ML has been used to infer consumer behaviour and economic growth forecasting.

As regards **the use of AI for more selective fishing techniques**, there is a mismatch between fisheries selectivity improvement management goals and industry's tools to comply with regulations. Species selectivity can be further improved with AI, and AI systems aimed at automated species forecasting and detection, identification and sizing of catches could allow improving fishing decisions and enable quota tracking.

As regards **the use of AI as a driving force for young people to seek jobs in fisheries**, AI, similarly to digitalisation, is likely to create new skilled jobs while decreasing the need for low skilled ones in the fisheries sector. The marine transport sector has developed AI systems focused on ship failure prediction and anomaly detection that could be applied in fishing vessels. A more digitalised and AI-based fisheries sector might attract new young talent, but will be competing against other industries currently offering higher incentives.

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Conclusions and policy recommendations

Main opportunities identified are: increased transparency of fishing activity and reduced impact on the environment, thereby improving the public image of the sector; early warning, forecasting and spatial planning systems can help in the planning activities considering trade-offs between them; accelerated and increased data acquisition and coverage for stock assessments, sustainability indicators evaluation and other management data needs; increased economic sustainability of the fishing industry, by reducing operational costs; and, the modernisation of fisheries and its subsequent attractiveness to the younger population.

Main obstacles identified are: industry trust and reluctance; initial costs and lack of expertise; and legal and bureaucratic uncertainty.

Main policy recommendations for the best use of AI in fisheries and its supply chain are:

- **Amend Regulations** that are or will be subject to revision in this field to include a reference to AI systems and AIA definition in paragraphs where digital transformation and new technologies are mentioned.
- **Amend the AIA proposal** to include the fisheries sector.
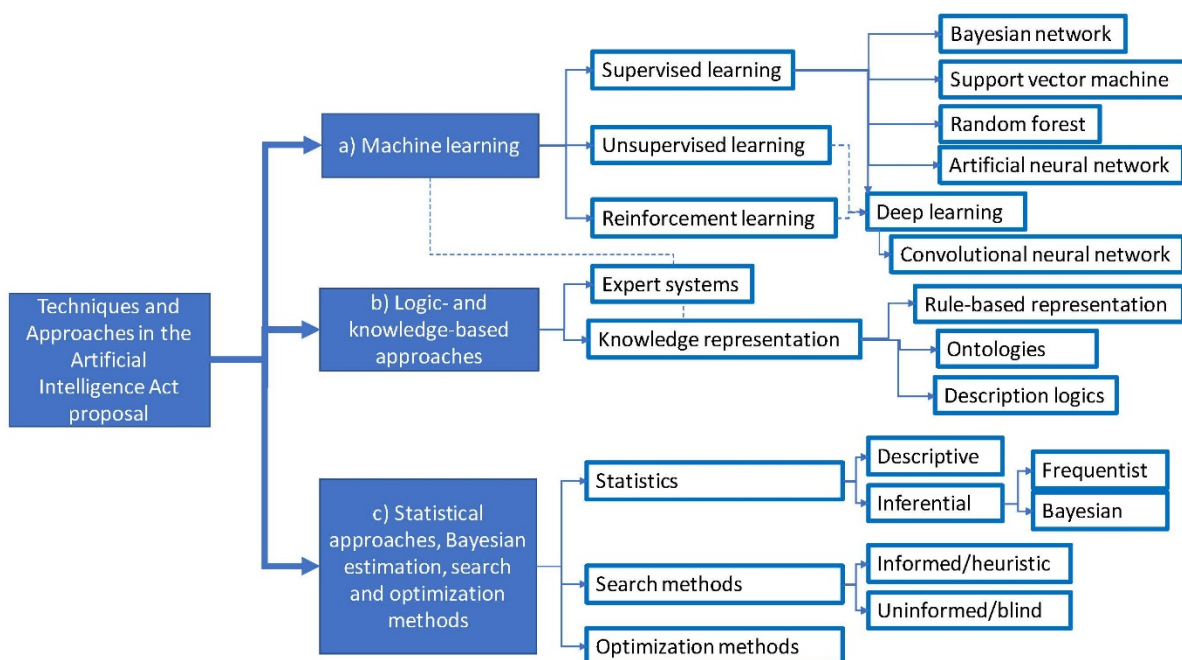- **Promote formation** of interdisciplinary fisheries experts with AI related skills and multidisciplinary teams.

- **Find ways to incentivise job opportunities** and promotion of multidisciplinary and interdisciplinary experts.
- **Attract young workers and empower women** with AI skills in fisheries sector jobs through dissemination of information programs and by providing adequate incentives.

Key areas for EU action

1. Add AI references to fisheries legislation and AIA proposal
2. Promote multidisciplinary fisheries experts
3. Incentivise job opportunities
4. Promote private data collection and sharing
5. Support the development of good AI practices

- **Promote private data collection and sharing,** including appropriate data aggregation and anonymization safety protocols to facilitate industry trust.
- **Support the development of good AI practices** and standards for statistical validation and ground truth verification to increase consumer and industry trust in AI performance.

Classification of AI techniques and approaches in the AIA proposal expanded with further subcategories used in the study

Source: AZTI