

WKMLEARN – Workshop on Uses of Machine Learning in Marine Science
2017/2/EOSG11

A **Workshop on Uses of Machine Learning in Marine Science** (WKMLEARN), co-chaired by Ketil Malde*, Norway and Shaheen Syed*, Netherlands/UK, will be established and will meet in ICES HQ, Copenhagen, 16-20 April 2018 to:

- a) Review ICES Fisheries Science processes to understand where machine learning and/or deep learning may be of greatest benefit, including:
 - i) Survey and data collection,
 - ii) Data handling,
 - iii) Analysis and assessment,
 - iv) Review and advice
 - v) Check degree to which expert groups are meeting their terms of reference
 - vi) Taking a forward look and consider emerging topics;
- b) Identify areas of marine science, data and advice within the ICES remit where machine learning/deep learning has already been applied;
- c) Identify options to better include social scientists into ICES processes, through the use of machine learning/deep learning, ;
- d) Recommend ways forward, particularly to include experts from outside ICES, and consider further areas of work within ICES where machine learning/deep learning would be particularly applicable. Future data storage options to facilitate machine learning/deep learning could also be considered.

WKMLEARN will report by 31 May 2018 for the attention of the Advisory and Science Committees.

Supporting information

Priority	The Workshop will explore an area of science and technology that is rising rapidly in its ability to support science and which has the potential to replace a number of traditional activities within the fishery science process. ICES needs to understand how best to respond to these developments.
Scientific justification	<p>Term of Reference a)</p> <p>Machine Learning (and/or Deep Learning) can be used in many ways – from text analysis to finding hidden patterns in large datasets, to analysing images and video, and to deriving analytical algorithms. All forms of machine learning will be considered in examining each stage of fish stock assessment and advice.</p> <p>Term of Reference b)</p> <p>Machine Learning has been applied to determining numbers of salmon lice on farmed fish, identifying fish species from trawl cameras, interpreting fish scales, classifying fish behavior, and interpreting acoustics data through use of image analysis. It has also been applied to analysis of marine science literature to determine trends in research and publication. Participants who can provide further examples will be specifically sought.</p> <p>Term of Reference c)</p> <p>Among the challenges in bringing more social science into the traditional fisheries science and advice process has been the lack of a common</p>

	<p>language – with specialist terms being used in both areas that may not have any meaning elsewhere. Machine learning can help overcome such barriers. One option might be to match trends in social science data and publications with trends in fisheries science literature. The overall aim would be to facilitate the further inclusion of the social sciences in ICES processes. It may also be useful to identify research areas that can be addressed through multi-/inter-disciplinary computational social science approaches to study social processes relevant to fisheries.</p> <p>Term of Reference d)</p> <p>The Terms of Reference for this workshop have been kept deliberately constrained so as not to overload its work. Lessons learned from the workshop should be considered and a path forward recommended.</p>
Resource requirements	It is hoped that participants will have sufficient access to computing resources so as to not require any further input.
Participants	Participants will be sought from as wide a community as is possible. We would hope to attach scientists with skills in surveying, stock assessment, social aspects, experience in ICES processes including advice and inter-disciplinary scientists. Scientists with access to complex datasets would be welcomed also. Early career scientists with skills in machine learning would be particularly welcome
Secretariat facilities	The Atlantic Room for 3 days, and the usual welcome Secretariat support.
Financial	No financial implications.
Linkages to advisory committees	Directly linked
Linkages to other committees or groups	Directly linked, and potentially to all SCICOM steering groups. Science Impact and Publications Group would be interested in bibliometric and citation analysis.
Linkages to other organizations	None at present