

**Editorial****Sea of Potentialities for Data Analytics in Fisheries Sector**Ramasubramanian V.¹ and M. Krishnan²¹Principal Scientist (Agricultural Statistics), ICAR-Indian Agricultural Statistics Research Institute, New Delhi²Former Principal Scientist (Agricultural Economics) & Head, ESM Division, ICAR- NAARM, Hyderabad; Former Head, FEES Division, ICAR-Central Institute of Fisheries Education, Mumbai & Presently Adviser, Committee for Marine Resources, Andhra Pradesh

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ABSTRACT**ARTICLE INFO**

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The scope and potentialities of data analytics in fisheries sector have been highlighted along with its recent offshoots viz., Artificial Intelligence and Deep Learning. The importance of having permanent faculty at fisheries universities has also been pointed out for the growth of data analytics in this sector. It has also been pointed out that a comprehensive fisheries database need be built and maintained for such analytics to thrive.

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Data analytics is poised to script an active role in the field of fisheries which is emerging as one of the most prodigious high growth areas in this digital era. Although it existed as just data analysis, it has gained its importance, hype and recognition only after the advent of high speed computers. The field of data analytics has continued to evolve with a much broader scope and potential than in the past, more so with incorporation of new technologies like Artificial Intelligence (AI). The conventional fishery programmes will require only reduced time frame for evolving new technologies if it takes full advantage of emerging data analytical tools. Nevertheless, the classical methods of fishery sciences will continue to flourish as these new tools will be useful only when they are built upon such established and time tested technologies. Data analytics has just scratched the surface of fishery domain.

In the words of the great American engineer and statistician, W. Edwards Deming, "In God we trust; all others must bring data". Therefore, data is to the digital economy what oil is to the industrial economy. Around a decade ago, we first heard the expression 'Data is the new oil'. It was coined by Clive Humby, the man who built Clubcard, the world's first supermarket loyalty scheme. He was using the metaphor to explain how data is a resource that is useless if left 'unrefined'; only when it's mined and analyzed, does it create (potentially extraordinary) value. Pound for pound the value of data is comparable to that of oil said Klingeneberg (2018). He has proceeded to state that drilling for data has created the tycoons of tomorrow. The empires of Facebook and Amazon are edifices created on data.

Having actionable data on hand is precisely how companies like Amazon enjoy their current success, and in order make the argument more convincing that data analytics should hold a more commanding role in the fishing industry it may be recalled that Amazon started by selling books on the internet while fishers pull fish out of the water in frequently inclement weather. The complexity of fisheries industry makes it a prime candidate why this sector should embrace a culture of data so that it can find itself at a huge advantage in the years to come.

Machines and Robotics (which primarily use AI) are products of data thus validating the rapidly growing universal truth in the emerging 'digitopia' today that all roads lead to data. AI is going to revolutionize our world, habits, professions, and religions, everything that we can touch, see or feel. Already our Government is committed to promoting AI in various sectors. Bhar *et al.* (2019) have outlined the various application areas wherein AI can be applied in agriculture; fishery being the allied sector of agriculture that has to catch up. Already fish based firms have started using data analytical tools using Information Technology (IT) and AI. IT tools provide a full-stack aquaculture technology venture that works with shrimp and fish aquaculture farmers to improve their farm productivity and market linkage through AI and satellite remote sensing technology. Gooptu (2019) has reported that Aqua-connect Limited in India, is in the forefront of using AI in aquaculture. It is employing predictive tools for farm management and enables AI which nurtures an under-served aqua-farmer market. Change in water quality, feed intake, shrimp growth, and disease occurrence are monitored by

AI-powered farm advisory solution which helps fish and shrimp farmers to monitor and track farming activities precisely. In this process, the AI solution helps rural farmers and coastal communities by reducing the dependency on technicians in daily culture operations. It is location-aware, context-aware which offers relevant products at the right time and intervention. The network of processors, certifying bodies, inputs and healthcare of the shrimp supply chain are integrated by Gooptu (2019) goes on to explain that with AI data, it is possible to connect farmers with formal financial institutions to offer financial assistance and crop insurance. Supply chain management and certification processes are streamlined for processors and certifying bodies by leveraging this data. Farms' inherent needs are clearly understood by use of AI generated solutions based on the input given by the farmer as well as the data captured by the Internet of Things (IoT) platforms. Based on the given database, both, the production efficiency model and disease prevention model are derived. Better water quality management, prediction on diseases, better feed management, eventually improve farm revenue besides quality and traceability based on these models help farmers improve production efficiency. AI hubs accelerate technology adoption among aqua farmers, improve last-mile connectivity and also source feed, health products and farm equipment.

Data analytics is the future and this can be seen, with many universities which have started offering Masters in Data Science courses. The course content of these degree programs contain nothing but statistics coupled with computer techniques and software tools to analyze these statistical data with recent advances like Machine Learning (ML), Deep Learning (DL) etc. In an effort to expand the scope of applications of AI and ML, the IIT Madras has started for the first time a wide spectrum application oriented degree program (<https://onlinedegree.iitm.ac.in/>). Other IITs like the new one in Bengaluru is offering a PG Diploma in Data Analytics, IIM Kozhikode is offering a certificate programme in advanced data analytics. Therefore high profile educational institutions in the country are rising up to the call of the industry and striving to bridge the gap between the demand and supply of data analysts in the country. As far as fisheries universities in India are concerned, programmes on data analytics can be seriously considered to be offered. For this, concerted efforts are needed to enhance the associated physical and manpower infrastructure requirements in the institutes and universities across the states and at the national level. Ramasubramanian *et al.* (2017) have pointed out that in most of the fishery colleges, temporary staff usually teaches courses related to statistics and computers. The new Ministry of Fisheries, Animal Husbandry and Dairying created in 2019 should pave the way for rectifying this trend so that dedicated data analysts in the form of regular faculty are in place.

The most obvious advantages in the use of AI, ML and DL are their ability to extract features automatically. Yang *et al.* (2020) have discussed elaborately about both the new avenues and challenges in processing information and DL based data processing in smart fish farming with applications of DL in aquaculture, including live fish identification, species classification, behavioral analysis, feeding decisions, size or biomass estimation, and water quality prediction.

As we advance deeper into the digital era, our demand for data analytics rises accordingly both in terms of quality and quantity. But are we ready? For instance, take the case of, say, modelling of shrimp prices. For requisite data, one can refer to PRIME (Price Indicator of Marine products Export) published weekly by Marine Products Exports Development Authority. These shrimp price export values are not electronically available in a ready to use form. On the other hand, consider FISHSTAT by FAO. Any data needed across the countries relating to production are easily available in a digital form and also the software which is available therein aids browsing, data mining, charting and reporting statistical datasets relevant to fisheries with an added functionality of data visualisation by filtering, grouping and aggregation through hierarchical dimensions. In our country, while the collection of fish statistics is done at the state level, the central statistical agencies aggregate the data made available to them from the state level to get final estimates. In case of still micro level data, like reservoir level information, there is no other way but to visit the local line departments and collect the information. Also, there is a time lag in arriving at the final values. However, a central data repository in digital form in real time on all aspects of fishery statistics is the need of the hour upon which the whole data analytics rest. One of the ways of exploiting data to its advantage is to first create a database and continually update them so that we can base our analysis on historical data.

To sign off, the future is in fisheries data analytics for production, marketing finance and overall development. The technology and methodologies of data analytics are knocking at our doorsteps. The onus is now on us to throw our gates wide open and give it the welcome it duly deserves.

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