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# Editorial: Artificial intelligence and forestry

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Editorial on the Research Topic
Artificial intelligence and forestry

Newly-developed techniques in artificial intelligence (AI) offer opportunities to enhance existing quantitative methods for forest management decision-making, particularly in monitoring and forecasting forest dynamics under changing conditions. The availability of publicly accessible databases, open-source libraries, and computing platforms now allows efficient prototyping of AI algorithms, creating numerous potential applications.

AI technologies have been explored in forestry research for various tasks, such as analyzing forest structure using 3D point cloud data. In forest management, AI can not only improve predictions of forest growth and yield but also be applied to site classification, hazard and risk assessments, and harvest scheduling. However, their use in forest practice remains limited. One major challenge is data quality and availability. Implementing AI requires vast amounts of data, which can be difficult and costly to obtain and compile, especially for small landowners. In addition, another issue is the compatibility of AI with existing forest management systems. AI models may produce different estimates than traditional methods, making it difficult to justify and validate these differences, particularly for auditing and accounting, as changing models complicates consistency with past reports.

Artificial intelligence represents a significant opportunity to change the way that we are doing in forestry, but the new technology comes with challenges and limitations. This Research Topic entitled "*Artificial intelligence and forestry*" compiles six papers conducted in Europe, North America, Asia and Oceania that develop and demonstrate the use of emerging AI technologies to improve the quantitative tools in forestry as well as provide guidance for forest managers and practitioners on applying AI.

Specifically, in this Research Topic different cutting-edge aspects have been analyzed. The use of utilized semantic web technologies to improve access and integration of forest inventories and land use map data was developed by Giménez-García et al. using data from Spain and Portugal by converting them into linked open data. Through ontologies, the datasets were harmonized and made available for querying via a SPARQL endpoint. The maximum entropy approach was presented by Peay et al. to define geographic bounds

for growth and yield model usage for planted loblolly pine in the southeastern U.S. They provided guidance on where these models are likely to perform well, offering a method that can be applied to other forest models. The combination of five regression methods and five competition indices was evaluated by Jha et al. to model height-diameter relationships for temperate and pantropical tree species in the U.S. They found that the generalized additive model with competition indices provided the most reliable predictions across study regions. introduced, A self-explainable model designed to detect emerald ash borer larvae in China (MelSPPNET) by analyzing their feeding vibration signals was introduced by Jiang et al.. The study demonstrates its potential for early and reliable pest monitoring in forests, with plans to expand its application to detect other pest vibration signals. A terrestrial photogrammetry system combined with 3D point-cloud reconstruction to monitor rubber tree forests in China was developed by Lei et al., demonstrating high accuracy in estimating tree volume. This method improves current rubber forest sample plot monitoring and offers a potential solution for future applications in other forest types. Finally, a comparison of four tree-based machine learning algorithms in predicting site soil fertility ratings and combined the algorithm with the 3-PG process-based model was compared by Taylor et al.. Their model improves spatial prediction accuracy of tree diameter and stand volume for Eucalyptus plantations in Tasmania. Jointly, these paper showcase different actual uses of forest ecosystems under integrative and sustainable management.

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## Conflict of interest

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The author(s) declared that they were an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

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