Artificial intelligence algorithms for medical prediction should be non-proprietary and readily available

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Wang and colleagues describe several challenges that arise for deep learning and other complex black-box machine learning algorithms for medical prediction.¹ The authors rightfully hint at the fact that reliable performance of predictive analytics in healthcare is far from guaranteed, by discussing data quantity, data quality, model generalizability and interoperability. To start with, machine learning algorithms are prone to overfitting due to small sample size or very flexible modeling. Apart from that, it is known that performance of diagnostic and prognostic algorithms is heterogeneous.² A first reason of heterogeneity is that characteristics of target populations are dependent on region and hospital. A second reason is that algorithm performance depends on local operational characteristics, such as biomarker assay kits, imaging machines, electronic health record (EHR) data handling, or local protocols.³ In addition to heterogeneity, patient characteristics, medical technology, and clinical management change continuously. Because of this, data used to develop algorithms tend to become outdated.⁴

The lack of model transparency is a commonly discussed challenge in the context of black-box machine learning algorithms that is also addressed by Wang and colleagues.^{1,5} Reportedly, the key issue with respect to transparency of black-box algorithms is their lack of interpretability. In light of the above, however, we argue that model transparency begins with model availability. We are therefore concerned by the growing interest in proprietary algorithms. By definition, this hampers transparency, and this is certainly not in the interest of patients. Opaque algorithms strongly prohibit continuous external validation of algorithms in different settings by independent researcher teams. Currently, such studies are scant.^{3,5} We postulate that the scientific community and regulatory bodies should encourage the development of easily available non-proprietary algorithms. In our view, regulatory bodies should consider dedicated procedures for non-commercial algorithms. Further, algorithms should be made available in a format that allows easy validation and implementation. For complex machine learning algorithms, specialized software is necessary. Machine learning algorithm repositories exist, mainly in domains such as object detection and visual recognition (see e.g. <https://modelzoo.co>). Model availability is the key ethical challenge for predictive analytics, to avoid research waste and maximal transparency to society.

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