INTEGRATING ARTIFICIAL INTELLIGENCE, STATISTICS, AND HEALTH TOWARDS A BETTER HEALTHCARE ECOSYSTEM

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EDITORIAL

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One of the record radical changes in the contemporary medicine is the merging of artificial intelligence (AI), statistics and health sciences. This is not the integration of technology only but is epistemological- the restructuring of the production, understanding and application of evidence based science. In essence, these three-components has the capacity to transform clinical decision-making, strategies of population health and research prototypes [1]. Historically, statistics has been used to support the medical research, which has provided the methodological strength to make valid interpretations based on data. Since randomized controlled trials are based on principles of statistics, they guarantee reproducibility, consistency, and generalizability. Nevertheless, the exponentially increasing volume of health information, such as electronic record of health, wearable gadgets, genomics, and real-time surveillance systems have outpaced the ability of traditional statistical methods to cope with them. The developing new era of artificial intelligence is a strong complement that comes in this picture [2].

AI, and especially deep learning and machine learning, are very effective in processing multi-dimensional, complicated, and non-uniform data structures. It allows configuration detection at speed and scale which is not possible with the customary models. The tools based on AI can now be used in clinical settings to detect diseases early, perform risk stratification, and provide customized treatment advice. As an illustration, predictive models that have been trained with big data may detect minor cues in imaging, lab results, or patient history that can pave the way to clinical degradation [3].

However, there are serious procedural and ethical concerns about increasing the use of AI in health. Many AI systems work as black boxes, which do not give arguments, in contrast to the customary statistical models. This non-interpretability is in conflict with the basic statistical law of being explainable. It can be cumbersome for the investigators to rigorously validate AI as they are not aware how this works, while many clinicians are reluctant to rely over AI outputs. It is where the assimilation of statistics is required rather than substitution. The statistical thinking readily provides the validation model, causal inference, bias, and uncertainty quantification. AI models are precise as well as reducible as made sure by these techniques such as external validation, calibration analysis, and cross-validation. In addition, while managing the common problems of AI analysis like confounding, overfitting, and data imbalance, statistical measures cannot be overlooked [4].

Regarding public health, the statistics and AI combination has many advantages. Improvement in monitoring of disease, outbreak prediction and resource allocation are managed through the analysis of data. In terms of international health crises, such as pandemics, AI-based models along with epidemiological statistics are utilized to make policy decision, enhance the management strategies, and follow the effectiveness in population. Even so, these AI uses must be guided by statistical ideals, which preclude confusing inferences as well as unintended results [5].

REFERENCES

1.Polce EM, Kunze KN. A guide for the application of statistics in biomedical studies concerning machine learning and artificial intelligence. Arthrosc J Arthroscopic Relat Surg. 2023,39:151-8

2.Dascălu C-G, Forna N, Georgescu A, Topoliceanu C. The impact of artificial intelligence in medical biostatistical studies: are the statisticians no longer necessary? A literature review. Rom J Oral Rehabil. 2025,17: 845-856

3.Rajkomar A, Oren E, Chen K, Dai AM, Hajaj N, Hardt M, et al. Scalable and accurate deep learning with electronic health records. NPJ Digit Med. 2018,1:18

4.Rudin C. Stop explaining black box machine learning models for high stakes decisions and use interpretable models instead. Nat Mach Intell. 2019,1:206-15

5.MacIntyre CR, Chen X, Kunasekaran M, Quigley A, Lim S, Stone H, et al. Artificial intelligence in public health: the potential of epidemic early warning systems. J Int Med Res. 2023,51:03000605231159335