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***Artificial Intelligence in Clinical Medicine and Healthcare the First Decade:
Lessons Learned and Future Directions from a Clinician-Data Scientist***

Abstract:

Since the advent of convolutional neural networks and deep learning last decade, clinical medicine and healthcare have adopted this technology in a myriad of domains with mixed results. The more clear successes have been in medical image interpretation and protein structure determination, with an additional success in the area of utilizing robotic process automation for healthcare administration. There are many disappointments of AI in healthcare as well, including lack of continual access to good quality healthcare data, relatively poor performance of AI models in decision support, and slow adoption of AI in healthcare.

The future is bright for AI in clinical medicine with all the upcoming AI tools that are improving and become more capable on an exponential scale. The future directions include: a healthcare learning system; digital twins as both research and treatment; and cognitive architectures in AI systems. REAL issues (regulatory, ethical and education, administrative, and legal) remain mostly unresolved.