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A Critical Analysis of Artificial Intelligence Integration in Healthcare

Nimmakayala Gopala Krishna[1] and Dr. Aprna Sachin Pande[2]
Research Scholar, Department of Computer Science[1]
Research Guide, Department of Computer Science[2]
Sunrise University, Alwar, Rajasthan, India

Abstract: *Recent years have seen fast development in AI software algorithms, hardware implementation, and applications in many fields. We cover the newest AI applications in biomedicine, including illness diagnosis, living assistance, biomedical information processing, and research. This review tracks new scientific achievements, understands technology availability, appreciates AI's promise in biomedicine, and inspires associated researchers. AI in biomedicine, like AI itself, is still developing. New innovations will push the boundary and expand AI application, and quick advancements are expected. Epileptic seizure prediction and urine bladder filling are shown in two case studies.*

Keywords: AI in Healthcare, Healthcare Analytics

REFERENCES

[1]. Minsky M. Steps toward artificial intelligence. Proc IRE 1961;49(1):8–30.
[2]. Weng J, McClelland J, Pentland A, Sporns O, Stockman I, Sur M, et al. Autonomous mental development by robots and animals. Science 2001;291 (5504):599–600.
[3]. Wooldridge M, Jennings NR. Intelligent agents: theory and practice. Knowl Eng Rev 1995;10(2):115–52.
[4]. Huang G, Huang GB, Song S, You K. Trends in extreme learning machines: a review. Neural Netw 2015;61:32–48.
[5]. Hopfield JJ. Neural networks and physical systems with emergent collective computational abilities. Proc Natl Acad Sci USA 1982;79(8):2554–8.
[6]. Watts DJ, Strogatz SH. Collective dynamics of 'small-world' networks. Nature 1998;393(6684):440–2.
[7]. Zucker RS, Regehr WG. Short-term synaptic plasticity. Annu Rev Physiol 2002;64:355–405.
[8]. Schmidhuber J. Deep learning in neural networks: an overview. Neural Netw 2015;61:85–117.
[9]. LeCun Y, Bengio Y, Hinton G. Deep learning. Nature 2015;521(7553):436–44.
[10]. Arel I, Rose DC, Karnowski TP. Deep machine learning—a new frontier in artificial intelligence research. IEEE Comput Intell Mag 2010;5(4):13–8.
[11]. Dinkelbach HU, Vitay J, Beuth F, Hamker FH. Comparison of GPU- and CPU- implementations of mean-firing rate neural networks on parallel hardware. Network Comput Neural Syst 2012;23(4):212–36.
[12]. Naveros F, Garrido JA, Carrillo RR, Ros E, Luque NR. Corrigendum: event- and time-driven techniques using parallel CPU–GPU co-processing for spiking neural networks. Front Neuroinform 2018;12:24.
[13]. Naveros F, Luque NR, Garrido JA, Carrillo RR, Anguita M, Ros E. A spiking neural simulator integrating event-driven and time-driven computation schemes using parallel CPU–GPU co-processing: a case study. IEEE Trans Neural Netw Learn Syst 2015;26(7):1567–74.
[14]. Nurvitadhi E, Sheffield D, Sim J, Mishra A, Venkatesh G, Marr D. Accelerating binarized neural networks: comparison of FPGA, CPU, GPU, and ASIC. In: Proceedings of 2016 International Conference on Field-Programmable Technology; 2016 Dec 7–9; Xi'an, China; 2016. p. 77–84.
[15]. Bartolozzi C, Indiveri G. Synaptic dynamics in analog VLSI. Neural Comput 2007;19(10):2581–603.
[16]. Kwon MW, Baek MH, Hwang S, Park K, Jang T, Kim T, et al. Integrate-and-fire neuron circuit using positive feedback field effect transistor for low power operation. J Appl Phys 2018;124(15):152107.

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[17]. Grollier J, Querlioz D, Stiles MD. Spintronic nanodevices for bioinspired computing. Proc IEEE 2016;104(10):2024–39.
[18]. Jeong H, Shi L. Memristor devices for neural networks. J Phys D Appl Phys 2018;52(2):023003.
[19]. Prezioso M, Merrikh-Bayat F, Hoskins BD, Adam GC, Likharev KK, Strukov DB. Training and operation of an integrated neuromorphic network based on metal-oxide memristors. Nature 2015;521(7550):61–4.
[20]. Wen S, Huang T, Zeng Z, Chen Y, Li P. Circuit design and exponential stabilization of memristive neural networks. Neural Netw 2015;63:48–56.
[21]. memristor crossbar. Phys Status Solidi A 2018;215(13):1700875.
[22]. Yoshida J. IBM guns for 8-bit AI breakthroughs [Internet]. Cambridge: EE Times; 2018 Dec 3 [cited 2019 Jan 17]. Available from: https://www. eetimes.com/document.asp?doc_id=1334029&utm_source=eetimes&utm_ medium=networksearch.
[23]. Marshall RC, Freed DB, Karow CM. Learning of subordinate category names by aphasic subjects: a comparison of deep and surface-level training methods. Aphasiology 2001;15(6):585–98.
[24]. Erhan D, Bengio Y, Courville A, Manzagol PA, Vincent P, Bengio S. Why does unsupervised pre-training help deep learning? J Mach Learn Res 2010;11:625–60.
[25]. Yuan X, Xie L, Abouelenien M. A regularized ensemble framework of deep learning for cancer detection from multi-class, imbalanced training data. Pattern Recognit 2018;77:160–72.
[26]. Rodríguez-Pérez R, Bajorath J. Prediction of compound profiling matrices, part II: relative performance of multitask deep learning and random forest classification on the basis of varying amounts of training data. ACS Omega 2018;3(9):12033–40.
[27]. Dudek-Dyduch E, Tadeusiewicz R, Horzyk A. Neural network adaptation process effectiveness dependent of constant training data availability. Neurocomputing 2009;72(13–15):3138–49.
[28]. Chiang M, Zhang T. Fog and IoT: an overview of research opportunities. IEEE Internet Things J 2016;3(6):854–64.
[29]. Guo Y, Liu Y, Oerlemans A, Lao S, Wu S, Lew MS. Deep learning for visual understanding: a review. Neurocomputing 2016;187:27–48.
[30]. Nguyen H, Kieu LM, Wen T, Cai C. Deep learning methods in transportation domain: a review. IET Intell Transp Syst 2018;12(9):998–1004.
[31]. Yang D, Jiang K, Zhao D, Yu C, Cao Z, Xie S, et al. Intelligent and connected vehicles: current status and future perspectives. Sci China Technol Sci 2018;61(10):1446–71.
[32]. Alshahrani S, Kapetanios E. Are deep learning approaches suitable for natural language processing? In: Métais E, Meziane F, Saraee M, Sugumaran V, Vadera S, editors. Natural language processing and information systems. Cham: Springer; 2016. p. 343–9.
[33]. Kim TH. Emerging approach of natural language processing in opinion mining: a review. In: Tomar GS, Grosky WI, Kim TH, Mohammed S, Saha SK, editors. Ubiquitous computing and multimedia applications. Berlin: Springer; 2010. p. 121–8.
[34]. Schaal S. Is imitation learning the route to humanoid robots? Trends Cogn Sci 1999;3(6):233–42.
[35]. Yu KH, Beam AL, Kohane IS. Artificial intelligence in healthcare. Nat Biomed Eng 2018;2(10):719–31.
[36]. Mamoshina P, Vieira A, Putin E, Zhavoronkov A. Applications of deep learning in biomedicine. Mol Pharm 2016;13(5):1445–54.
[37]. Peng Y, Zhang Y, Wang L. Artificial intelligence in biomedical engineering and informatics: an introduction and review. Artif Intell Med 2010;48(2–3):71–3.
[38]. Dahal N, Nandagopal N, Nafalski A. Nedic Z. Modeling of cognition using EEG: a review and a new approach. In: Proceedings of 2011 IEEE Region 10 Conference; 2011 Nov 21–24; Bali, Indonesia; 2011. p. 1045–9.
[39]. Dahmani K, Tahiri A, Habert O, Elmeftouhi Y. An intelligent model of home support for people with loss of autonomy: a novel approach. In: Proceedings of 2016 International Conference on Control, Decision and Information Technologies; 2016 Apr 6–8; St. Julian's, Malta; 2016. p. 182–5.

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[40]. Rabhi Y, Mrabet M, Fnaiech F. A facial expression controlled wheelchair for people with disabilities. Comput Methods Programs Biomed 2018; 165:89–105.
[41]. Hudec M, Smutny Z. RUDO: a home ambient intelligence system for blind people. Sensors 2017;17(8):1926.
[42]. Tumpa SN, Islam AB, Ankon MTM. Smart care: an intelligent assistant for pregnant mothers. In: Proceedings of 2017 4th International Conference on Advances in Electrical Engineering; 2017 Sep 28–30; Dhaka, Bangladesh; 2017. p. 754–9.
[43]. Wu Q, Zhang YD, Tao W, Amin MG. Radar-based fall detection based on Doppler time–frequency signatures for assisted living. IET Radar Sonar Navig 2015;9(2):164–72.
[44]. Lloret J, Canovas A, Sendra S, Parra L. A smart communication architecture for ambient assisted living. IEEE Commun Mag 2015;53(1):26–33.
[45]. García-Vázquez JP, Rodríguez MD, Tentori ME, Saldaña D, Andrade ÁG, Espinoza AN. An agent-based architecture for developing activity-aware systems for assisting elderly. J Univers Comput Sci 2010;16(12):1500–20.
[46]. Lai DTH, Begg RK, Palaniswami M. Computational intelligence in gait research: a perspective on current applications and future challenges. IEEE Trans Inf Technol Biomed 2009;13(5):687–702.
[47]. Chin LC, Basah SN, Yaacob S, Juan YE, Kadir AKAB. Camera systems in human motion analysis for biomedical applications. In: Proceedings of International Conference on Mathematics, Engineering and Industrial Applications 2014; 2014 May 28–30; Penang, Malaysia; 2014. p. 090006.
[48]. Man DWK, Tam SF, Hui-Chan CWY. Learning to live independently with expert systems in memory rehabilitation. NeuroRehabilitation 2003;18 (1):21–9.
[49]. Ben Abacha A, Zweigenbaum P. MEANS: a medical question-answering system combining NLP techniques and semantic Web technologies. Inf Process Manage 2015;51(5):570–94.
[50]. Sarrouti M, Ouatik El Alaoui S. A machine learning-based method for question type classification in biomedical question answering. Methods Inf Med 2017;56(3):209–16.
[51]. Sarrouti M, El Alaoui SO. A generic document retrieval framework based on UMLS similarity for biomedical question answering system. In: Proceedings of the 8th KES International Conference on Intelligent Decision Technologies; 2016 Jun 15–17; Puerto de la Cruz, Spain; 2016. p. 207–16.
[52]. Sarrouti M, El Alaoui SO. A yes/no answer generator based on sentiment- word scores in biomedical question answering. Int J Healthc Inf Syst Inform 2017;12(3):62–74.
[53]. Shahar Y. Timing is everything: temporal reasoning and temporal data maintenance in medicine. In: Horn W, Shahar Y, Lindberg G, Andreassen S, Wyatt J, editors. Artificial intelligence in medicine. Berlin: Springer; 1999. p. 30–46.
[54]. Rodriguez-Esteban R, Iossifov I, Rzhetsky A. Imitating manual curation of text-mined facts in biomedicine. PLoS Comput Biol 2006;2(9):e118.
[55]. Zhou L, Hripcsak G. Temporal reasoning with medical data—a review with emphasis on medical natural language processing. J Biomed Inform 2007;40 (2):183–202.
[56]. Athenikos SJ, Han H. Biomedical question answering: a survey. Comput Methods Programs Biomed 2010;99(1):1–24.
[57]. Handelman GS, Kok HK, Chandra RV, Razavi AH, Lee MJ, Asadi H. eDoctor: machine learning and the future of medicine. J Intern Med 2018;284 (6):603–19.
[58]. Almeida H, Meurs MJ, Kosseim L, Tsang A. Data sampling and supervised learning for HIV literature screening. IEEE Trans Nanobioscience 2016;15 (4):354–61.
[59]. Névéol A, Shooshan SE, Humphrey SM, Mork JG, Aronson AR. A recent advance in the automatic indexing of the biomedical literature. J Biomed Inform 2009;42(5):814–23.
[60]. Choi BK, Dayaram T, Parikh N, Wilkins AD, Nagarajan M, Novikov IB, et al. Literature-based automated discovery of tumor suppressor p53 phosphorylation and inhibition by NEK2. Proc Natl Acad Sci USA 2018;115 (42):10666–71.
[61]. Yang Z, Tang N, Zhang X, Lin H, Li Y, Yang Z. Multiple kernel learning in protein–protein interaction extraction from biomedical literature. Artif Intell Med 2011;51(3):163–73.

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[62]. Yu W, Clyne M, Dolan SM, Yesupriya A, Wulf A, Liu T, et al. GAPscreener: an automatic tool for screening human genetic association literature in PubMed using the support vector machine technique. BMC Bioinf 2008;9(1):205.

[63]. Plaza L, Díaz A, Gervás P. A semantic graph-based approach to biomedical summarisation. Artif Intell Med 2011;53(1):1–14.

[64]. Liu F, Yu H. Learning to rank figures within a biomedical article. PLoS One 2014;9(3):e61567.

[65]. Ruffini G. An algorithmic information theory of consciousness. Neurosci Conscious 2017;3(1):nix019.

[66]. Arsiwalla XD, Herreros I, Verschure P. On three categories of conscious machines. In: Lepora NF, Mura A, Mangan M, Verschure PFMJ, Desmulliez M, Prescott TJ, editors. Biomimetic and biohybrid systems. Cham: Springer; 2016. p. 389–92.

[67]. Christley S, An G. A proposal for augmenting biological model construction with a semi-intelligent computational modeling assistant. Comput Math Organ Theory 2012;18(4):380–403.

[68]. Almog DM, Heisler EM. Computer intuition: guiding scientific research in imaging and oral implantology. J Dent Res 1997;76(10):1684–8.

[69]. Kanevsky J, Corban J, Gaster R, Kanevsky A, Lin S, Gilardino M. Big data and machine learning in plastic surgery: a new frontier in surgical innovation. Plast Reconstr Surg 2016;137(5):890e–7e.

[70]. Negoescu R. Conscience and consciousness in biomedical engineering science and practice. In: Proceedings of International Conference on Advancements of Medicine and Health Care through Technology; 2009 Sep 23–26; Cluj-Napoca, Romania; 2009. p. 209–14.