Vol-5, Issue-1 PP. 1-3 ISSN: 2394-5788

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

THE IMPACT OF ARTIFICIAL INTELLIGENCE ON CANCER

Dr. Nik Tehrani
International Technological University
DynoSense Corp.
100 Century Center Court, Suite 100,
San Jose, CA 95112, USA
nik@niktehrani.com

Dr. Dennis Miller
Argosy University
46794 Verdugo Road
Banning, CA 92220,
USA
dbm12@aol.com

ABSTRACT

Despite incremental progress in curing cancer it remains the second most common cause of death. Most, if not all, health professionals agree that early detection of cancer offers the greatest chance of a cure or control of the disease. Skin cancers are highly treatable if they are caught early. Unfortunately, skin cancer doctors (dermatologists) are often not readily available in remote or third-world countries. Today, with the advancement of Artificial Intelligence (AI) doctors hope to provide patients with machines that can early diagnose skin cancers and thus save lives through early detection. Early results are promising as the machines are providing up to 85% accuracy in detecting skin cancers. The use of Artificial Intelligence in medicine is expanding with the experimental use of AI machines reading radiographic breast images (mammograms). Again, the early results are promising. Computer power is increasing dramatically and is the key to more use of advanced AI machines. The use of AI can dramatically reduce the cost of medicine while providing quicker diagnoses. However, AI, at least at this time, is not intended to replace physicians. The best minds in the field of medicine believe the combination of physicians working with AI will provide patients with the greatest opportunity to successfully survive their diseases.

General Terms

Your general terms must be any term which can be used for general classification of the submitted material such as Pattern Recognition, Security, Algorithms et. al.

Keywords

Artificial Intelligence, cancer, mammograms, delayed diagnoses.

1. INTRODUCTION

Each year, a great number of people die of cancer. Fortunately, when the disease is detected early the cure rate is high, which has led to the development of many forms of cancer screening tests. For example, in the case of breast cancer mammography is one of the most effective screening tests available. The problem is that screening tests remain imperfect, which can lead to some false positive results, which in turn can lead to unnecessary surgeries and biopsies. A common cause of false positive diagnoses is the category high-risk lesions, which look suspicious on a screening mammogram and have abnormal cells when analyzed by needle biopsy.

2. ARTIFICIAL INTELLIGENCE AND CANCER

Artificial intelligence (AI) has brought change to the diagnosis of cancer, just like it has to many other aspects of our lives (Pannu, 2015). The general purpose of AI technologies is to make it possible for a society to improve and progress its quality of life. Advances in studies with automatic diagnoses of cancer specimens using AI were beginning to produce results that were sometimes superior to human analysis as early as 2006 and continue to the present day (Deepa &Aruna, 2011; Lisboa&Taktak, 2006; Pannu, 2015).

Artificial intelligence advances and with it the field of medicine. In 2011, IBM introduced their supercomputer Watson to the world on the game show Jeopardy where it beat accomplished Jeopardy champions (Ferucci, D. A., 2012). By 2017 Watson was able to diagnose some types of skin cancer, after the technology was improved to match the diagnostic ability of a dermatologist. The improvement came from the creation of an automatic learning algorithm - called machine learning - by the team of Professor Sebastian Thrun from Stanford University. Thrun's team trained artificial neural networks using a total of 129,450 images and data from about 2,032 different cases of diagnosed diseases. They tested their performance against a score of dermatologists, and the result was that clearly both obtained the same diagnostic results (Esteva, Kuprel, Novoa, Ko, Swetter, …&Thrun, 2017).

Perhaps the most important aspect of Thun's study was that AI used the same method of diagnosing skin cancer as that performed by a specialized doctor: visual observation. Thus, using simple photographs of skin lesions, the algorithm could reveal if the patient suffered from some type of tumor in the skin, and if it was benign or malignant (Esteva et al., 2017). This technological and medical breakthrough was an important milestone both for its reliability, which is very important not to delay the diagnosis of the disease and its severity, and because it starts the path towards the possibility that mobile devices with cameras can expand the reach of a patient's dermatologists outside the medical or hospital center (Esteva et al., 2017).

Arriving at a complete diagnosis to give the correct treatment to patients with cancer requires a complex process where accuracy and speed play a fundamental role. Looking for alternatives to the conventional methods applied in these clinical cases, a team from Beth Israel Deaconess Medical Center (BIDMC) and Harvard Medical School worked on a project that sought to exploit the potential of artificial intelligence. According to the report shared by the researchers, after participating in the ISBI (The International Symposium on Biomedical Imaging), their AI was able to be accurate 92% of the time, compared to 96% of the pathologists' effectiveness (BIDMC, 2016).

But what is really interesting, as the BIDMC study emphasizes, is that combining the work of the pathologist with the identification of the AI, up to 99.5% accuracy could be achieved. And this is just one example of the potential of deep learning to improve the objectivity and accuracy of diagnoses, and as a result to provide patients with the right treatment without losing time. They created a system based on deep learning so that machines can learn and interpret patterns based on the analysis of histopathological images. And so, for example, in patients with breast cancer, identify the presence or absence of metastatic cancer in the lymph nodes (Zheng, Yoon, & Lam, 2014). This melding of the physician with machine is called computer-aided diagnosis (CAD) and is the wave of the future because it can streamline the diagnostic process and increase accuracy (Amato, López, Peña-Méndez, Vaňhara, Hampl& Havel, 2013; Deepa &Aruna, 2011; Esteva et al., 2017).

Artificial Intelligence appears to be limited only by the power of the computer. The long-held anecdotal theory (1965, Moore's Law, n.d.) proposed by Intel founder Gordon Moore postulated that every 18 months computer power will double and the cost of production will be halved. With increases in computer power, AI will surely provide more robust decisions in the medical field. Through a process known as "Reinforcement Learning" computers can acquire additional skills for AI by teaching themselves beyond what humans can input. In spite of this unchecked learning ability, there remain obstacles such as AI interpreting simple cartoons to determine if they are funny or not (Granter, Beck, &Papke, 2017). This leads to a discussion of the ability of AI to surpass the skill of pathologists and radiologists in medical diagnoses. However, there is little chance that your doctor will be replaced by a computer anytime soon.

In a somewhat bizarre and unconventional study Levenson, Krupinski, Navarro and Wasserman (2015), while researching AI, the researchers trained pigeons to discriminate between radiographic pictures of benign and malignant breast tissue with a 85% accuracy. At the time, this compared favorably to AI diagnosing where algorithms were developed for the same purpose. Rest easy, pigeons will not be reading your next mammogram.

As computers self-whirr to expand their knowledge, another interesting question arises. Have microscopes outlived their ingenuity when a single drop of blood placed into a machine can give results that are undetectable with visual examinations (Granter, 2016)? The answer is still up for grabs. However, Rosai (2007) writes that the trained pathologist will not be replaced as best-practice medicine. Rosai explains that the dependence of microscopic and molecular science complement each other and reside harmoniously to generate new and improved modalities to treat disease.

3. CONCLUSION

While diagnosis of disease through artificial intelligence would mean significant savings in health costs and human resources, as well as universal access to medical care, there are issues that go beyond the appearance of the injuries, such as the stage of the disease, the depth it has reached, or its possible evolution. As of now, physicians, i.e. humans, are still the most important part of medical care when it comes to cancer.

REFERENCES

[1] Amato, F., López, A., Peña-Méndez, E. M., Vaňhara, P., Hampl, A., & Havel, J. (2013). Artificial neural networks in medical diagnosis. Journal ofApplied Biomedicine 11(2), 47-58. http://doi.org/10.2478/v10136-012-0031-x

[2] Beth Israel Deaconess Medical Center (BIDMC). (2016). Artificial intelligence achieves near-human performance in diagnosing breast cancer: Human and computer analyses together identify cancer with 99.5% accuracy [June, 19, 2016]. Retrieved from http://www.bidmc.org/News/PRLandingPage/2016/June/Beck.aspx

[3] 011, S. N. &Aruna Devi, B. (2011). "A survey on artificial intelligence approaches for medical image classification", Indian Journal of Science and Technology, 4(11),1583-1595. Retrieved from http://52.172.159.94/index.php/indjst/article/view/30291/26223

[4] Esteva, A., Kuprel, B. Novoa, R. A., Ko, J, Swetter, S. M., Blau, H.M., &Thrun, S. (2017). Dermatologist-level classification of skincancer with deep neural networks. Nature 542, 115-118. http://doi:10.1038/nature21056

[5] Ferucci, D.A. (2012). Introduction to "this is Watson." IBM Journal of Research and Development, 56(3.4), 1:1-1:15. http://doi: 10.1147/JRD.2012.2184356

[6] Ghafarpour, A., Zare, I., Zadeh, H. G., Haddadnia, J., Zadeh, F. J. S., Zadeh, Z. E., ... &Nour, S. (2016). A review of the dedicated studies to breast cancer diagnosis by thermal imaging in the fields of medical and artificial intelligence sciences. Biomedical Research, 27(2), 543-552. Retrieved from http://www.alliedacademies.org/articles/a-review-of-the-dedicated-studies-to-breast-cancer-diagnosis-by-thermal-imaging-in-the-fields-of-medical-and-artificial-intelligen.pdf

[7] Granter, S.R., Beck, A.H., &Papke Jr , D.J. (2017) AlphaGo, deep learning, and the future of the human microscopist. Archives of Pathology & Laboratory Medicine: May 201 141(5), 619-621. Retrieved from http://www.archivesofpathology.org/doi/full/10.5858/arpa.2016-0471-ED?code=coap-site

[8] Levenson, R. M., Krupinski, E. A., Navarro, V. M., & Wasserman, E. A. (2015). Pigeons as trainable observers of pathology and radiology breast cancer images. PLoS ONE 10(11): e0141357. Retrieved from http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0141357

[9] Lisboa, P. J., &Taktak, A. F. (2006). The use of artificial neural networks in decision support in cancer: a systematic review. Neural networks, (19)4, 408-415.

[10] 1965: Moore's Law Predicts the Future of Integrated Circuits. (n.d.). Retrieved from http://www.computerhistory.org/siliconengine/moores-law-predicts-the-future-of-integrated-circuits/.

[11] Pannu, A. (2015). Artificial intelligence and its application in different areas. Artificial Intelligence, 4(10), 79-84. Retrieved from https://pdfs.semanticscholar.org/beef/7d200e92832d520d39f3c21e80aaa2ec8279.pdf

[12] Zheng, B., Yoon, S. W., & Lam, S. S. (2014). Breast cancer diagnosis based on feature extraction using a hybrid of K-means and support vector machine algorithms. Expert Systems with Applications, (41)4, 1476-1482.