International Journal of Scientific Research in Science and Technology
Available online at : www.ijsrst.com
Print ISSN: 2395-6011 | Online ISSN: 2395-602X
doi : https://doi.org/10.32628/IJSRST52310666

Artificial Intelligence Applied Cancer Detection : Potential and Barriers

Mrs. Payal D Bhavsar[1], Dr. Darshanaben Dipakkumar Pandya[1], Hansaben Haribhai Patel[2], Dr. Abhijeetsinh Jadeja[3]

[1]Assistant Professor, Department of Computer Science, Shri C. J Patel College of Computer Studies (BCA), Sankalchand Patel University, Visnagar, Gujarat, India

[2]Faculty, Electrical Department, SSPC, Sankalchand Patel University

[3]I/C Principal, Department of Computer Science, Shri C. J Patel College of Computer Studies (BCA), Sankalchand Patel University, Visnagar, Gujarat, India

ARTICLEINFO

Article History:
Accepted: 05 Jan 2024
Published: 15 Jan 2024

Publication Issue :
Volume 11, Issue 1
January-February-2024
Page Number :
117-120

ABSTRACT

This study looks into the possibilities and related challenges of using artificial intelligence (AI) to identify cancer. AI technologies have become attractive tools in oncology because of the growing complexity of medical data and the need for precise and timely cancer diagnosis. In reviewing the state of AI applications for cancer detection today, the paper focuses on biomarker analysis, medical imaging, and biomarker analysis. Additionally continuing conversation on how to use technology to improve cancer diagnostics' efficiency and accuracy while maintaining ethical norms and patient safety.

Keywords: AI, Handling, Cancer Detection, AI psychotherapists

I. INTRODUCTION

The application of artificial intelligence (AI) to cancer detection procedures represents a dramatic change in the way healthcare is provided. This study addresses the major obstacles that must be conquered in order to effectively use AI in early identification of cancer, while additionally exploring the revolutionary potential of this technology. Gaining a grasp of the potential benefits and obstacles of AI applications in cancer detection is essential to achieving superior patient outcomes and accuracy in diagnosis as the healthcare landscape changes in concert with technological improvements.

Cancer is still a major global health concern, and as its incidence rises, more advanced and prompt detection techniques are required. Although imaging and pathology, two traditional approaches of cancer detection, have proved very helpful, they frequently have drawbacks in terms of accuracy, speed, and resource-intensive procedures. Cancer detection techniques are being revolutionized by the incorporation of AI technology, such as machine learning and deep learning algorithms.

2. Programming for AI concentrates on cancer detection abilities

Evaluation of pictures and computation: Artificial intelligence (AI) algorithms can be trained to examine medical photos and spot trends that point to malignant cells or tumors. Preprocessing and image enhancement are required in order to identify pertinent features that facilitate detection from medical images.

Machine Learning Models: Labeled datasets can be used to train supervised machine learning models, including convolution neural networks (CNNs), to identify the features of healthy and malignant tissues. Subsequently, these models can be applied to categorize previously unnoticed photos and identify areas of interest that require additional analysis.

Early Detection: By assisting in the early identification of malignant lesions, AI algorithms can increase the likelihood that treatment will be effective. For many cancer forms, early identification is essential because it enables prompt intervention and better patient outcomes.

Multi-Modal Fusion: By merging data from MRIs, CT scans, and other sources, information from many imaging modalities can be integrated using AI approaches. This all-encompassing strategy can improve cancer diagnosis accuracy.

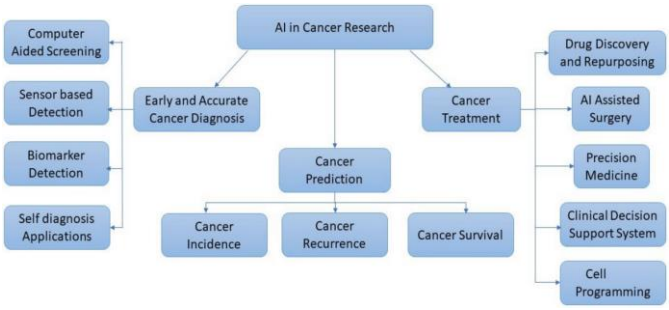

Fig 1. Using AI in Oncology Investigation: Developments, Obstacles, and Prospects

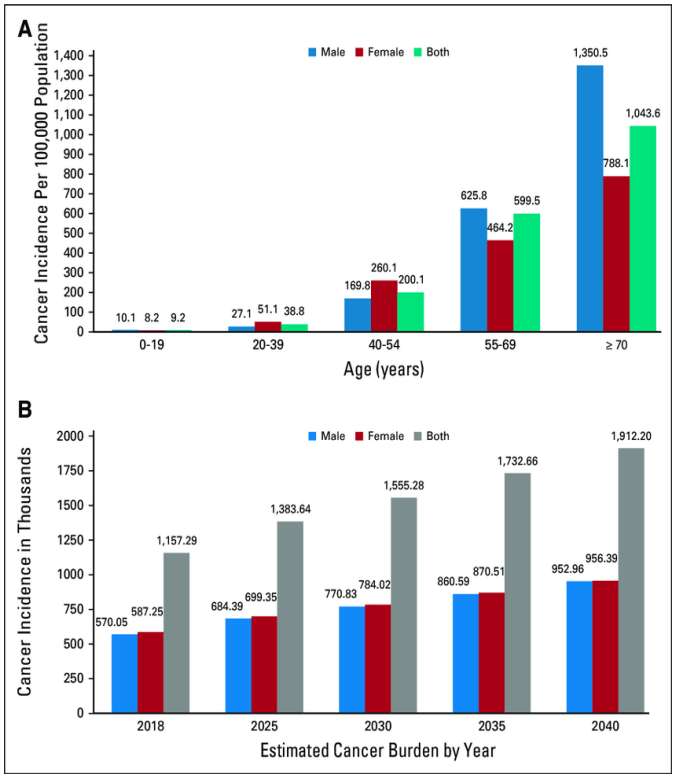

Fig 2. Cancer Detection ratio in male/female/age

3. Algorithm on Artificial Intelligence Applied Caner Detection

Step 1: Compile a collection of medical photographs that have been categorized as either positive or negative for cancer, together with pertinent patient data.

Step 2: Data Preprocessing:

-> Standardize and normalize the photos. Utilize strategies for noise reduction. Address data inconsistencies or gaps in patient records.

Step 3. Feature Extraction:

-> Determine pertinent characteristics from the medical photos that will aid in differentiating between tissues that are malignant and those that are not. Extract features such as shape, texture, and intensity.

Step 4. Data Splitting:

-> To evaluate the model, divide the dataset into training and testing sets.

Step 5. AI Algorithm Selection:

-> Select an appropriate machine learning algorithm according to the problem's nature. Typical algorithms consist of:

Convolution Neural Networks (CNNs): Useful for problems involving images.

Support Vector Machines (SVM): Suitable for binary classification jobs.

Ensemble approaches, like Random Forests, can increase accuracy and resilience.

6. Model Training:

-> Train the chosen algorithm using the labeled training dataset and Adjust hyper parameters to optimize the model's performance.

7. Model Evaluation:

-> Metrics like accuracy, sensitivity, specificity, and area under the ROC curve can be used to evaluate the model's performance on the testing dataset.

8. Post-Processing:

-> Adjust the model in light of the evaluation's findings and Consider techniques like threshold adjustment to balance sensitivity and specificity.

9. Deployment:

-> Apply the learned model in an actual healthcare setting and Assure adherence to moral and legal requirements.

10. Continuous Improvement:

->Track the performance of the model over time and Finished

II. RESULTS AND DISCUSSION

AI AND CANCER DETECTION

Analyzing Images: Medical Imaging: To find early indications of cancer, AI algorithms may examine medical imaging including X-rays, CT, MRI, and mammograms. This may aid in the early detection of malignancies.

AI can help pathologists analyze pathology slides more quickly and effectively. It can spot irregularities and patterns that the human eye can find challenging to notice.

Analysis of Genomes: Genomic sequencing: AI is utilized to examine enormous volumes of genomic data in order to find genetic alterations linked to cancer. This aids in identifying the unique features of a patient's cancer and adjusting the course of treatment appropriately.

Early Identification: AI is capable of analyzing a variety of biomarkers and risk variables to identify people who may be more likely to develop specific types of cancer. This makes tailored preventive measures and early intervention possible.

Drug Development and Discovery: Large-scale datasets are analyzed by AI to find possible cancer treatment medication candidates. By forecasting the interactions that various substances will have with cancer cells, it expedites the process of finding new drugs.

Remote monitoring and telemedicine: AI technologies can help with patient monitoring from a distance, guaranteeing prompt intervention and customized care.

III.CONCLUSION

This paper shows there is a great deal of promise for using artificial intelligence (AI) to identify cancer. This might lead to early diagnosis, individualized treatment plans, and better patient outcomes. Nevertheless, significant obstacles and difficulties must also be overcome in order to use AI widely and successfully in this vital area of healthcare.

IV. REFERENCES

[1]. Esteva, A., Kuprel, B., Novoa, R. A., Ko, J., Swetter, S. M., Blau, H. M., & Thrun, S. (2017). Dermatologist-level classification of skin cancer with deep neural networks. Nature, 542(7639), 115-118.

[2]. McKinney, S. M., Sieniek, M., Godbole, V., Godwin, J., Antropova, N., Ashrafian, H., ... & Reicher, J. J. (2020). International evaluation of an AI system for breast cancer screening. Nature, 577(7788), 89-94.

[3]. Rajkomar, A., Dean, J., & Kohane, I. (2019). Machine learning in medicine. New England Journal of Medicine, 380(14), 1347-1358.

[4]. Topol, E. J. (2019). High-performance medicine: the convergence of human and artificial intelligence. Nature Medicine, 25(1), 44-56.

[5]. Litjens, G., Kooi, T., Bejnordi, B. E., Setio, A. A. A., Ciompi, F., Ghafoorian, M., ... & Sánchez, C. I. (2017). A survey on deep learning in medical image analysis. Medical Image Analysis, 42, 60-88.

[6]. Cho, K., van Merrienboer, B., Gulcehre, C., Bahdanau, D., Bougares, F., Schwenk, H., & Bengio, Y. (2014). Learning phrase representations using RNN encoder-decoder for statistical machine translation. arXiv preprint arXiv:1406.1078.

[7]. Haenssle, H. A., Fink, C., Schneiderbauer, R., Toberer, F., Buhl, T., Blum, A., ... & Enk, A. (2018). Man against machine: diagnostic performance of a deep learning convolutional neural network for dermoscopic melanoma recognition in comparison to 58 dermatologists. Annals of Oncology, 29(8), 1836-1842.

[8]. Ardila, D., Kiraly, A. P., Bharadwaj, S., Choi, B., Reicher, J. J., Peng, L., ... & Shetty, S. (2019). End-to-end lung cancer screening with three-dimensional deep learning on low-dose chest computed tomography. Nature Medicine, 25(6), 954-961.

Cite this article as :

Mrs. Payal D Bhavsar, Dr. Darshanaben Dipakkumar Pandya, Hansaben Haribhai Patel, Dr. Abhijeetsinh Jadeja, "Artificial Intelligence Applied Cancer Detection : Potential and Barriers", International Journal of Scientific Research in Science and Technology (IJSRST), Online ISSN : 2395-602X, Print ISSN : 2395-6011, Volume 11 Issue 1, pp. 117-120, January-February 2024. Available at doi : https://doi.org/10.32628/IJSRST52310666

Journal URL : https://ijsrst.com/IJSRST52310666