Acta Scientific CANCER BIOLOGY (ISSN: 2582-4473)

Volume 7 Issue 7 September 2023

Editorial

Editorial on Role of Artificial Intelligence and Data Science in Cancer Management

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Received: July 24, 2023

Published: August 01, 2023

Millions of people die from cancer each year, and though medical science has made great strides, the toxicity of cancer treatments makes it more crucial than ever to enhance cancer patients' quality of life (QoL). Thus Monitoring and managing QoL based on data collected by the patient in his/her home environment, its integration, and its analysis, is of utmost importance as it supports personalization of cancer management recommendations. AI and Data Science methods makes it easy to monitor the health status and provide support to cancer patients that can be easily managed at home.

One such approach is Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) is a widely recognised and recommended guideline for conducting systematic reviews and meta-analyses that aims to enhance the transparency and quality of reporting in these types of research. This technique assists in monitoring cancer patients in their homes using sensors and self-reporting, including what data is collected, what methodologies are utilised to collect it, how to semantically integrate it, how to infer the patient's state from it, and how to give coaching/behavioural change treatments.

Since it involves large amount of data it becomes extremely essential to store it for future access. Electronic Health Records (EHRs) are digital versions of patients' medical records, containing a wealth of information collected over time by healthcare providers and institutions. It stores informations like patient demographics, medical history, pathology reports, imaging and diagnostic test results, treatment information, clinical notes and many such valuable medical informations.

From that huge pool of data finding the correct information required for monitoring becomes extremely difficult. To make the tedious work easy computerized systems is used that support clinical decision making and action management by using artificial intelligence (AI) methods. These systems acquires data from clinical guidelines, evidence-based studies or experts, or mined from electronic health records (EHRs) and display human-like artificial intelligence for helping medical diagnosis, prevention, and care. These AI based computerised systems address all stages of the data life cycle. We grouped them into four categories: data collection (covering data generation and collection especially from EHRs); data integration (covering processing, integration, storage, and management of medical reports of patients); data analysis (covering predictive ML modeling); and results communication (covering visualization and interpretation of predicted results).

These models used for analysis can help in early detection, prognosis, treatment selection, and outcome prediction. Few such important predictive models are - Logistic Regression (this model is commonly used for binary classification tasks, such as predicting whether a patient has cancer (1) or does not (0) thus can be used for risk assessment and predicting the probability of a patient developing cancer based on certain risk factors); Random Forest (it combines multiple decision trees to improve predictive accuracy and reduce overfitting used for classification of tasks in cancer diagnosis and prognosis); Convolutional Neural Networks or CNNs and Recurrent Neural Networks or RNNs (used for image analysis such as radiology and pathology images); Support Vector Machines or SVM (used for cancer subtype classification and prediction of treatment response); Long Short-Term Memory or LSTM Networks

(is a type of RNN designed to model sequential data that analyses based on time-series data such as electronic health records to predict cancer progression and treatment outcomes).

Though artificial intelligence and data science has shown great promise in cancer management there are several areas where further improvements are needed to maximise their potential and impact. Some areas of improvement are - data privacy and security, data imbalance, interpretability and explainability, integration with clinical workflow, data validation, real-time and dynamic predictions. If above mentioned areas are improved cancer management will become much easy leading to early cancer detection and treatment.