THE AAS IMPACT

Deltas Africa: Study to aid in the early detection and treatment of cancer

SSACAB at a glance

The Developing Excellence, Leadership and Training in Science in Africa (DELTAS Africa), a programme of The African Academy of Sciences, supports the Sub-Saharan Africa Consortium for Advanced Biostatistics Training (SSACAB), which brings together about 20 African and Northern academic and research institutions to develop and improve biostatistical skills among researchers at Masters and PhD levels. The consortiums goal is to create research nodes of excellence to grow the discipline and a biostatistical network to nurture researchers with advanced skills and expertise.

Background

Non-communicable diseases (NCDs) are now the leading cause of mortality worldwide. NCDs represent 63% of all annual deaths, and 80% of all NCD deaths occur in low and middle income countries. Cancer is one of the major contributors to the high NCD mortality rate in both developed and developing countries.

The cancer burden can be reduced through early detection of cancer and management of patients who develop cancer. SSACAB scientists have developed a method to aid in early detection and classification of cancer outcomes through gene expression data.

80%
of all NCD deaths occur in low and middle income countries

63%
of all annual deaths are attributed to NCDs

Description of study

The study was done using ten microarray gene expression datasets from the four most common cancer types among men and women, with a total sample size of 681. The datasets are publicly available from the gene expression omnibus (GEO) repository.

Using publicly-available gene expression data from cancer research, the scientists, a PhD student and two Professors, performed a comparative review on seven binary classification methods; (support vector machines, with the radial basis kernel (SVM(RK), linear kernel (SVM(LK) and the polynomial kernel (SVM(PK), artificial neural networks (ANN), random forests (RF), k-nearest neighbor (KNN), and naive Bayes (NB). Results indicated that NB is the best classifier, outperforming the other methods in terms of the accuracy, sensitivity, specificity, kappa coefficient, area under the curve (AUC), and balanced error rate (BER) of the binary classifier. The NB approach turned out to be the best classifier.

This study enhances the capacity of selecting useful biomarkers needed for accurate cancer classification and prediction.

Anticipated outcomes

- This study will enhance the capacity of selecting useful biomarkers needed for accurate cancer classification and prediction
- The study will also help in the early detection of cancer and the application of stage-specific therapies to patients.