DOI: https://doi.org/10.36094/sc.v92.2026.Prediction_of_Bone_Cancer_Using_Hybrid_Stacked.Pyne.643

ARTICLE

Sci. and Cult. 92 (9–10) : 643-651 (2026)

PREDICTION OF BONE CANCER USING HYBRID STACKED CLASSIFIER

RIA PYNE[1], AVIJIT KUMAR CHAUDHURI[1] AND DAIZY DEB[1]*

In this study, we present a robust cancer outcome prediction model using a stacking ensemble classifier applied to a clinical dataset encompassing demographic, pathological, and treatment-related variables. The dataset comprises 500 instances and includes features such as sex, age, tumour grade, MSKCC type, primary site, status, surgical intervention, radiotherapy, and patient outcome. To enhance predictive performance, a stacking ensemble approach was employed, combining multiple base learners—including decision trees, logistic regression, and support vector machines—along with a meta-learner trained to optimise the final prediction. The proposed model achieved a notable accuracy of 86%, with a Cohen's Kappa score of 72%, indicating substantial agreement beyond chance. Additionally, the model demonstrated strong discriminatory power with an AUC score of 92%, and balanced classification metrics including precision (87%), recall (86%), and F1-score (86%). These results underscore the effectiveness of ensemble learning techniques in clinical predictive modelling, particularly for heterogeneous datasets with mixed-type variables. Our findings support the integration of stacking-based models into medical decision-support systems, where interpretability, accuracy, and robustness are paramount. Future work will explore explainability enhance-ments and deployment in real-time clinical settings.