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**Title:** Application of Logistic Regression and Neural Network Models to Breast Cancer Patients.

**Abstract:**  Breast cancer is a disease in which the cells in the breast grows out of control. It is the second most common cause of death from cancer in women after lung cancer and over 50 thousand new cases are reported every year in the United States. The survival rates of breast cancer depend on many factors. Using a sample of 100,002 breast cancer patients from three states in the United States covering the period 1992 – 2019, this study focuses on developing predictive models based on patient’s demographic risk factors, and mammographic descriptors to predict breast cancer patient’s last status (Alive or dead) and examine the influence of these factors on the patient’s last status. Using machine learning and deep learning techniques, five models were developed using logistic regression, feed forward neural networks, Support Vector Machine, and Random Forest Classification to predict the breast cancer patient’s last status for both sex and each sex separately. We compared the output of all models and found that the Convolutional Neural Network outperformed all models in both sex and each sex separately. However, in assessing the influence of the risk factors on patient’s last status, the Random Forest is proposed to be the best fit compared with all the other model. This work provides insight into increasing the effectiveness of machine learning in contributing to improve clinical decision making.