# Breast Cancer Detection in Mammographic Images Using an Ensemble Deep Learning Model

Patel, Eesha (School: Ardrey Kell High School)
Jasti, Harshitha (School: Ardrey Kell High School)

According to the US Breast Cancer Statistics, Breast Cancer has become the most common cancer in women in the United States. About 1 in 8 US women will develop invasive breast cancer over the course of her lifetime, a threat to all women. Although mammograms have been of great use in early diagnoses, they come with many limitations. About 1 in 5 breast cancers go undiagnosed by radiologists. For this reason, we propose an automated machine learning model to classify mammogram images, determining if they are cancerous or not utilizing the CBIS-DDSM dataset. In Phase 1, three separate models were made from scratch and tested. Then in Phase 2, VGG16 convolutional neural network architecture was modified for mammogram classification. In Phase 3, an ensemble network was created through a method called stacking, utilizing all four of the previous models. The ensemble CNN outperformed the other singular networks with an accuracy of 91.34%. For real world use, a basic web application was developed, which allows medical professionals to input a mammogram image and quickly receive breast cancer diagnoses. With being easily accessible and time-conservative to radiologists, our machine learning model provides an advancement in breast cancer radiology, having the potential to save lives with early and accurate breast cancer detection.

**Awards Won:**