

Title: Determining Malignancy: Can Mammogram Results Help Predict the Diagnosis of Breast Tumors?

Undergraduate Student(s): Taylor Behrens

Research Mentor(s): Professor Susan Mathews Hardy

Even with advancements in treatment and preventative care, breast cancer remains an epidemic claiming more than 40,000 American male and female lives each year. The mammogram dataset that I am analyzing was initially compiled in the early 1990s by a team from the University of Wisconsin - Madison. Past research diagnoses breast cancer from fine-needle aspirates. My research focuses on predicting whether we can determine breast cancer diagnoses without the use of invasive procedures and, in particular, whether we can predict breast cancer based on mammogram data. Do measures of gray-scale texture, radius, concavity, perimeter, compactness, area, and smoothness of the tumor predict whether the tumor is malignant or benign? Are there relationships between these quantitative predictor values? Do these relationships differ for the two categories of tumors: benign and malignant?

Some of my preliminary findings include that malignant breast tumors had a higher texture, higher radius, higher area, more smoothness, and more compactness than benign breast tumors. I will research the interrelationships among these measures. Does area, radius, or perimeter predict smoothness? Does area, radius, or perimeter predict texture? Does concavity predict concavity points? Do any of these relationships change based on whether the tumor is malignant or benign? To answer these questions I use a variety of parametric and nonparametric analyses with corresponding post hoc comparisons. Stratified box plots and mean plots will be used to display these findings.

Through study of the relationships among these measures and the relationships of the measures with malignant and benign tumors, clinicians may be able to create potential treatment plans without using more invasive procedures and predict whether more invasive procedures are warranted.

Word count: 271