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Kelsey Pearson, 2115 Summit Ave, St Paul, MN 55105, and **Naomi Latt***
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Mammography persists as a challenge in radiology because the structural differences between benign and malignant tumors are indistinguishable to the human eye. However, the application of fractal dimensions and cumulative distance histograms can diagnose breast tumors by mathematically analyzing contours. Our methodology extends to using fractal dimensions, which are a numerical measure of the complexity and irregularity of an object. Using the box counting method to calculate the fractal dimension, tumors can be diagnosed as cancerous or benign. A higher fractal dimension corresponds to a more complex and irregular contour, indicating a cancerous tumor; in contrast, a lower fractal dimension indicates a benign tumor. The final method we use is invariant distance histograms, which are formed by collecting a sample of distances between random points on the contour. Benign and malignant invariant distance histograms are compiled to create two respective cumulative distance histograms. The curve of best fit for these histograms can be compared for diagnosis because the curves of benign tumors differ from those of malignant tumors. (Received September 15, 2014)