1106-92-1973 **Anna Grim*** (grim4684@stthomas.edu), 2115 Summit Avenue, St. Paul, MN 55105. *Diagnosing Breast Cancer with Symmetry of Signature Curves.*

Mammography persists as a challenge in radiology because the structural differences between benign and malignant tumors are indistinguishable to the human eye. However, the unprecedented application in symmetry of signature curves can diagnose breast tumors by mathematically analyzing curvature. Our methodology quantifies a 2-dimensional (2D) tumor contour C by the rigidly invariant curvature parametrization $C = \{\kappa(t), \kappa'(t)\}$, where $\kappa(t)$ is curvature and $\kappa'(t)$ is the derivative of curvature. The malignancy of a tumor is determined by the frequency, range, and density of zero curvature points, where either $\kappa(t) = 0$ or $\kappa'(t) = 0$. In addition, contrasting global versus local symmetry patterns in the signature curve further distinguish malignancy. Benign tumors are distinctive by a high degree of global symmetry calculated from the 2D tumor contour. Whereas, malignant tumors exhibit multiple types of local symmetry embedded within their signature curve. The methodology has been implemented on over 150 tumors, demonstrating a strong correlation between curvature complexity and symmetry patterns with malignancy.

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