Abstract

After skin cancer, breast cancer accounts for the second greatest number of cancer diagnoses in women. Currently the etiologies of breast cancer are unknown, and there is no generally accepted therapy for preventing it. Therefore, the best way to improve the prognosis for breast cancer is early detection and treatment. Computer aided detection systems (CAD) for detecting masses or micro-calcifications in mammograms have already been used and proven to be a potentially powerful tool, so the radiologists are attracted by the effectiveness of clinical application of CAD systems.

Fractal geometry is well suited for describing the complex physiological structures that defy the traditional Euclidean geometry, which is based on smooth shapes.

The major contribution of this research include the development of

- A new fractal feature to accurately classify mammograms into normal and abnormal (i) with masses (benign or malignant)
  (ii) with microcalcifications (benign or malignant)
- A novel fast fractal modeling method to identify the presence of microcalcifications by fractal modeling of mammograms and then subtracting the modeled image from the original mammogram.

The performances of these methods were evaluated using different standard statistical analysis methods. The results obtained indicate that the developed methods are highly beneficial for assisting radiologists in making diagnostic decisions.

The mammograms for the study were obtained from the two online databases namely, MIAS (Mammographic Image Analysis Society) and DDSM (Digital Database for Screening Mammography).