

## Evolving Digital Circuits for Early Stage Breast Cancer Detection Using Cartesian Genetic Programming

**Authors :** Zahra Khalid, Gul Muhammad Khan, Arbab Masood Ahmad

**Abstract :** Cartesian Genetic Programming (CGP) is explored to design an optimal circuit capable of early stage breast cancer detection. CGP is used to evolve simple multiplexer circuits for detection of malignancy in the Fine Needle Aspiration (FNA) samples of breast. The data set used is extracted from Wisconsin Breast Cancer Database (WBCD). A range of experiments were performed, each with different set of network parameters. The best evolved network detected malignancy with an accuracy of 99.14%, which is higher than that produced with most of the contemporary non-linear techniques that are computationally expensive than the proposed system. The evolved network comprises of simple multiplexers and can be implemented easily in hardware without any further complications or inaccuracy, being the digital circuit.

**Keywords :** breast cancer detection, cartesian genetic programming, evolvable hardware, fine needle aspiration

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