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# Using a Genetic-Fuzzy Algorithm as a Computer Aided Diagnosis Tool on Saudi Arabian Breast Cancer Database

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The computer-aided diagnosis has become one of the major research topics in medical diagnostics. In this research paper, we focus on designing an automated computer diagnosis by combining two major methodologies, namely the fuzzy base systems and the evolutionary genetic algorithms and applying them to the Saudi Arabian breast cancer diagnosis database, to be employed for assisting physicians in the early detection of breast cancers, and hence obtaining an early-computerized diagnosis complementary to that by physicians. Our hybrid algorithm, the genetic-fuzzy algorithm, has produced optimized diagnosis systems that attain high classification performance, in fact, our best three rule system obtained a 97% accuracy, with simple and well interpretive rules, and with a good degree of confidence of 91%.

*Key Words:* Fuzzy systems, Genetic algorithms, Optimization methods, Breast cancer, Computer-aided diagnosis.

*AMS 2010 Subject Classification:* 68T01, 68T20, 03B52, 65Y10.

## 1. INTRODUCTION

In medical science, diagnosis of a disease is very complicated, and many tests must be done on patients to obtain a near accurate diagnosis. This has given rise to computerized diagnostic tools, intended to aid the physician in making primary medical decisions and hence an early diagnosis which helps reduce the treatment time or may save lives. Some of the most important areas in medicine research are related to cardiovascular diseases, lung cancer, and breast cancer. Specifically, breast cancer, since the physician needs to know early on whether the patient under examination exhibits the symptoms of a benign, or a malignant case. The computerized assisted diagnostic tools should attain the highest possible performance, which means they must classify correctly benign or malignant cases with a good degree of confidence. Moreover, it would be desirable for such diagnostic systems to be simple rules that are well interpreted by the physicians.

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