

# Performace on differnet parameter setting in GA-BPNN

**Abstract**—GA-BANN is an easy and well-known hybrid network. However, it's difficult to finds to goood solution beacaus the paramerters of backpropagation neutral network is large. This paper want to discuss the differnet strategies to run GA BPNN, and test which performace is better.

**Index Terms**—GA-BPNN, genetic algorithm, backpropagation

## I. INTRODUCTION

GA-BANN is a two-layers hybrid network. First use genetic algorithm to evolute paramerters, then apply to backpropagation. It is to implement. However, due to the range of paremeters is infinity. The accuracy rate of GA BPNN is often low. To solve this, we revise the geneti algorithm part to improve accuracy rate.

Genetic algorithm involves population, crossover, mutation. Backpropagation neutral network involves weight, bias, the number of neurons in hidden layer and dropout. The genetic algorithm will adjust weight and bias.

### A. Genetic algorithm

Genetic algorithm is a method inspired by the natural process. The process can be divide into 6 parts.

First is generating population the process will generate  $N$  population.

Second part is evaluate the every poppulation's fitness, th fitness can be defined widely. In GA-BPNN, we can define the the accuracy rate of testing data.

Third is parent selection, we use 2-tournament selector that is, select 2 parents randomly and retain the one ha higher fitness.

The fourth step is crossover. We define a constant,  $p_c$ , is th rate of crossover, and use random function as roulette. Whe the result of roulette is  $< p_c$  do crossover, otherwise not to do.

After crossover is mutation, like crossover,  $p_m$  is the rate of mutation.

Final is surival selection, select best  $L$  population from parents or offspring based on fitness. That's the whole process of genetic algorithm. [?]



Fig. 1. Process of Genetic Algorithm

### B. Backpropagation Neutral Network

Backpropagation Neutral Network is a three-layers neutral network. Fisrt is input layer, second is hidden layer, third is output layer. [?]

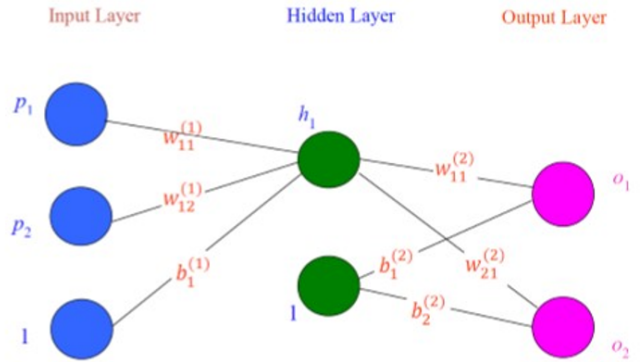


Fig. 2. Backpropagation Structure

It uses gradient descent to adjust weight and bias.

$$\nabla f(x, y) = \begin{bmatrix} \frac{\partial f(x, y)}{\partial x} \\ \frac{\partial f(x, y)}{\partial y} \end{bmatrix} \quad (1)$$

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