

## **Employing genetic algorithms in electronic tests (intelligence subject) in distinguished schools**

**HAYDER MOHAMMED MUSLIM**

**General directorate of education Baghdad,al - karkh/3,Iraq**

[hayder.moslem3@gmail.com](mailto:hayder.moslem3@gmail.com)

**Abstract.** Conducting tests by extracting questions manually and using random methods of generating tests from question banks. It consumes a significant Duration and strain, and the quality of the resulting tests is mostly inexact and the tests built Perhaps not exactly match Pre-formulated requirements. This research paper focuses on creative ways to improve process of researching questions in ways that meet extraction requirements and conditions that have been identified. This study proposes a genetic algorithm (GA) To create multi-choice tests, depending on the hardness levels of questions, and extracted assessments, trials and analyses using a Suggested mutation factor, has demonstrated the success of the gene algorithm method to a high percentage. An electronic system has also been designed to select and evaluate questions and their difficulty level are Depending on a genetic algorithm.

**Keywords.** Genetic algorithm -Question Bank- MYSQL-Python-Web Application

### **1. Introduction:**

Education is fundamental element for the country's improvement and progress. Technology is used to create flexible learning environments, The challenges facing education have reached stages that Enabling universities and schools to Providing effective and efficient operations, One of the important aspects education is how to Choose and evaluate questions posed to applicants for distinguished schools on the one hand quality, goal and level, Many researchers put a lot of effort into creating automated multi-choice tests, from used question repository, and they have demonstrated outstanding results, Since the use of computers has made multi-choice tests, more beneficial than other tests, Here we are looking for a genetic algorithm to select and determine most appropriate questions in order to complete questions in a particular test in order to provide teachers and academics by effective means of conducting tests from multiple-choice questions from bank question, Therefore, the use of genetic algorithm speeds up the selection of the optimal solution through several stages that pass through the questions according to criteria and requirements set by academics and teachers.

### **2. Research Problem**

The research problem lies in investing information technology in all its aspects in some schools for the Ministry of Education, including distinguished schools that are in dire need of this type of technology, To transform it from the traditional manual system into an automated system for testing and evaluation.

### **3. Research Objective**

The study aims to employ smart methods to select questions for distinguished school students from the question bank database, This is done by building a genetic algorithm, Thus, an automated and intelligent electronic question bank system is designed.

### **4. Genetic Algorithm (GA)**

Genetic algorithms (GA) are important methods of artificial intelligence, it is a search technique that echo natural genetic gene. A genetic algorithm uses operators Inventive by methods of natural selection on binary strings. GAs is typically used as an Enhancement technique to find the universal optimal value of a function , work of GA starts with an initial set of sequences, which are in general named chromosomes, represented by four stages. [5] [1] [7]

#### **A. (Initialization)**

A primary population is randomly selected. A chromosome is delegate solution to a problem and represents a set of genes. The size of a chromosome, differs from problem to problem. The Chance of every chromosome lingering in population is then determined. In short, fitness, according to which the chromosome is evaluated, [5] [4]

#### **B. (Selection)**

Where (Selection) the candidate individuals are selected from elect chromosomes in the next Breed. Depending on fitness criteria, That means selecting just Hereditarily new Personalities "chromosomes" to become "parents" [4],[2].

#### **C. (Crossover)**

After selection, the crossover process takes place, and an arbitrary intersection point chosen. Pairs of parents are randomly selected from the crossover population, In general, the crossover combines the features of two original chromosomes to form two new offspring from Questions, With the possibility that new chromosomes may generate better chromosomes. [7][5],[4]

#### **D. (Mutation)**

Here the candidate chromosomes go through the process of mutation, the Modernize is done on bits or Gene makes the chromosome unique. mutation process extends search space to regions that might not be soon to present "chromosome" population. Consequently Guarantee a comprehensive seek. Such a development rotation is duplicated until the desired criterion is reached. This standard can be set by number of development rotations (calculations) or a preset objective function value.[4],[3]

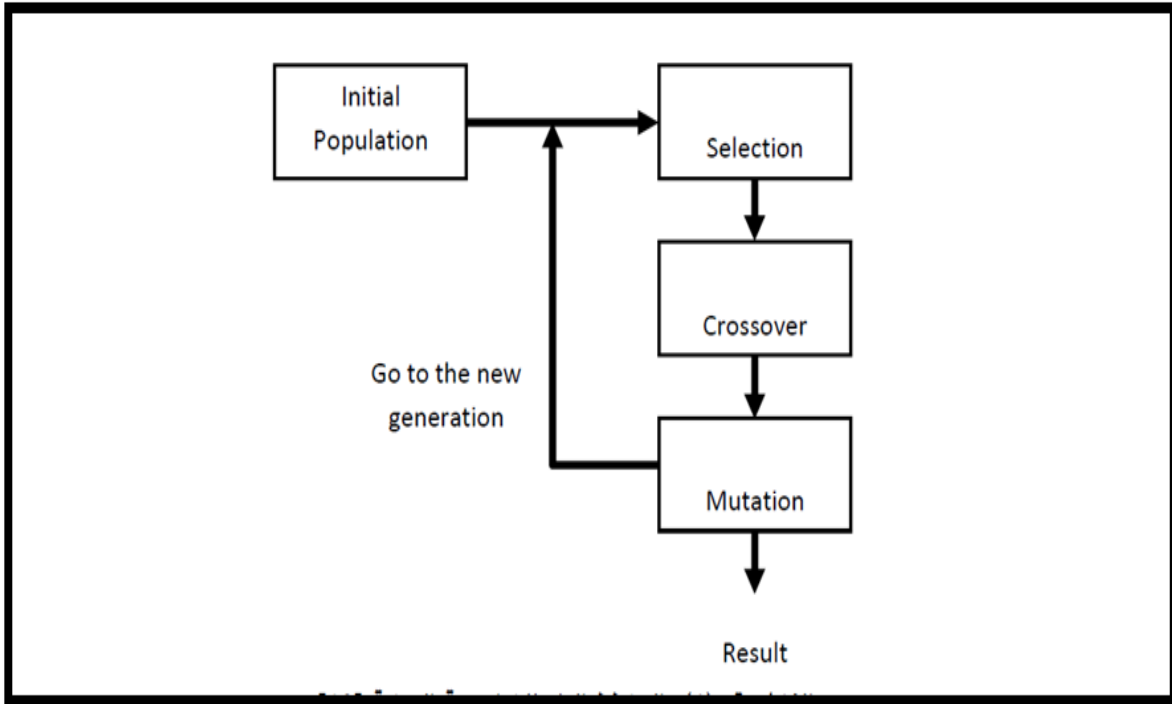


Figure (1) is a general diagram showing the work of genetic algorithm [5]

### 5. Question selection model using the genetic algorithm (GA).

Genetic algorithm to choose questions
Input: Database
Output: Best questions
beginning first step: Determine the number of questions to be chosen. Step Two: Download the questions from the database. Third step: Fitness account. Step Four: Call the GA algorithm. Step five: The number of questions you want. End

Group No = GA ( NO eq , DB , ID , Fitness )

**NO eq:** number of questions to be selected.

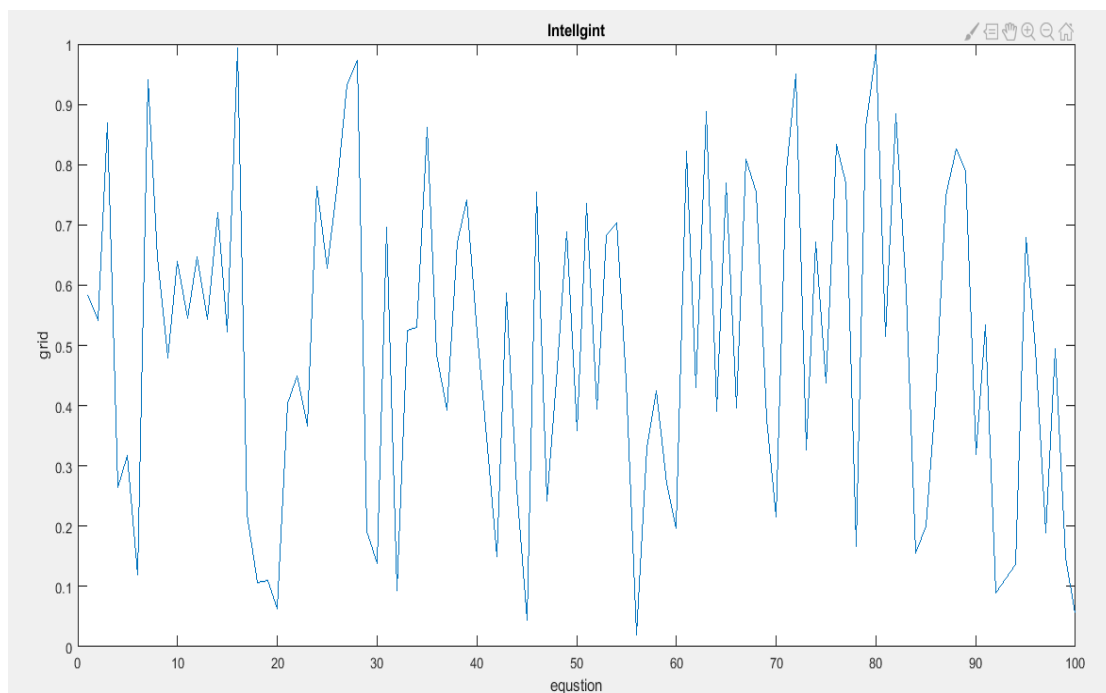
**DB:** Questions in database

**ID:** question number.

**Fitness:** Question efficiency

Through the above model, which explains how the genetic algorithm works to select questions from the question bank, where the input to this system is a database containing a large number of questions, Then, in the first step,

number of questions to be selected from database is determined, Then in the second step, the questions are downloaded from the database, In the third step, the efficiency of the Fitness questions is calculated by storing the efficiency of each question in the question bank in the database, Then in the next stage, the genetic algorithm is applied through four stages that take place on the questions through the steps of the genetic algorithm and in accordance with the established requirements, Thus, the number of desired questions is extracted according to the required and specific conditions and requirements.



**Figure (2) show proficiency rates of questions for intelligence subject**

## 6. The research sample

The Suggested system was applied to questions and answers of the intelligence exam from (distinguished schools), where a database was designed using the MySQL program, which contain test questions from {2010 to 2022} , in addition to outcomes of "students' answers" at the questions.

## 7. Work Environment

The model was designed in Python 3.7.4 programming environment, and the (Django Library) program was used for purpose of building a web application to display questions and answers.

## 8. Conclusions

The genetic algorithm (GA) achieved very good results in finding the optimal solution to the questions selected from the database (question bank) in terms of selection and evaluation from the database.

The genetic algorithm GA shows, in the mutation technique stage, that questions are not repeated in the group that was chosen for the application.

## Resources

1. مها عبد الاله محمد البدراني " استخدام الخوارزمية الجينية في تطابق أنماط الاحرف الإنكليزية" ، مجلة التربية والعلم ، 4.19 (2007) : 84-99 .
2. يحيى قاسم إبراهيم "مهاجمة نص مشفر (معلوم نصه الصريح) باستخدام الخوارزمية الجينية، مجلة التربية والعلم ، 1.27 (2014): 158-168 ،
3. Esmine, Ahmed Ali Abdalla, Germano Lambert-Torres, and Guilherme Bastos Alvarenga. "Hybrid evolutionary algorithm based on PSO and GA mutation." 2006 Sixth International Conference on Hybrid Intelligent Systems (HIS'06). IEEE, 2006
4. Huang, Mu-Jung, Hwa-Shan Huang, and Mu-Yen Chen. "Constructing a personalized e-learning system based on genetic algorithm and case-based reasoning approach." Expert Systems with applications 33.3 (2007): 551-564.
5. Yildirim, Mehmet. "A genetic algorithm for generating test from a question bank." Computer Applications in Engineering Education 18.2 (2010): 298-305.
6. Garg, Harish. "A hybrid PSO-GA algorithm for constrained optimization problems." Applied Mathematics and Computation 274 (2016): 292-305
7. Mirjalili, S., & Mirjalili, S. (2019). Genetic algorithm. Evolutionary Algorithms and Neural Networks: Theory and Applications, 43-55.