

# Implementation of Genetic Algorithm for Agriculture System

Shweta Srivastava

*Department of Computer science Engineering  
Babu Banarasi Das University ,Lucknow, Uttar Pradesh, India*

Diwakar Yagyasen

*Department of Computer science Engineering  
BBDNITM, Lucknow, Uttar Pradesh, India*

**Abstract-** The enactment of agricultural system is most vital for India as it is the land of agriculture. Agriculture is related to the Latin term “Ager” and “Cultura”. This paper focuses on the development of a agriculture system for farmers using MATLAB. The GA technique is used to evolve farming techniques for maximizing benefits in Uttar Pradesh. The main objective of development is to provide better farming facilities to the farmers of the State. Our work focuses on the Promotes farming skills and preserves the lands suitable for Indegenous species. Farmers have many queries regarding the kind of soil/climate for a specific crop and timelines corresponding with each activity related to agriculture. The motive of our work is to provide the farmers with the best possible expertise.

**Keywords:** agricultural System, genetic algorithm, MATLAB

## I. INTRODUCTION

The major aspects of our research is on embedding agriculture information System by establishing collaboration to extend the services that will be provide a better farming. Facilities to the farmers who are in distant locations and not aware of new technology of nowadays. Agriculture plays a crucial role in the development of the Indian economy. Our large percentage of population directly depend on agriculture and GDP dependent on agricultural sector administrative. In this scenario it becomes very important to educate farmers with new technologies. Our paper deals with the agriculture system. [1-2]

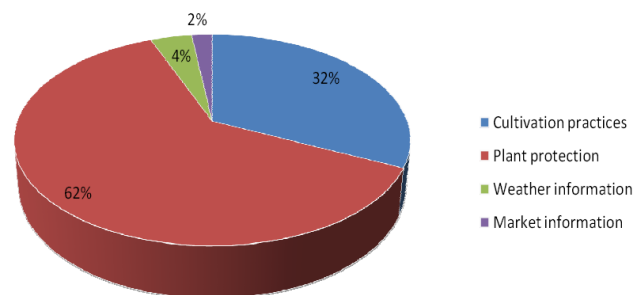


Figure1. Type of Queries raised by farmers

## II. AGRICULTURE SYSTEM USING GENETIC ALGORITHM

Agriculture system is capable of recognizing, managing transferring all agriculture related information of an farmer of any location and area. This information helps in collection of relevant data about the farming techniques, crop, type of soil and so that they are provided with the best farming methods. This include crop he is sowing and also the information of land of that area. This will help in improving quick decision making capabilities. The aim of genetic algorithm is to provide the optimal solution to the farmer. Genetic algorithms are a type of optimization algorithm, meaning they are used to find the maximum or minimum of a function. Using MATLAB, we here solve the problems of farmer by giving them the most optimal solution to their problem.[3-10].

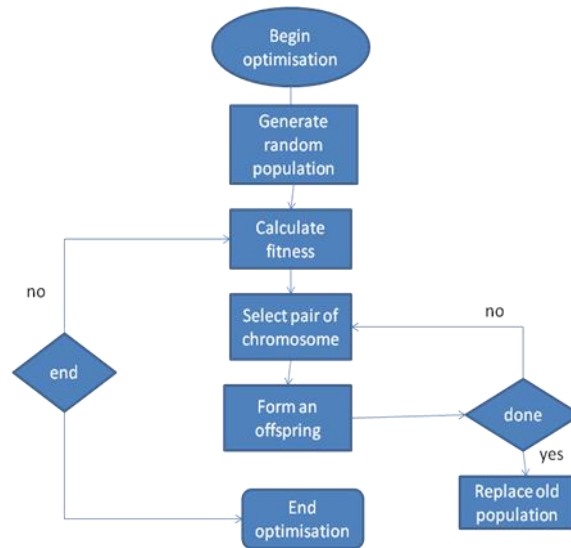


Figure2. Genetic algorithm flow Diagram

### III. LITERATURE SURVEY

- In 1996 Thomas Back presents Evolutionary Algorithms in Theory and Practice which show the new existing probabilistic search tools by biological models that have immense potential as practical problem solver which shows Evolution Strategies, Evolutionary
- In 1997 Programming, Genetic Algorithms. Oxford presents the comparison between genetic algorithm, evolution strategies and evolutionary programming.
- In 1991 Belew, R. K. and Booker, L. B in the Proceedings of the Fourth International Conference on Genetic Algorithms. Morgan Kaufmann presents spectral and geometric properties of crossover operator in a genetic algorithm with general size alphabet.
- In 1987 Davis, L.ed. Genetic Algorithms and Simulated Annealing. Morgan Kaufmann shows biological evolution to be so good at adaption have been employed in the field of artificial intelligence.
- In 1995 Eshelman, L. J., ed. in Proceedings of the Sixth International Conference on Algorithms Morgan shows genetic programming is a subclass of genetic algorithm in which evolving programs are directly represented in the chromosome as trees.
- In 1995 Fogel, D. B. in Evolutionary Computation: Toward a New Philosophy of Machine Intelligence. IEEE shows genetic algorithm evaluates each candidate according to the fitness function.
- In 1993 Forrest, S.ed in Proceedings of the Fifth International Conference on Genetic Algorithms. Morgan shows one common approach is to encode solutions as binary string: sequence of 1's and 0's where the digit at each position represents the value of some aspect of the solution.
- In 1985 Grefenstette, J. J. in Proceedings of an International Conference on Genetic Algorithms and Their Applications. Erlbaum shows genetic algorithm and their applications.
- International Conference on Genetic Algorithms. Erlbaum shows machine learning is devoted to genetic algorithm and genetic based learning systems.
- In 1992 Michalewicz, Z. Shows Genetic Algorithms + Data Structures = Evolution Programs. Springer-Verlag in which principle of evolution i.e survival of the fittest. It works on Optimisation of functions with linear and non linear constraints.
- In 1995 Schwefel, H.-P shows Evolution and Optimum Seeking. Wiley in which he presents numerical optimization methods and algorithm applied to computer applications. It consist of the adaption of simple evolutionary rules to a procedure which is search for optimal parameters..
- In 1995 Whitley, D., and Vose, M., eds. Shows Foundations of Genetic Algorithms Morgan Kaufmann.”

In which GA is that it maintains a population of the candidate solutions that evolve over time. The population allows the GA to continue to explore a number of regions of the search space that appear associated with high performance solutions.

#### IV. ANALYSIS OF GENETIC ALGORITHM AND ITS WORKING

In this research the model work for the evaluation of the crop where the input is soil and weather. And the output come as crop, the attempt is for the evaluation of the land/crop/weather suitability. A database of all the crop has been formulated. After the collection of the data, We work for a fitness function with variables defining crop, weather and soil. After defining fitness function we apply crossover, mutation, reproduction for finding the optimal solution. We use MATLAB as software for the input of data and for desired output (optimal solution). In this method we use Geographic Information System for the analysis of location from which we take information about the area. The information works as input for genetic algorithm. The research for genetic algorithm is used to introduce the population various operations implemented on it, fitness function and its programming. MATLAB software is used for programming because it is robust in nature.

#### V. RESULTS

- Contains information which is common to every crop, like
- Weather
- Type of soil
- Crop type
- First generation
- Second generation after mutation and crossover
- Fitness function
- $(Z = y \cdot x a(\varphi + I^{0.5})$   
Z is a crop, Y is a weather, I is a type of soil

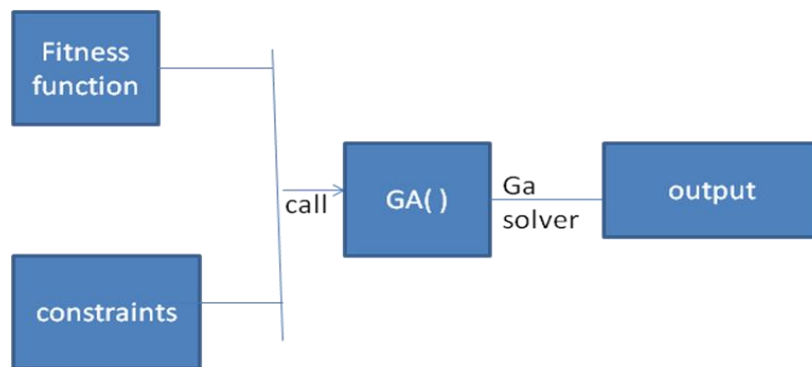


Figure3. Proposed diagram

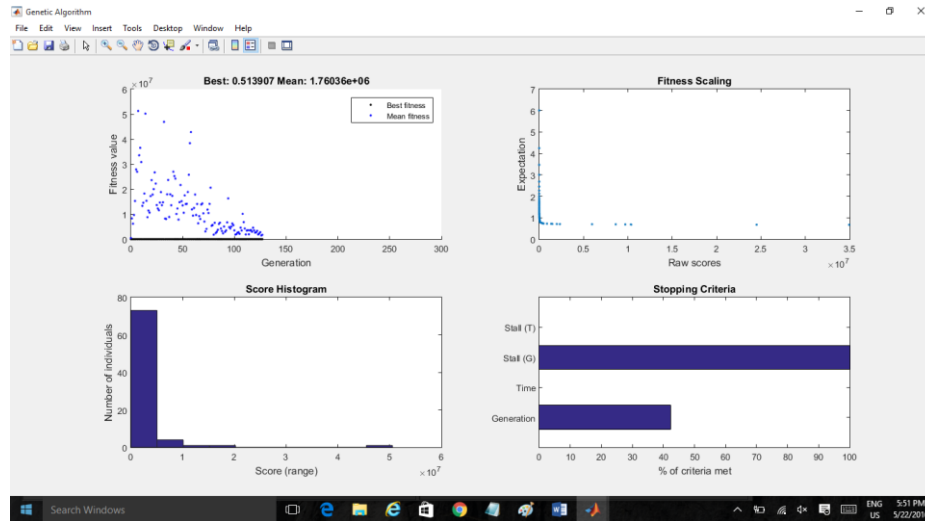


Figure4. Graph Generated by MATLAB

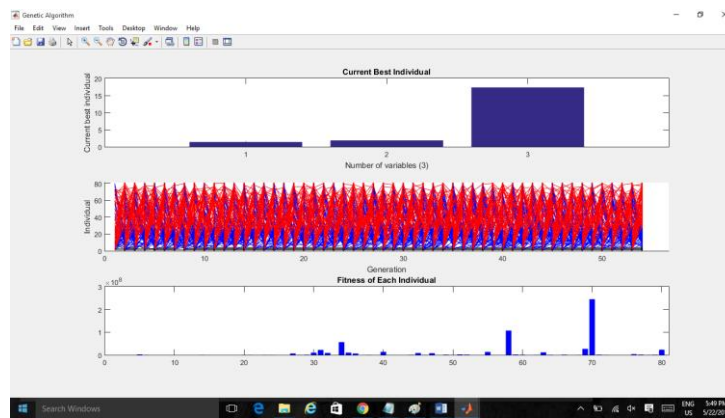


Figure5. Graph Generated by MATLAB

## VI. CONCLUSION

This paper is for Societal, Economical and Environmental strategies for major crops of Uttar Pradesh through GA by considering the best combination of GA parameters. Nowadays large companies used genetic algorithm to optimize and design products range from tiny chip to a agriculture system. In GA there is a parallel computing which make it more appealing because it helps to reduce the problem of lack of speed in computing. It allows more number of iteration which will increase solution and provide ways for better solutions. The working for combining genetic algorithm with other evolutionary computation algorithm such as fuzzy and neural network is going on. This paper presents strategies for optimal Solution for major crops in four seasons and for crop varieties of Uttar Pradesh, India. The models proposed in this paper are solved through real parameter GA for optimal solution by parametric study. It based on the results achieved with the help of genetic algorithm will lead towards a development strategy in the rural sector through agriculture. In a country like India whose rural economy is mostly agriculture based, a sustainable development in the context of globalization is only and environmental strategies by reorganizing land system for various agricultural activities keeping in view of the local and market requirements allocation .This model is based on single objective optimization possible by way of improved land, societal, economical. So the result of testing the genetic algorithm is efficient and effective.

REFERENCES

- [1] Goldberg, D. E. (1989). Genetic Algorithms in Search, Optimization, and Machine Learning. Reading: Addison-Wesley.
- [2] Haupt, R. L., & Haupt, S. E. (1998). Practical Genetic Algorithms. New York: Wiley-Interscience.
- [3] Haupt, R. L., & Haupt, S. E. (2004). Practical Genetic Algorithms (2nd ed.). Hoboken: Wiley.
- [4] Kinnear, K. E. (1994). A Perspective on the Work in this Book. In K. E. Kinnear (Ed.), Advances in Genetic Programming (pp. 3-17). Cambridge: MIT Press.
- [5] (Ed.), Advances in Genetic Programming (pp. 3-17). Cambridge: MIT Press.
- [6] Koza, J. R. (1994). Introduction to Genetic Programming. In K. E. Kinnear (Ed.), Advances in Genetic Programming (pp. 21-41). Cambridge: MIT Press.
- [7] Mitchell, M. (2009). Complexity: A Guided Tour. New York: Oxford University Press.
- [8] Mitchell, M. (1996). An Introduction to Genetic Algorithms. Cambridge: MIT Press.
- [9] Mitchell, M. (1995). Genetic Algorithms: An Overview. Complexity, 1(1), 31-39.30
- [10] Simon, D. (2013). Evolutionary Optimization Algorithms: Biologically-Inspired and Population-Based Approaches to Computer Intelligence. Hoboken: Wiley.
- [11] Steeb, W. (2001). The Nonlinear Workbook : Chaos, Fractals, Cellular Automata, Neural Networks, Genetic Algorithms, Fuzzy Logic: with C++, Java, SymbolicC++ and Reduce Programs. Singapore: World Scientific.
- [12]