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# IMPLEMENTATION OF ANT COLONY OPTIMIZATION ALGORITHM ON LADY FINGER EXPERT ADVISORY SYSTEM

Prof. M.S. Prasad Babu[1] & B. Jogeswara Rao[2]
[1]Professor, Dept. of CS & SE, Andhra University, Visakhapatnam (A.P), INDIA.
[2]Research Scholar, Dept. of CS & SE, Andhra University, Visakhapatnam (A.P), INDIA

## Abstract

The present paper deals with the development of web based expert systems using machine learning techniques to advice the farmers in villages through online. An expert system is a computer program, with a set of rules encapsulating knowledge about a particular problem domain. In the present paper Ant Colony Optimization algorithm has been taken and this algorithm mainly focuses on finding the diseases affected to the Lady Finger plants. At First, the symptoms provided by the user are processed by a rule based expert system, If the rules required for processing the data by the above are not present in the database, then the system automatically calls the machine learning algorithm technique. As a whole, the system results global solution for recognizing the diseases in Lady Finger plants, and corresponding treatments to the diseases may also be suggested to the users. This expert system is a web based online application for online users with java as front end and MySQL as backend.

***Keywords :*** Expert Systems, Machine Learning, Ant Colony Optimization Algorithm, Lady Fingers, JSP & MYSQL.

## 1. Introduction

***Expert Systems:***

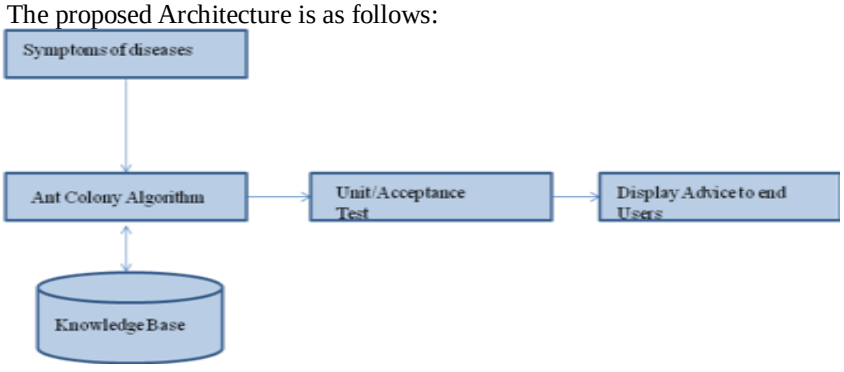
An expert system is software that attempts to provide an answer to a problem, or clarify uncertainties where normally one or more human experts would need to be consulted. Expert systems are most common in a specific problem domain, and are traditional application and/or subfield of artificial intelligence. A wide variety of methods can be used to simulate the performance of the expert however common to most of all are 1) The creation of a knowledge base which uses some knowledge representation formalism to capture the Subject Matter Expert's (SME) knowledge and 2) A process of gathering that knowledge from the SME and codifying it according to the formalism, which is called knowledge engineering.

## 2. Machine Learning

Machine Learning is a mechanism, concerned with writing a computer program that automatically improves with experience. It is a very young scientific discipline whose birth can be placed in the mid-seventies. The First Machine Learning Workshop was taken place in 1980 at Carnie-Mellon University (USA) The goal of machine learning is to program computers to use example data or past experience to solve a given problem. Many successful applications of machine learning exist already, including systems that analyze past sales data to predict customer behavior, recognize faces or spoken speech, optimize robot behavior so that a task can be completed using minimum resources, and extract knowledge from bioinformatics data. Machine learning refers to the changes in systems that perform tasks associated with artificial intelligence (AI). Such tasks involve recognition, diagnosis, planning, robot control, prediction, etc. The changes might be either enhancements to already performing systems or abs initial synthesis of new systems

## 3. Ant Colony Algorithm

Ant colony Optimization (ACO) metaheuristic is a recent population based approach inspired by the observation of real ants colony and based up on their collective foraging behavior. Ant Colony Optimization (ACO) is a paradigm for designing metaheuristic algorithms for combinatorial optimization problems. A Meta heuristic is a set of algorithmic concepts that can be used to define heuristic methods applicable to a wide set of different problems. Examples of metaheuristics include simulated annealing, tabusearch, iterated local search, evolutionary computation, and ant colony optimization. Meta heuristic algorithms are algorithms which, in order to escape from local optima, drive some basic heuristic: either a constructive heuristic starting from a null solution and adding elements to build a good complete one, or a local search heuristic starting from a complete solution and iteratively modifying some of its elements in order to achieve a better one. The proposed Architecture is as follows:



### *3 .1. Proposed Algorithm*

Ant colony Optimization (ACO) metaheuristic is a recent population based approach inspired by the observation of real ants colony and based up on their collective foraging behavior. Ant Colony Optimization (ACO) is a paradigm for designing metaheuristic algorithms for combinatorial optimization problems.

### *3.2. Implementation Procedure of Proposed ACO Algorithm*

Step.1. Set parameters initialize pheromone trails. Pheromone values are associated with Disease.
Step.2. while termination conditions not met do.
Step.3. Construct Ant Solutions,
Calculate the pheromone value for each disease by the symptom related to that disease.
Step.4. Apply Local Search (optional).
Step.5. Update Pheromones.
Step.6. end while.

## 4. Database Generation

In this section, the setup for production rules in the knowledge base is presented. Generally, the rules are of the form,
Rule 1: S1=1,S2= 0,S3= 0,S4= 0, S5=0,S6= 1,S7= 0,S8=1, S9= 0,S10= 0,S11= 0,S12= 0
Resultant disease may be D1
Rule 2: S1= 1,S2=1 ,S3= 0 ,S4= 0, S5= 0,S6= 0 ,S7=1,S8= 0 ,S9= 0 ,S10= 0 ,S11=0,S12= 1Resultant disease may be D2
Rule 3: S1= 0,S2= 1 ,S3= 0 ,S4= 0 , S5= 1,S6= 1 ,S7= 0,S8= 0 ,S9= 0 ,S10=1 ,S11=0 ,S12= 0 Resultant disease may be D3.

## 5 . Results

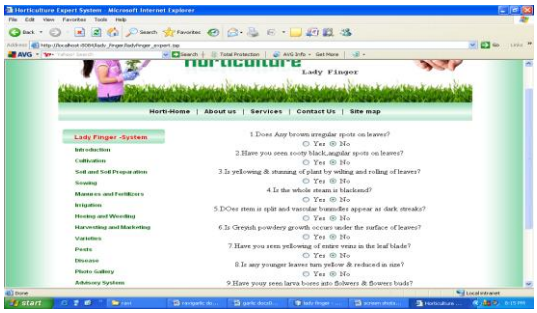


Fig.1: Selection of Symptoms

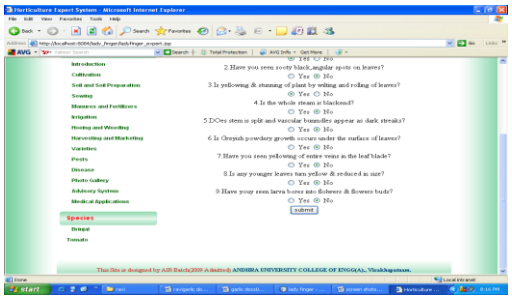


Fig.2: Selection of Symptoms

Fig: 3.-displaying advice to the end user

## 6. Conclusions

Its main emphasis is to have a well designed interface for giving Lady finger plant related advices and suggestions in the area to farmers by providing facilities like online interaction between expert system and the user without the need of expert all times. In the present developed expert system, the user can get a detailed data about the Lady finger and the diseases affecting to lady finger plants and cure to those diseases can also be seen by the user. The implementation of the proposed system also gradually reduces the processing time of rules and gives the solution to the

problem in a more pheromone level. The algorithm used in the system can be treated as quite effective, in most cases it finds a solution which represents a good approximation to the optimal one and fast enough for the number of iterations. By the thorough interaction with the users and beneficiaries the functionality of the System can be extended further to many more areas in and around the world.

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