A Web Based Rose Crop Expert Information System Based on Artificial Intelligence And Machine Learning Algorithms

Prof.M.S.Prasad Babu[1] S.V.N.L.Narayana[2] ch.viswanadha sarma[3] K.A.Suryanarayana[4]

1. Professor, Department of CS & SE, Andhra University, Visakhapatnam, Andhra Pradesh, India.
msprasadbabu@yahoo.co.in

2. Head of the Department, Department of Physics, M.R.P.G.College, Vizianagaram, Andhra Pradesh, India
laxminarayanasvn@yahoo.com

3.Sr.Asst.professor Department of mathematics, Vignan engineering college, Dwavada, visakhapatnam.
Andhra Pradesh, India
Vissu.viit@gmail.com

4. Head of the Department, Department of Economics, M.R.P.G.College, Vizianagaram, Andhra Pradesh, India
suryakas@yahoo.co.in

Abstract- The Rose Expert System is basically gives the information regarding the diseases, viruses and their symptoms and chemical controls which are used to prevent the diseases and viruses of cultivation of Rose.
This Rose Expert Advisory System is simulation of more than one expert. This system is developed in Java Server Pages. There are two modules "Information system" and "Advisory system" are embedded in present system. For advising the farmers in the disease identification and preventive measures of Rose plantation, this "Rose Expert Advisory System" uses backward chaining mechanism for building Rule Based Expert system which results in giving exact disease. If rule base system fails in giving the exact disease then Rose Expert Advisory System provides an alternative system using Machine Learning Techniques – Optimization Algorithm, which produces subset of diseases with probabilistic values. Then the system uses Particle Swarm Optimization Algorithm for each disease by taking some sign values from the user and gives a nearest disease to the user with the preventive measures.

Keywords:
Expert Advisory System – Information System – Rule Based-Optimization Algorithms- Particle Swarm Optimization Algorithm – Web Based – JSP – SQL

1. Introduction

Expert system can be defined as a tool for information generation from knowledge. Information is either found in various forms or generated from data and/or knowledge. Text, images, video, audio are forms of media on which information can be found, and the role of information technology is to invent, and devise tools to store and retrieve it. Information is generated from knowledge. The expert system gives advises.

Rose flowers are symbol of fragrance, beauty and to convey the message of love. In India roses are used to make bouquet, oil, rose water and gulkand. And also used for making incense sticks with Dry petals of roses. The native places of Roses are Asia, North America, China, Japan, Europe and Himalayas regions in India. There are about 150 species

1.1 Rose Varieties

1.2 Climate:

Rose can grow in various climates, and also good for flower production at bright sunshine It should be noted the quality rose blooms are obtained during December to April.

1.3 Temperature:

The growth of the Rose plant and flower are depending upon the temperature. For the rose the minimum and maximum temperatures are 7.9^{o} C 22.6^{o} C with minimum 6 sunshine hours during winter season. During summer and rain seasons flower quality and lifetime of rose and rose plant are to be affect.

1.4 Soil:

In fertile soil, the growth of Rose plants is well. If the proper drainage facilities in all types soil then the plant growth is well. In soil pH level upto 6.0 to 7.5, Roses grow well. If pH is less than 6 then the soil depth of minimum 45 cm is good for rose growing.

2. Proposed System:

The proposed system is Rose expert advisory system. It is divided into two aspects

1. Information System
2. Advisory System

In Information system, the user can get all the static information about different species, Diseases, Symptoms, chemical controls, Preventions, Pests, Virus of Rose flower and plants.

In Advisory System, the user is having an interaction with the expert system online; the expert system asks the questions. User has to answer which is given by the expert system. Depends on the response by the user the expert system decides the disease and displays its control measure of disease.

It is aimed at a collaborative venture with eminent Agriculture Scientist and Experts in the area of Rose Plantation with an excellent team of computer Engineers, programmers and designers.

This web application is expected to have the following features:

1) This web application provides time- to- time updates of Rose information to the users at their door steps regarding diseases, virus and its control measure which leads to good yields.

2) This site contains four major sections named Information Systems of Rose, Rose Advisory System, other services related to web application and an additional feature is links to other agriculture systems

3) The web directory service, articles and the discussion forum service provided in the website will help the floriculture fraternity in a greater way to interact each other to produce better findings in the area of floriculture field.

2.1. Functional Requirements for Rose Expert System:

2.1.1. Inputs:

The system needs the information about the symptoms from the user to produce the output.

2.1.2. Outputs:

The outputs of the system will be:

1) Information Diseases & Viruses

2) Small Description about the disease & Viruses

S.No	Name of variety	Flower color
1.	Black Velvet, Crimson Glory, Happiness	Red and dark red
2.	Eiffel Tower, First Love, First Prize	Pink
3.	Blue, Africa Star, Paradise	Lavender
4.	Hawaii, Super, Star, Duke of Windsor	Orange
5.	Virgo, White Christmas	White
6.	Careless Love	Novel Color
7.	Summer Sunshine, Golden Giant, Kiss of Fire, Double Delight	Yellow
8.	Perfecta (pink and white), Suspense (red and yellow)	Bicolor

3) Chemical controls & Nutrients

4) Preventions

2.1.3. Store:

The information collected through experts is stored as a database (Knowledge Base) that serves as a repository for quick processing and future retrieval. The system stores the following information in terms of html files.

1) About Rose system
2) About Rose Varieties
3) Climate and Soil
4) Plantation
5) Common Symptoms
6) Common Diseases
7) Chemical Control
8) Preventions

The System Stores the information related to Expert System in knowledge base in the following ways.

2.1.4. Rules A set of rules that constitute the program stored in a rule memory of production memory and on an inference engine using JSP files required to execute the rules.

2.1.5. Dataset: MySQL database can be used to store data in a database. The post-analysis of the monitoring data can be conducted by you for increases the opportunity.

3. Machine Learning

Architecture of Rose Crop Advisory Expert System

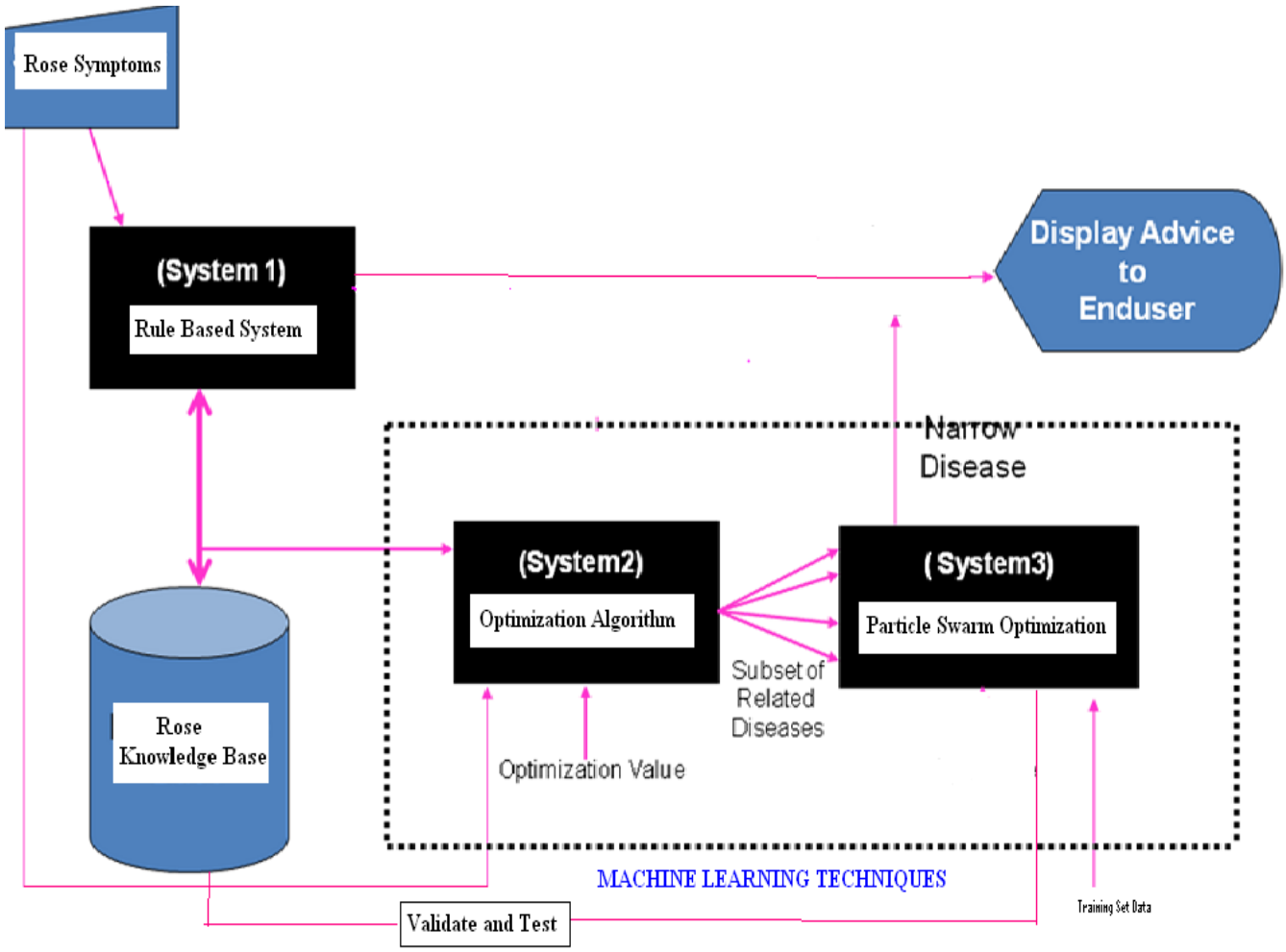


Fig 1. Rose Crop Advisory System

Fig.2 Architecture of subsystem –I (RULE BASED SYSTEM)

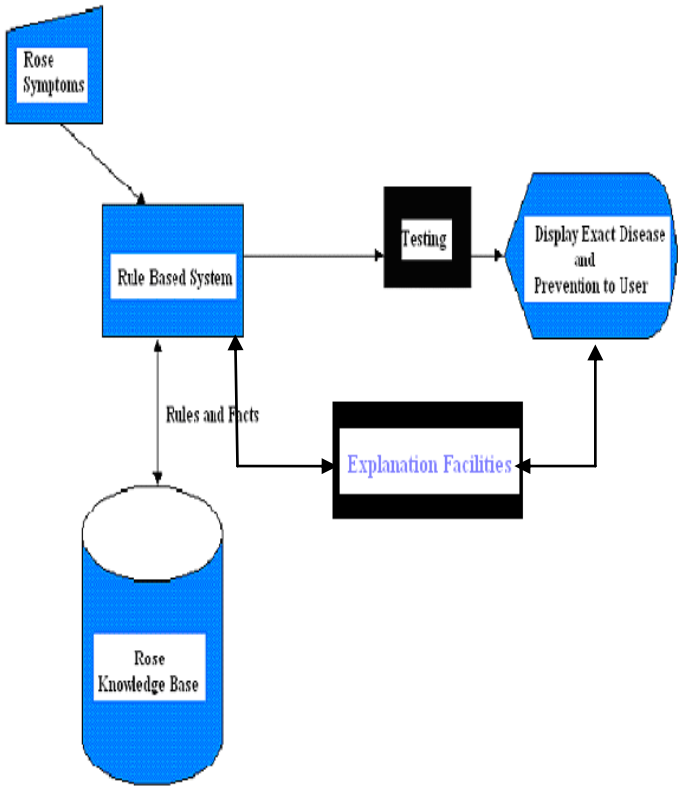


Fig 3. Architecture of subsystem –II (Optimization Algorithm):

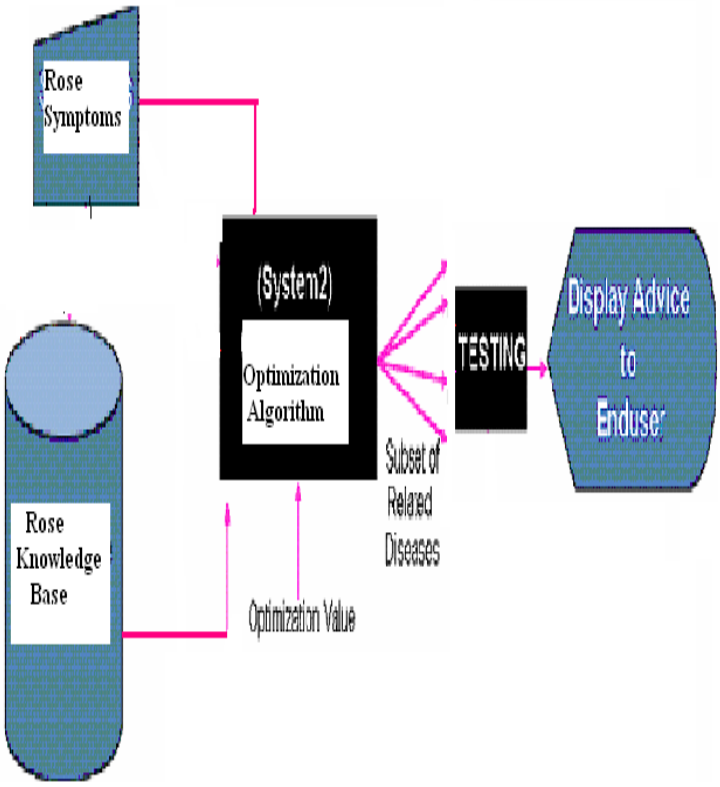
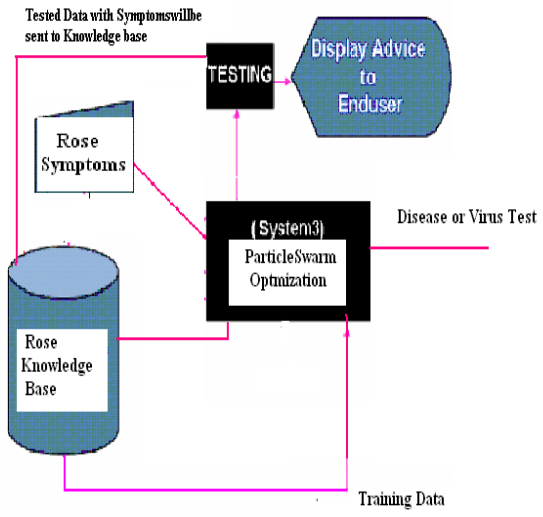


Fig.4 Architecture of subsystem –III



(Particle Swarm Optimization Algorithm)

3.1. Rule Based System
(System-1)

In the Rule Based System the System takes the Symptoms as Input and produce the Exact Disease with all the facts and Rules that matches with in the Knowledge base. This Rule Based System Consists of Knowledge Base, Inference Engine, User Interface, Expert and the User.

Algorithm:

- Repeat
- Collect the *rules* whose conditions match facts in Working Memory.
- If more than one rule matches
- Use *conflict resolution strategy* to eliminate all but one
- Do actions indicated by the rules
- (Add facts to Working Memory or delete facts from Working Memory)
- Until problem is solved or no condition match

The output of the this system produce the exact disease basing on the symptoms produced by the user which leads to a disadvantage that if any of the symptom does not match with the knowledge it will not produce any output for the further proceedings.

If the system1 (Rule Based System) unable to produce the exact disease then the system2 starts performing its work.

1.2. Optimization Algorithm: -
(SYSTEM-II)

Algorithm:

Optimization (Computation Vector, Memory Matrix, Resultant vector)

Computation Vector is the input vector that has to be mapped with the Memory Matrix and produce the result in the Resultant vector.

Computation Vector is an Input Boolean string of length n. and Memory Matrix is generated from the Knowledge base with all Boolean value of order m X n.

Step 1: Read the Computation vector as Boolean String of n length.

Step 2: Create a Resultant vector that initialize to null and counter to zero

Step 3: Construct the Memory Matrix of Boolean Value from the Knowledgebase.

Step 4: for i in 0 to m in the Memory Matrix of m X n
Make counter as zero. (Perform Step 4a and step 4b m times)

Step 4a: for j in 0 to n element in the row
Compare the jth element of the Computation vector with the jth element of the row
if both the element are equal
counter++ (increment the counter).

Step 4b: Assign the ith element of the Resultant vector with the counter.

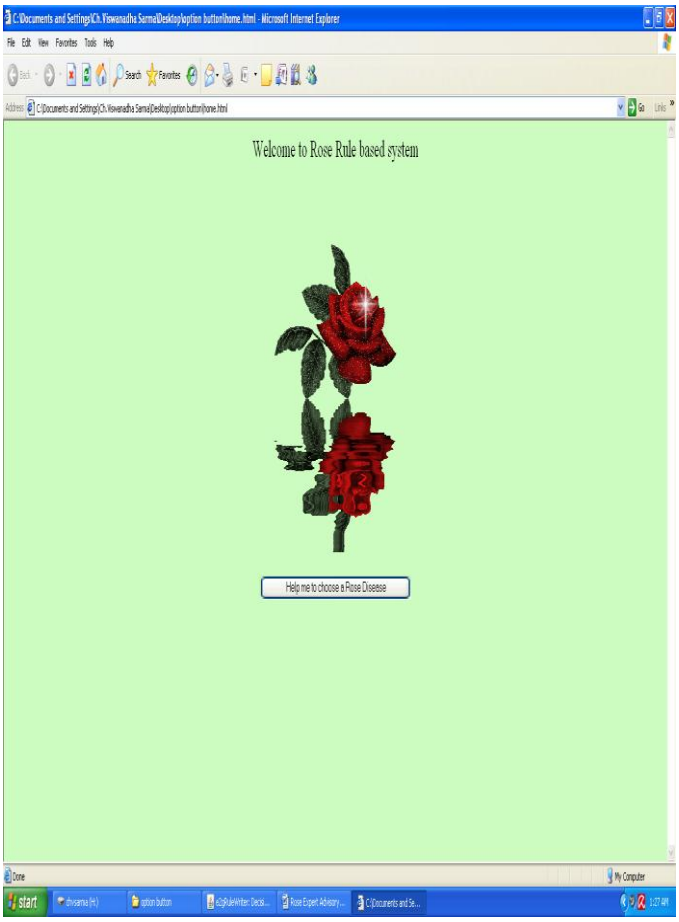
Step 5: (The resultant vector will be within the value of count which is has to be converted into
probability value of percentage value).

Step 6: For each element in the Resultant Vector replace the value by value/m*100 for Percentage
value of replace the value by value/m*1 by Probability value.

Step 7: End the process

1.3. Particle Swarm Optimization Algorithm:

For each particle
Initialize particle with feasible random number
END
Do
For each particle
Calculate the fitness value
If the fitness value is better than the best fitness value (pbest) in history
Set current value as the new pbest
End
Choose the particle with the best fitness value of all the particles as the gbest
For each particle
Calculate particle velocity according to velocity update equation
Update particle position according to position update equation
End
While maximum iterations or minimum error criteria is not attained.



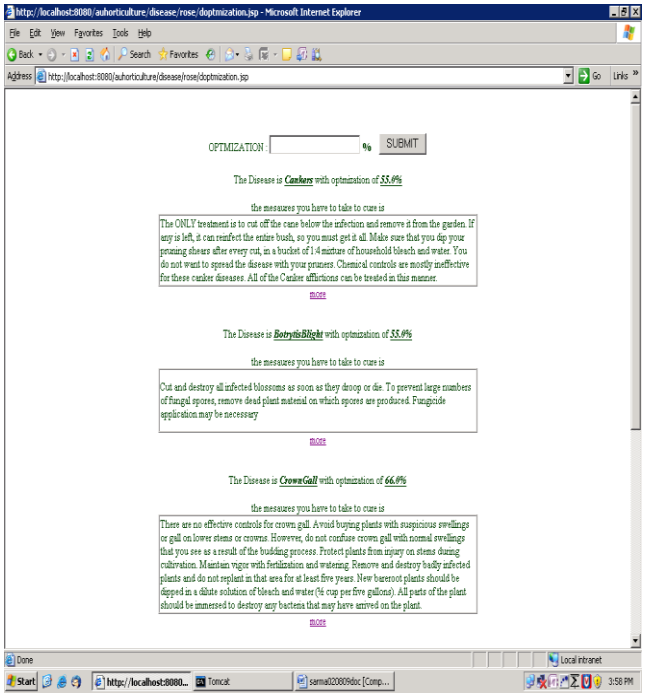
Disease

1. BotrytisBlight
2. Cankers
3. CrownGall
4. BlackSpot
5. PowderMildew
6. BotrytisBlight

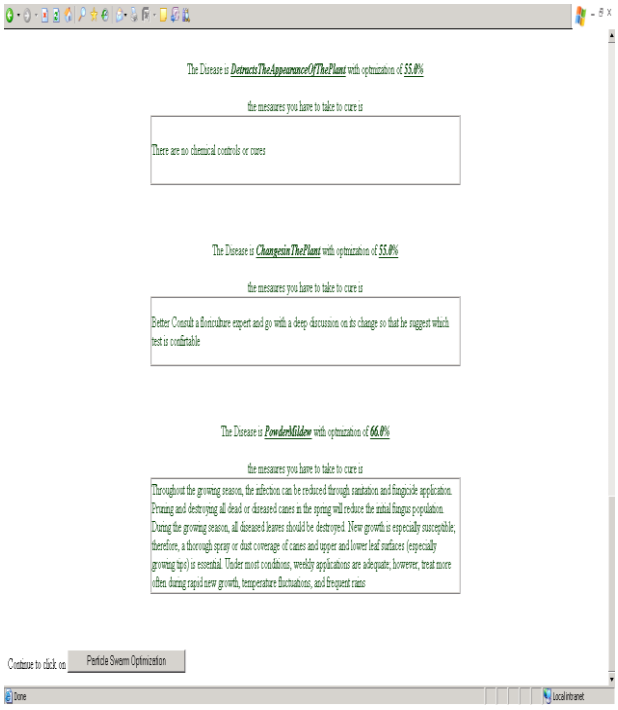
2. Results & Reports

4.1 Rule Based System Screen Shots:

4.2. Optimization Algorithm Screen shots:



4.3. Particle Swarm Optimization Screen Shots:



5. Future Work

In Rose Expert System we have impletemented three algorithms to identify the Diseases and viruses of the rose plant and also give the advices to the farmer about the prevention of that particular disease. Those algorithms are

1. Rule based Algorithm
2. Optimization Algorithm
3. Particle Swarm Optimiation

In future we want to enhance the system in such a way the it has to perform multi language (Translators) , animations , video's for the userinterface design of the system and markerting statistics in the system.

Research issues in agricultural expert systems are categorized under these topics: integration of software components with agricultural expert systems, knowledge sharing and reuse, intelligent retrieval of agricultural data, and automatic knowledge acquisition. The future trends in research and development of agricultural expert systems are expected to be using agent based approaches to solve the integration problem of different software components, developing domain specific tasks that will contribute to knowledge sharing and reuse and automatic knowledge acquisition.

6. Conclusion

The project "Rose Expert Advisory System" is a web-enabled application developed using java server pages (jsp) and MySql database is used as backend. So as to ensure the quality of the software, all software engineering concepts, including test cases are implemented.

Its main emphasis is to have a well designed interface for giving advices and suggestions in the area of horticulture (Rose) field by providing facilities like dynamic interaction between expert system and the user without the need of expert at all times.

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.

7. Acknowledgements

Thank you to every one

References

1. TIMOTHY C. LETHBRIDGE ROBERT LAGANIERE*:*
Object-Oriented Software Engineering,,TMH Publications.

2. **ANN NAVARRO TODD STAUFFER**
HTML by Example, PHI Publications

3. **TIMOTHY BRIGGS, SAMEER TYAGI**
Professional JSP - Wrox Press, Shroff Publishers

4. **C.J. DATE**
An Introduction to Database System

5. Rose crop information collected from professors, **Acharya. N.G.Ranga, Agricultural University.**

6. **Lavandowska**, **L."**JSP Architectures: An explanation and comparison of the methodologiesCommonly known as 'Model I' and 'Model II',"