International Journal of Engineering and Information Systems (IJEAIS)
ISSN: 2643-640X
Vol. 6 Issue 6, June - 2022, Pages: 89-95

CLIPS - Expert System to Predict Coriander Diseases

Y. I. Aslem and Samy S. Abu-Naser

Department of Information Technology,
Faculty of Engineering and Information Technology,
Al-Azhar University, Gaza, Palestine
yasneemesleem@gmail.com

Abstract: Artificial intelligence is one of the most rapidly evolving fields today. It is used in the majority of computer science applications nowadays. Expert systems are one of the most valuable types of AI; they are used to deliver predictions and decisions in order to make scientific, medical, and even architectural challenges easier to address; they will eventually take the place of a human expert. Without having to meet with a genuine human specialist, the user will be able to get a precise solution or diagnose to his problem. This study provides an illustration of how computer systems can be used in agriculture. In order to construct an expert system that can forecast a disease based on its symptoms, we chose a Coriander plant and five of its recognized ailments. CLIPS was used to develop the system. This article contains a full summary of the work that has been done.

Keywords**:** Expert Systems, CLIPS, Plant Diseases, Coriander.

1. Introduction

For a long time, expert systems have been used to handle agricultural challenges. Because of the difficulties involved in diagnosing plant diseases, expert systems are a good fit for this challenge. Those same intricacies, on the other hand, make developing a viable system a difficult undertaking. Many attempts to develop such tools have been documented in the literature, with varying degrees of success and scope.

1.1 Expert Systems

An expert system is a computer software that can handle complex issues and make decisions in the same way as a human expert can. It does so by pulling knowledge from its knowledge base based on the user's queries, employing reasoning and inference procedures. [1].

The expert system is a type of AI, and the first ES was created in 1970, making it the first successful artificial intelligence approach. As an expert, it solves the most difficult problems by extracting knowledge from its knowledge base. Like a human expert, the system assists in decision making for compsex problems by employing both facts and heuristics. It is so named because it comprises expert knowledge of a certain subject and is capable of solving any complex problem in that domain. These systems are tailored to a particular field, such as medicine or science. [1].

An expert system's performance is determined on the knowledge stored in its knowledge base by the expert. The more knowledge that is stored in the KB, the better the system performs. When typing in the Google search box, one of the most common examples of an ES is a suggestion of spelling problems [1].

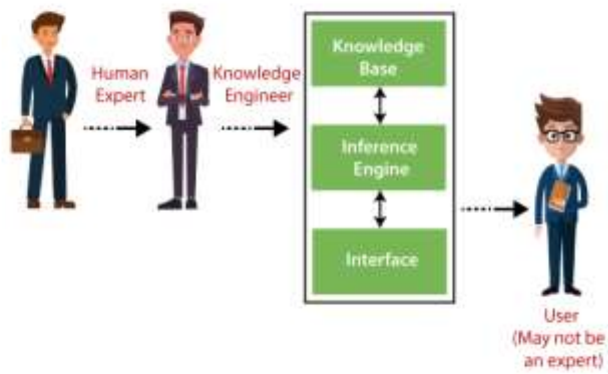


Figure 1Expert Systems

An expert system's performance is determined on the knowledge stored in its knowledge base by the expert. The more knowledge that is stored in the KB, the better the system performs. When typing in the Google search box, one of the most common examples of an ES is a suggestion of spelling problems[2]. Human specialists must be interviewed and observed in order to obtain facts for a knowledge base. This information is typically written as "if-then" rules (production rules): "If a condition is true, then the following inference (or action) can be drawn." Thousands of rules make up a significant expert system's knowledge base. Because the conclusion of each production rule and the ultimate recommendation is not a certainty, a probability component is frequently applied to them. A system for diagnosing eye illnesses, for example, might indicate that a person has glaucoma with a 90% chance based on information provided to it, and it might also provide conclusions with lesser probabilities. The sequence of rules by which an expert system arrived at its conclusion may be displayed; tracing this flow allows the user to assess the trustworthiness of the expert system's proposal and is valuable as a learning tool for students. In addition to fundamental production principles gathered from engineering handbooks, human specialists frequently use heuristic rules, or "rules of thumb." As a result, a credit manager may recognize that an applicant with a low credit history but a spotless record since starting a new job is a good credit risk. Such heuristic rules have been included into expert systems, and they are increasingly capable of learning from experience. Expert systems should be used in conjunction with human specialists rather than as a replacement for them [2].

1.2 CLIPS "A Tool for Building Expert Systems"

CLIPS is one of the most widely used technologies for implementing expert systems. It offers a complete environment for building rule and/or object-based expert systems. For pattern matching, its inference engine employs the Rete Algorithm: Look for rules and facts that are appropriate. [3].

The C Language Integrated Production System (CLIPS) is a rule-based programming language used to create expert systems and other applications when a heuristic solution is easier to construct and maintain than an algorithmic answer. It was developed at NASA's Johnson Space Center from 1985 to 1996. CLIPS is a portable program written in C that can be installed and used on a variety of platforms. CLIPS has been provided as free software since 1996 [4].

CLIPS is a relatively simple language that operates on fundamental concepts while still managing to generate deep complicated systems. Basic syntax and a thorough comprehension of rules and facts are sufficient to begin developing your own artificially intelligent expert systems. [3].

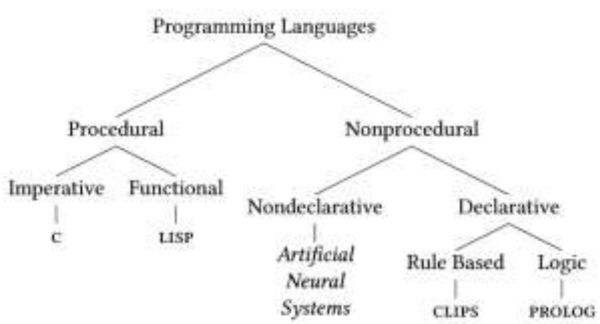


Figure 2clips

1.2 Expert Systems for Agriculture

Pests such as germs, fungi, and microbes cause illness in plants by causing a loss in quality and quantity of production. There is a significant amount of farmer loss in the production of crops. As a result, regular plant care is required. Plant disease research is gaining traction these days, and it could be effective in observing a vast region and, as a result, mechanically detecting symptoms as they appear on plants [5]. There are many technologies used to anticipate and diagnose plant diseases, one of which is the use of expert systems, which allow farmers and ordinary people to know the diagnosis without having to consult genuine human experts.

The works listed in the following section used expert systems to solve agricultural challenges.

2. Literature Review

[6] is an example. This research focuses on a Windows Phone application that can identify vineyard diseases from a picture of the leaves with an accuracy of more than 90%. This capability can be applied to a variety of plant diseases as well as smartphone platforms. However, only a tiny training set is employed for picture detection, and the application platform has limitations. [7] A real-time testing system is presented in this research. Cotton and groundnut plantations provide data for this study. The disease identification accuracy scores for groundnut and cotton plantations were determined to be excellent. We must employ effective methods to improve detection accuracy with various plant species. [8] An expert system was created by combining two plant diagnosis methods: step-by-step descriptive and graphical representational methods. This project used CLIPS, which makes it too similar to ours.

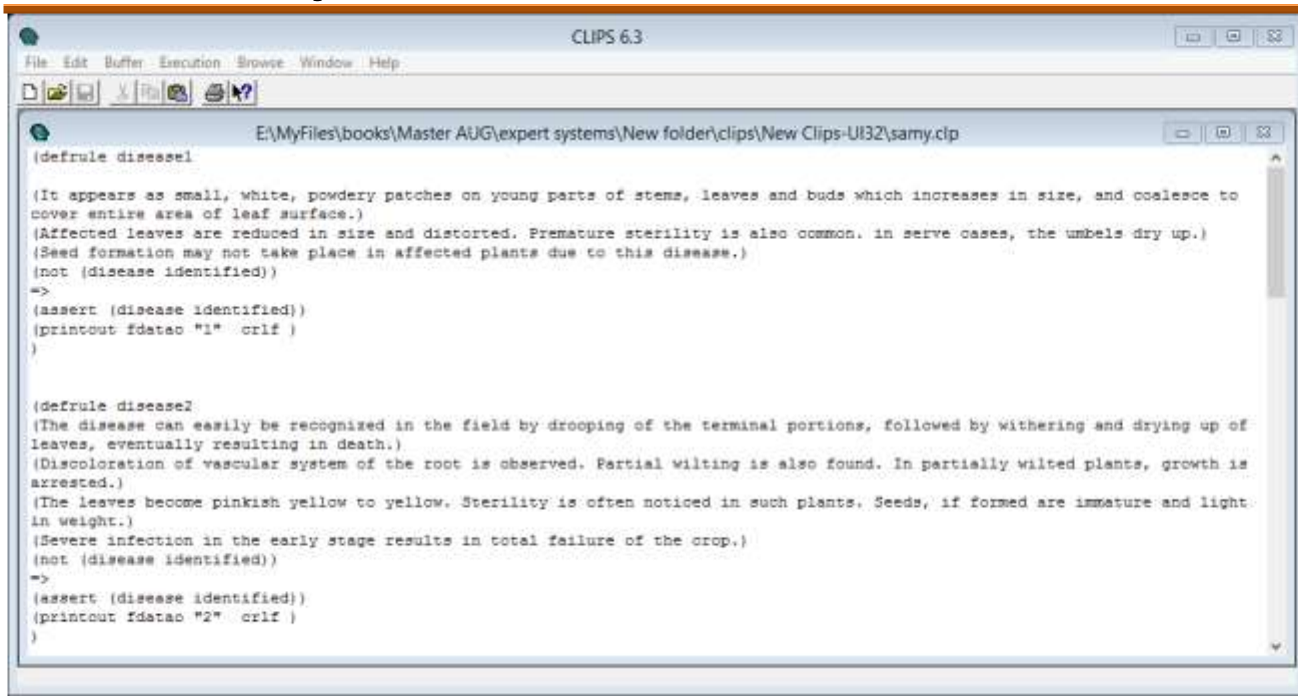
The Coriander plant has been chosen for this project in order to perform and test the expert system that will diagnose five of its ailments.

3. Methodology

The symptoms of the five Coriander diseases are listed as rules in a CLIPS program, as seen below. Each set of symptoms will lead to a specific

3.1 CLIPS code:

Diagnosis, which will be explained in the application interface.

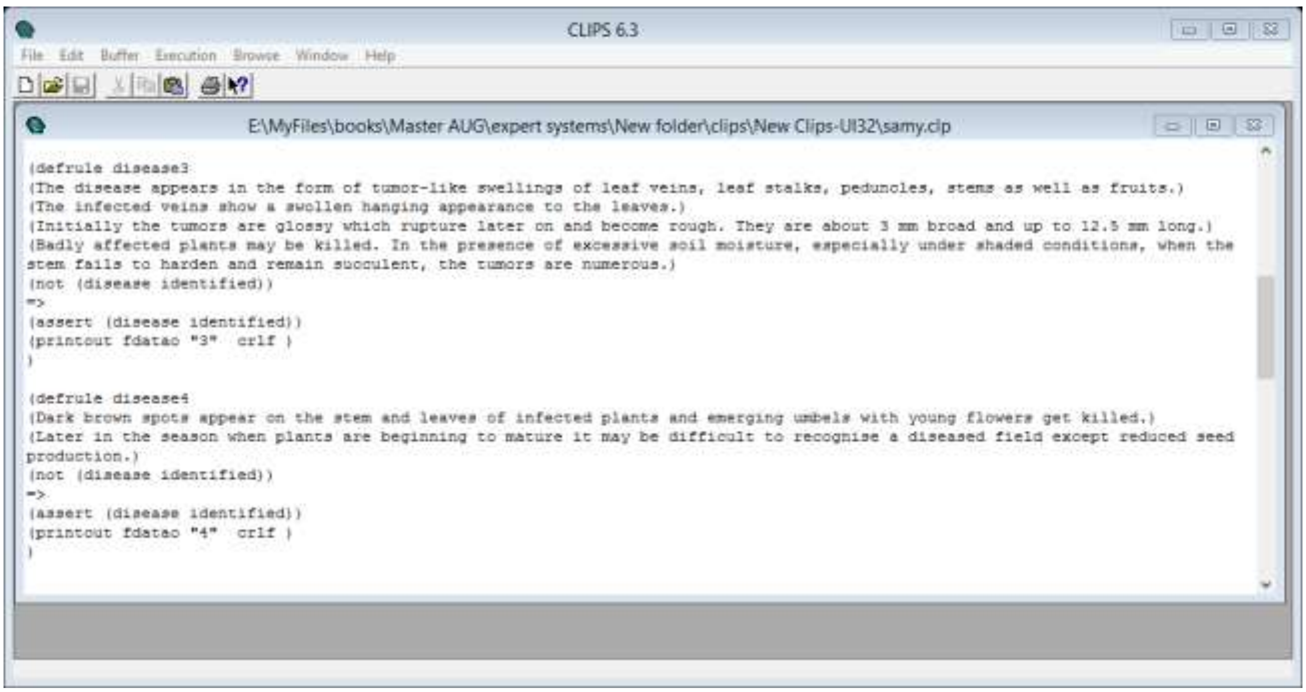


```
(defrule disease1

(It appears as small, white, powdery patches on young parts of stems, leaves and buds which increases in size, and coalesce to cover entire area of leaf surface.)
(Affected leaves are reduced in size and distorted. Premature sterility is also common. in serve cases, the umbels dry up.)
(Seed formation may not take place in affected plants due to this disease.)
(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "1"  crlf )
)


(defrule disease2
(The disease can easily be recognized in the field by drooping of the terminal portions, followed by withering and drying up of leaves, eventually resulting in death.)
(Discoloration of vascular system of the root is observed. Partial wilting is also found. In partially wilted plants, growth is arrested.)
(The leaves become pinkish yellow to yellow. Sterility is often noticed in such plants. Seeds, if formed are immature and light in weight.)
(Severe infection in the early stage results in total failure of the crop.)
(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "2"  crlf )
)
```

Figure 3 CLIPS program for first and second diseases



```
(defrule disease3
(The disease appears in the form of tumor-like swellings of leaf veins, leaf stalks, peduncles, stems as well as fruits.)
(The infected veins show a swollen hanging appearance to the leaves.)
(Initially the tumors are glossy which rupture later on and become rough. They are about 3 mm broad and up to 12.5 mm long.)
(Badly affected plants may be killed. In the presence of excessive soil moisture, especially under shaded conditions, when the stem fails to harden and remain succulent, the tumors are numerous.)
(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "3"  crlf )
)

(defrule disease4
(Dark brown spots appear on the stem and leaves of infected plants and emerging umbels with young flowers get killed.)
(Later in the season when plants are beginning to mature it may be difficult to recognise a diseased field except reduced seed production.)
(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "4"  crlf )
)
```

Figure 4 CLIPS program for third and fourth diseases

International Journal of Engineering and Information Systems (IJEAIS)
ISSN: 2643-640X
Vol. 6 Issue 6, June - 2022, Pages: 89-95

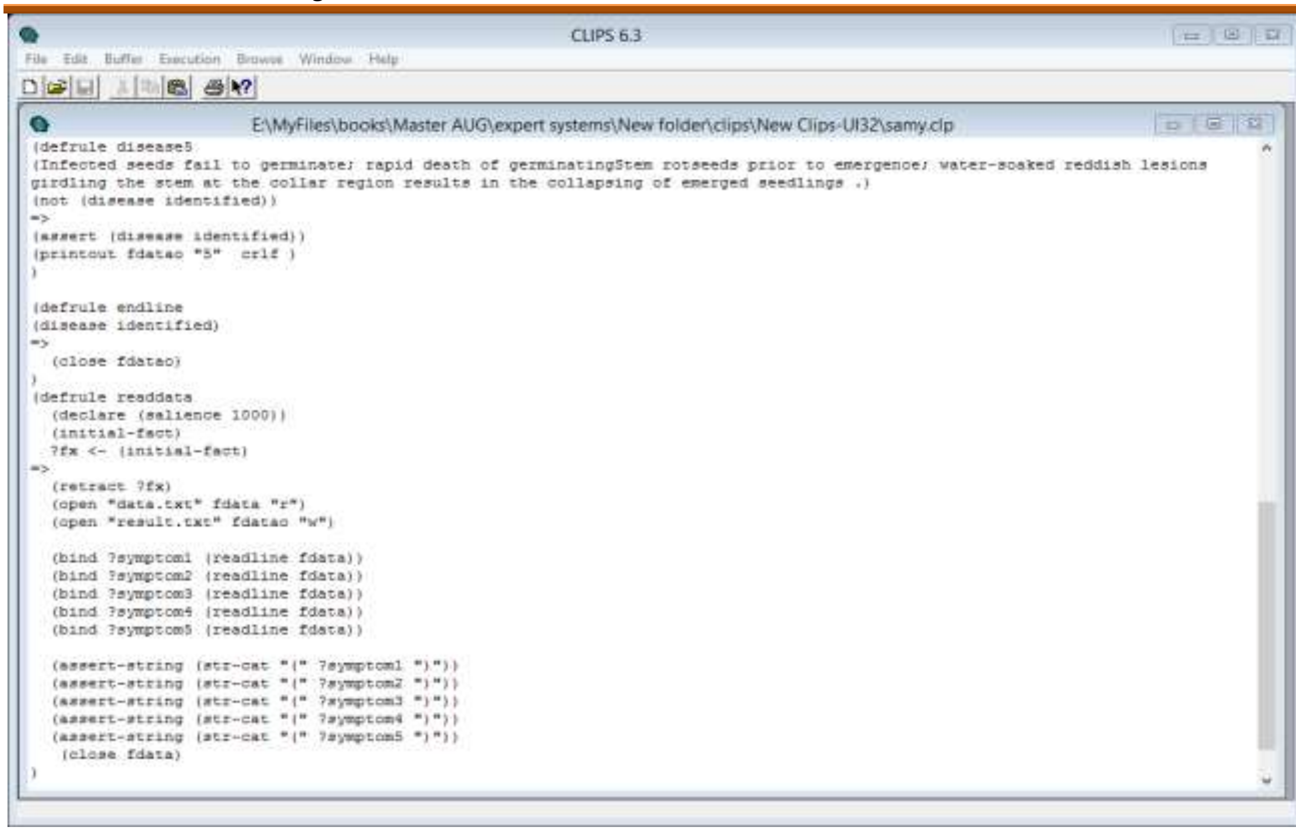


Figure 5 CLIPS program describing the fifth disease and command for reading data from the database

3.2 User Interfaces

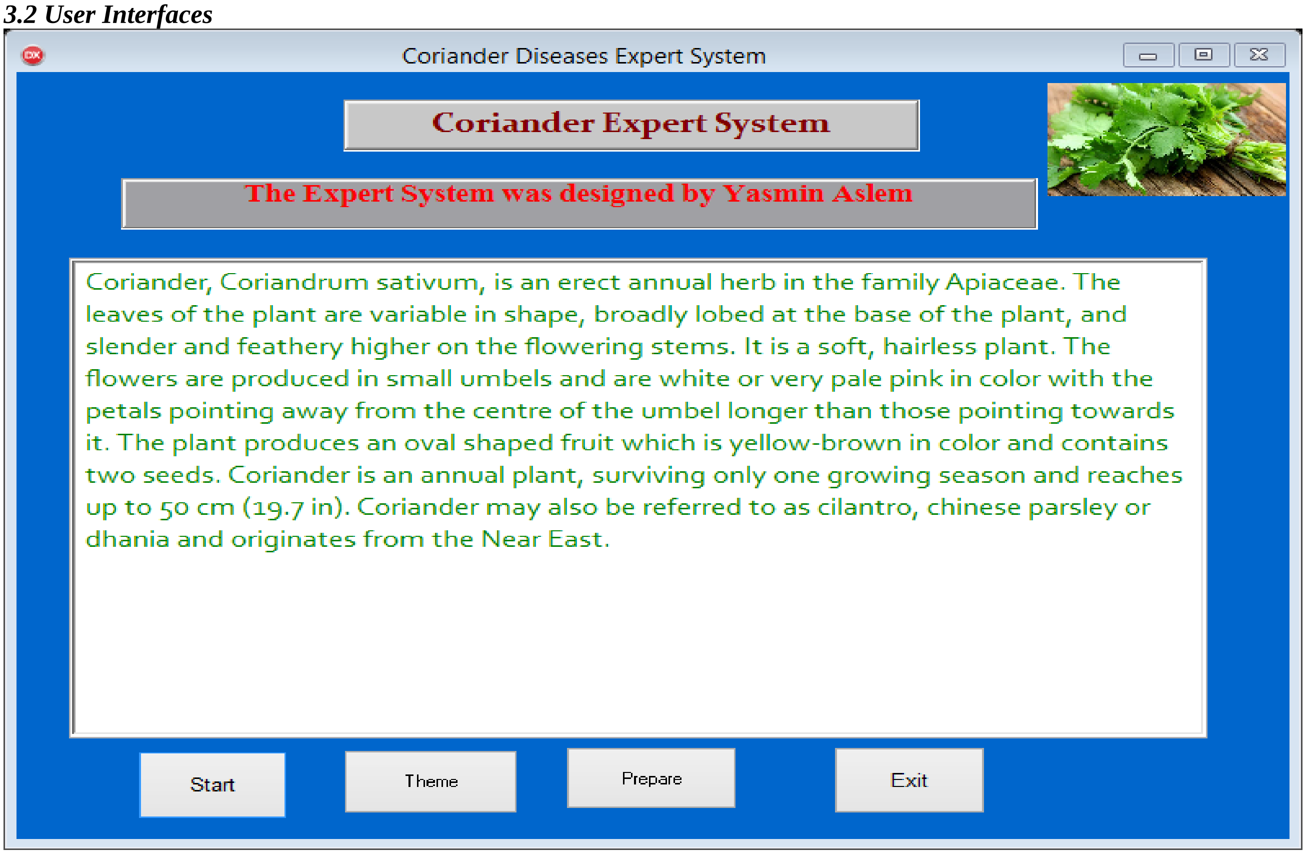


Figure 6 Main user interface

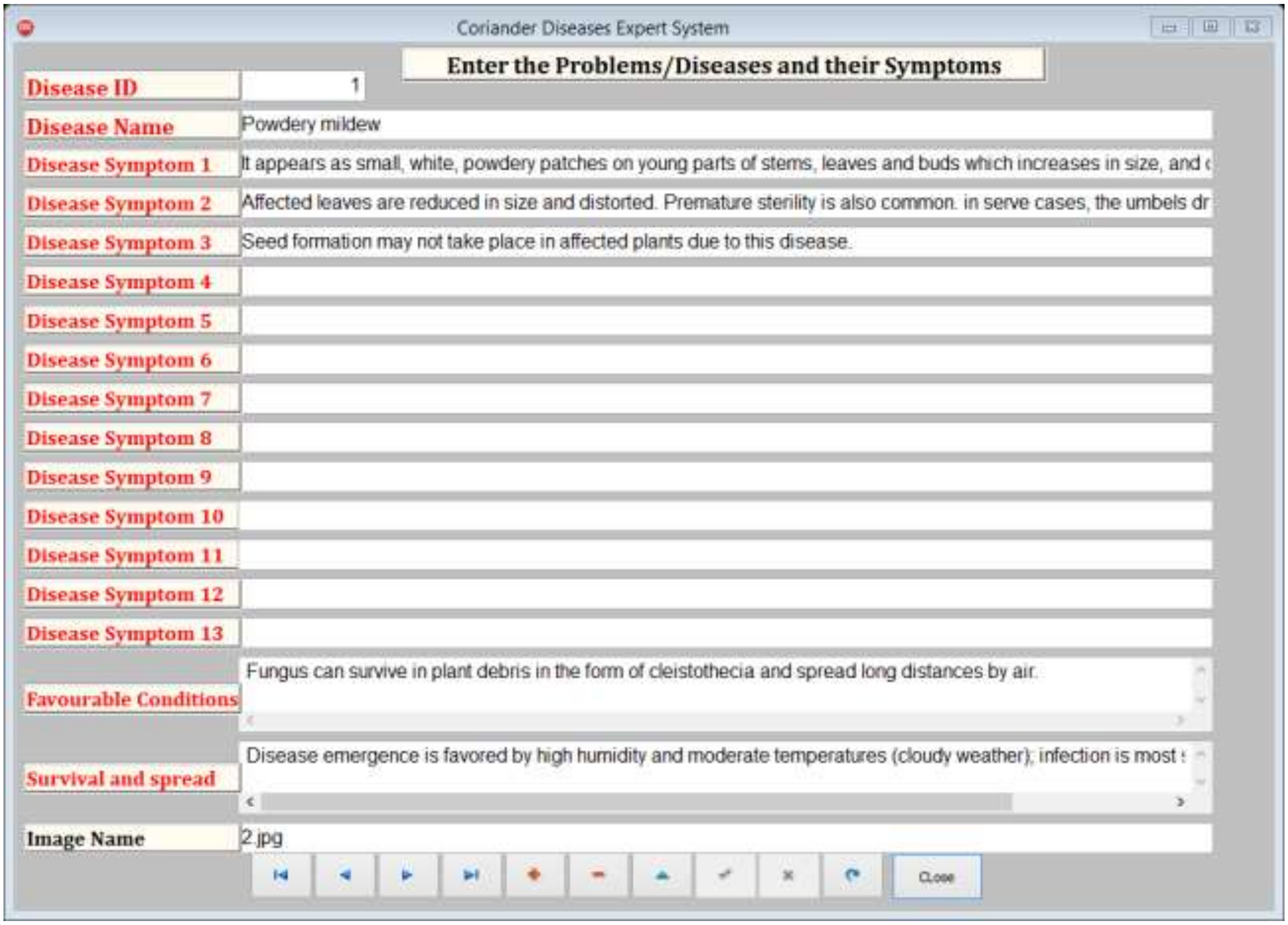


Figure 7 Interface for adding disease to program, it also allows adding pictures and other diagnosis and descriptions

5. Experiments

This application only supports a Coriander Plant and five recognized illnesses, all of which have been successfully tested. If the system is given the correct symptoms, it can identify all five diseases correctly. The user must choose symptoms from a list and search for a diagnosis; the system will match the symptoms to cases in the CLIPS program to determine the correct diagnosis. Here's an example of a system test in action.

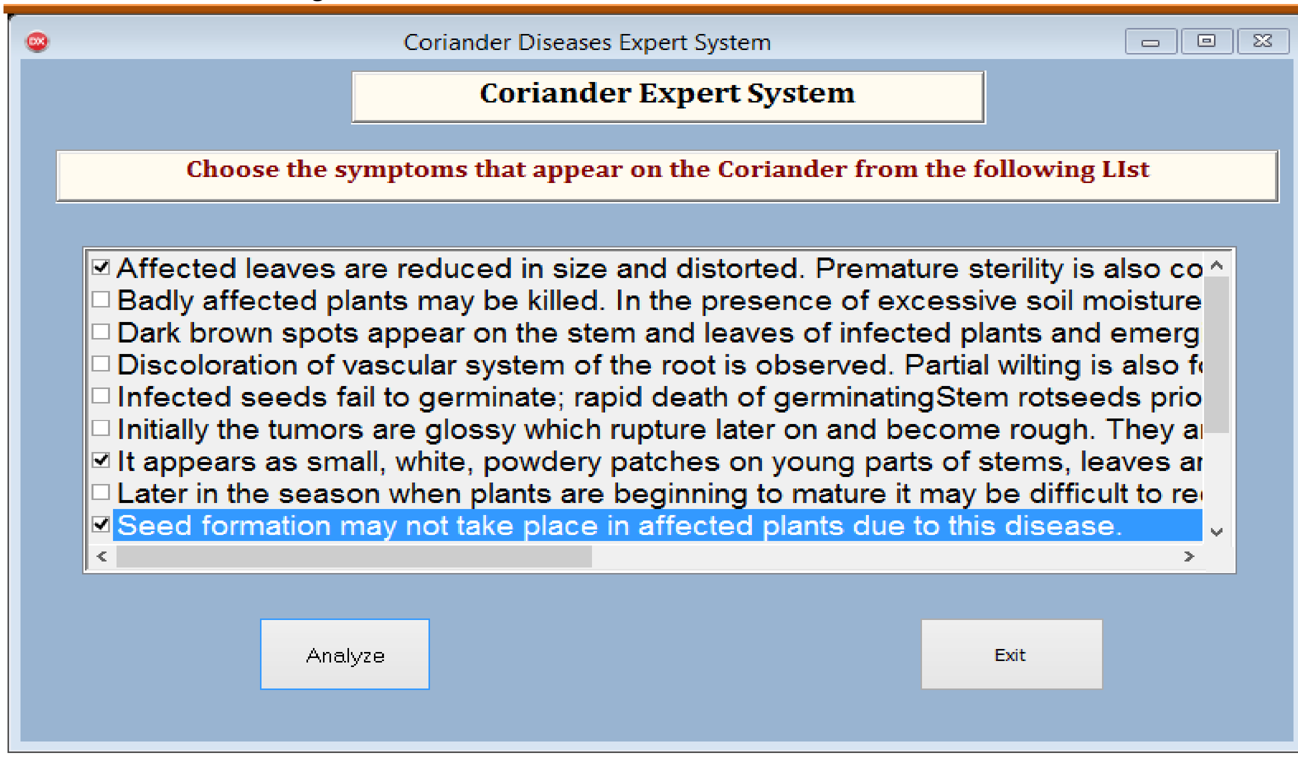


Figure 8 Symptoms list

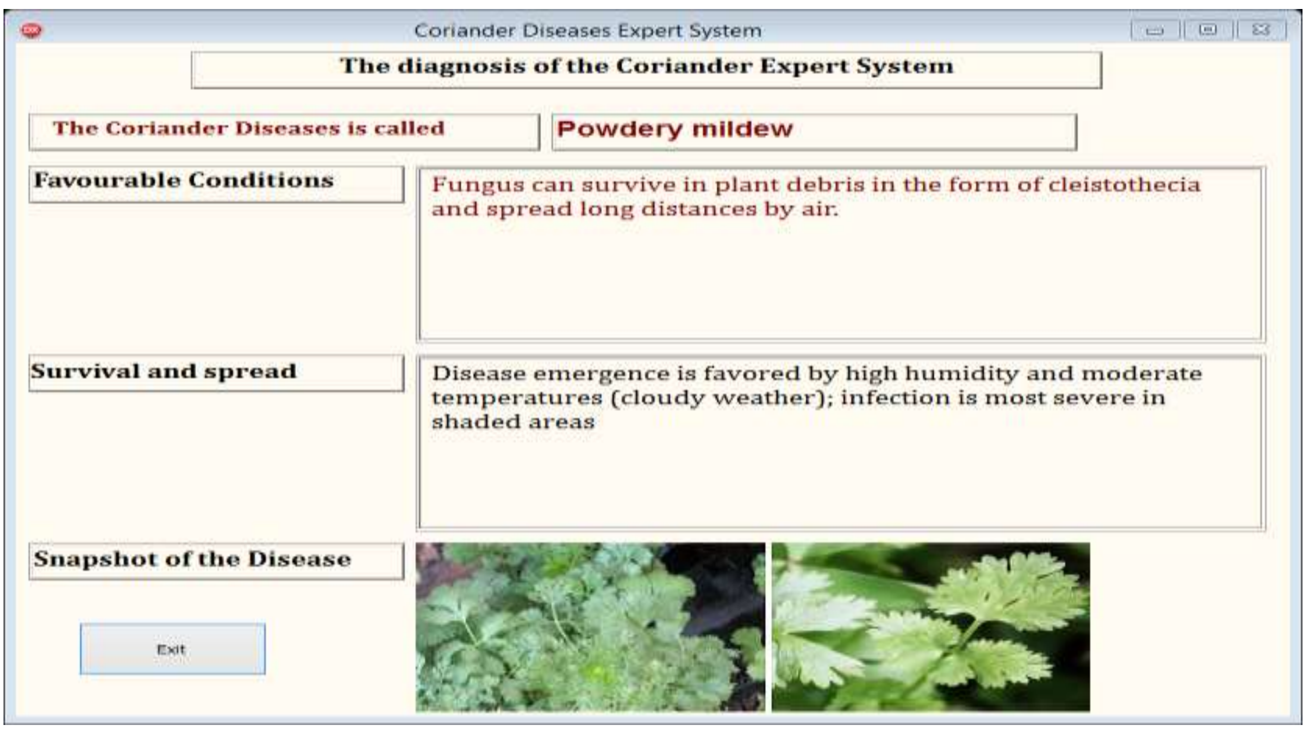


Figure 9 the given diagnose (results interface)

6. Conclusion

Finally, the system demonstrated the effectiveness of using expert systems to diagnose plant illnesses and handle agricultural issues. The system is limited, but it may be expanded to cure a wide range of ailments and issues simply by giving enough data.

References

1. [1] Java T Point, (2016). What is an Expert System? [online]: https://www.javatpoint.com/expert-systems-in-artificial-intelligence [Published on October 26 2016].
2. [2] Vladimir Z., (2016). expert system. Encyclopedia Britannica, 10 Feb. 2016, https://www.britannica.com/technology/expert-system. [Accessed 1 June 2022]
3. [3] Singh A., (2020). How to build an Expert System with CLIPS. LD Talent Blog, April 26, 2020, https://blog.ldtalentwork.com/2020/04/26/how-to-build-an-expert-system-with-clips/ [Accessed on 31 May 2022]
4. [4] CLIPS. CLIPS A Tool for Building Expert Systems [online]: https://www.clipsrules.net/ [Accessed on 31 May 2022].
5. [5] D. O. Shamkuwar, G. Thakre, A. R. More, K. S. Gajakosh, M. O. Yewale., (2018). An Expert System for Plant Disease Diagnosis by using Neural Network, International Research Journal of Engineering and Technology (IRJET), Volume: 05 Issue: 04 | Apr-2018.
6. [6] Petrellis N. (2017),"A Smart Phone Image Processing Application for Plant Disease Diagnosis ", 6th International Conference on Modern Circuits and Systems Technologies (MOST).
7. [7] Pilli S. K., Nallathambi B., George S. J. , Diwanji V., (2015) eAGROBOT- A Robot for Early Crop Disease Detection using Image Processing, IEEE (ICECS 2015).
8. Abu-Saqer, M. M., et al. (2019). "Developing an Expert System for Papaya Plant Disease Diagnosis." International Journal of Academic Engineering Research (IJAER) 3(4): 14-21.
9. Alajrami, M. A., et al. (2018). "Onion Rule Based System for Disorders Diagnosis and Treatment." International Journal of Academic Pedagogical Research (IJAPR) 2(8): 1-9.
10. Alajrami, M. A., et al. (2019). "Grapes Expert System Diagnosis and Treatment." International Journal of Academic Engineering Research (IJAER) 3(5): 38-46.
11. Aldaour, A. F., et al. (2019). "An Expert System for Diagnosing Tobacco Diseases Using CLIPS." International Journal of Academic Engineering Research (IJAER) 3(3): 12-18.
12. Almadhoun, H. R., et al. (2018). "Banana Knowledge Based System Diagnosis and Treatment." International Journal of Academic Pedagogical Research (IJAPR) 2(7): 1-11.
13. Al-Qumboz, M. N. A., et al. (2019). "Spinach Expert System: Diseases and Symptoms." International Journal of Academic Information Systems Research (IJAISR) 3(3): 16-22.
14. Al-Shawwa, M., et al. (2019). "Knowledge Based System for Apple Problems Using CLIPS." International Journal of Academic Engineering Research (IJAER) 3(3): 1-11.
15. AlZamily, J. Y., et al. (2018). "A Cognitive System for Diagnosing Musa Acuminata Disorders." International Journal of Academic Information Systems Research (IJAISR) 2(8): 1-8.
16. Barhoom, A. M., et al. (2018). "Black Pepper Expert System." International Journal of Academic Information Systems Research (IJAISR) 2(8): 9-16.
17. Dheir, I., et al. (2019). "Knowledge Based System for Diagnosing Guava Problems." International Journal of Academic Information Systems Research (IJAISR) 3(3): 9-15.
18. El Kahlout, M. I., et al. (2019). "An Expert System for Citrus Diseases Diagnosis." International Journal of Academic Engineering Research (IJAER) 3(4): 1-7.
19. El-Mashharawi, H. Q., et al. (2019). "An Expert System for Sesame Diseases Diagnosis Using CLIPS." International Journal of Academic Engineering Research (IJAER) 3(4): 22-29.
20. Elqassas, R., et al. (2018). "Expert System for the Diagnosis of Mango Diseases." International Journal of Academic Engineering Research (IJAER) 2(8): 10-18.
21. Elsharif, A. A., et al. (2019). "An Expert System for Diagnosing Sugarcane Diseases." International Journal of Academic Engineering Research (IJAER) 3(3): 19-27.
22. Mansour, A. I., et al. (2019). "Expert System for the Diagnosis of Wheat Diseases." International Journal of Academic Information Systems Research (IJAISR) 3(4): 19-26.
23. Mettleq, A. S. A., et al. (2019). "A Rule Based System for the Diagnosis of Coffee Diseases." International Journal of Academic Information Systems Research (IJAISR) 3(3): 1-8.
24. Musleh, M. M., et al. (2018). "Rule Based System for Diagnosing and Treating Potatoes Problems." International Journal of Academic Engineering Research (IJAER) 2(8): 1-9.
25. Salman, F., et al. (2019). "Rule based System for Safflower Disease Diagnosis and Treatment." International Journal of Academic Engineering Research (IJAER) 3(8): 1-10.
26. Salman, F. M., et al. (2019). "Expert System for Castor Diseases and Diagnosis." International Journal of Engineering and Information Systems (IJEAIS) 3(3): 1-10.
27. Alshawwa, I. A., et al. (2019). "An Expert System for Coconut Diseases Diagnosis." International Journal of Academic Engineering Research (IJAER) 3(4): 8-13.
28. Kashkash, K. A., et al. (2010). "Developing an expert system for plant disease diagnosis." Journal of Artificial Intelligence; Scialert 3(4): 269-276.
29. Khalil, A. J., et al. (2019). "Apple Trees Knowledge Based System." International Journal of Academic Engineering Research (IJAER) 3(9): 1-7.
30. Akkila, A. N., et al. (2016). "Proposed Expert System for Calculating Inheritance in Islam." World Wide Journal of Multidisciplinary Research and Development 2(9): 38-48.
31. Azaab, S., et al. (2000). "A proposed expert system for selecting exploratory factor analysis procedures." Journal of the College of Education 4(2): 9-26.
32. Baraka, M. H., et al. (2008). "A Proposed Expert System for Guiding Freshman Students in Selecting a Major in Al-Azhar University, Gaza." Journal of Theoretical & Applied Information Technology 4(9).
33. Aldaour, A. F., et al. (2019). "Anemia Expert System Diagnosis Using Sl5 Object." International Journal of Academic Information Systems Research (IJAISR) 3(5): 9-17.
34. Almadhoun, H. R., et al. (2020). "An Expert System for Diagnosing Coronavirus (COVID-19) Using SL5." International Journal of Academic Engineering Research (IJAER) 4(4): 1-9.
35. Al-Masawabe, M. M., et al. (2021). "Expert System for Short-term Abdominal Pain (Stomach Pain) Diagnosis and Treatment." International Journal of Academic Information Systems Research (IJAISR) 5(5): 37-56.
36. Almurshidi, S. H., et al. (2018). Expert System for Diagnosing Breast Cancer, Al-Azhar University, Gaza, Palestine.
37. Al-Shawwa, M. O., et al. (2019). "A Proposed Expert System for Diagnosing Skin Cancer Using SL5 Object." International Journal of Academic Information Systems Research (IJAISR) 3(4): 1-9.
38. Elhabil, B. Y., et al. (2021). "An Expert System for Ankle Problems." International Journal of Engineering and Information Systems (IJEAIS) 5(4).
39. Elhabil, B. Y., et al. (2021). "Expert System for Hib Problems." International Journal of Academic Information Systems Research (IJAISR) 5 (5):5-15.
40. Hamadaqa, M. H. M., et al. (2021). "Hair Loss Diagnosis Expert System and Treatment Using CLIPS." International Journal of Academic Engineering Research (IJAER) 5(5): 37-42.
41. Khella, R., et al. (2017). "Rule Based System for Chest Pain in Infants and Children." International Journal of Engineering and Information Systems 1(4): 138-148.
42. Mansour, A. I., et al. (2019). "Knowledge Based System for the Diagnosis of Dengue Disease." International Journal of Academic Health and Medical Research (IJAHMR) 3(4): 12-19.
43. Mansour, A. I. and S. S., et al. (2021). "Expert system for the diagnosis of high blood pressure diseases."
44. Qwaider, S. R., et al. (2017). "Expert System for Diagnosing Ankle Diseases." International Journal of Engineering and Information Systems (IJEAIS) 1(4): 89-101.
45. Salman, F. M., et al. (2019). "Thyroid Knowledge Based System." International Journal of Academic Engineering Research (IJAER) 3(5): 11-20.
46. Salman, F. M., et al. (2020). "Expert System for COVID-19 Diagnosis." International Journal of Academic Information Systems Research (IJAISR) 4(3): 1-13.
47. Abu Ghali, M. J., et al. (2017). "Expert System for Problems of Teeth and Gums." International Journal of Engineering and Information Systems (IJEAIS) 1(4): 198-206.
48. Abu-Jamie, T. N., et al. (2021). "Diagnosing Cough Problem Expert System Using CLIPS." International Journal of Academic Information Systems Research (IJAISR) 5(5): 79-90.
49. Ahmed, A., et al. (2019). "Knowledge-Based Systems Survey." International Journal of Academic Engineering Research (IJAER) 3(7): 1-22.
50. Aish, M. A., et al. (2021). "Lower Back Pain Expert System Using CLIPS." International Journal of Academic Information Systems Research (IJAISR) 5(5): 57-67.
51. Al Rekhawi, H. A., et al. (2017). "Rickets Expert System Diagnoses and Treatment." International Journal of Engineering and Information Systems (IJEAIS) 1(4): 149-159.
52. Alfarra, A. H., et al. (2021). "An Expert System for Neck Pain Diagnosis." International Journal of Academic Information Systems Research (IJAISR) 5(7): 1-8.
53. Alkahlout, M. A., et al. (2021). "Expert System Diagnosing Facial-Swelling Using CLIPS."
54. Alkahlout, M. A., et al. (2021). "Expert System for Throat Problems Using SL5 Object." International Journal of Academic Information Systems Research (IJAISR) 5(5): 68-78.
55. Alkahlout, M. A., et al. (2021). "Knowledge Based System for Diagnosing Throat Problem CLIPS and Delphi languages." International Journal of Academic Engineering Research (IJAER) 5(6): 7-12.
56. Al-Qumboz, M. N. A., et al. (2019). "Kidney Expert System Diseases and Symptoms." International Journal of Academic Engineering Research (IJAER) 3(5): 1-10.
57. Alsaqqa, A. H., et al. (2021). "Knowledge Based for Tooth Problems." International Journal of Academic Information Systems Research (IJAISR) 5(5).
58. Alshawwa, I. A., et al. (2019). "An Expert System for Depression Diagnosis." International Journal of Academic Health and Medical Research (IJAHMR) 3(4): 20-27.
59. Dheir, I. M., et al. (2019). "Knowledge Based System for Diabetes Diagnosis Using SL5 Object." International Journal of Academic Pedagogical Research (IJAPR) 3(4): 1-10.
60. El Agha, M., et al. (2017). "Polymyalgia Rheumatic Expert System." International Journal of Engineering and Information Systems (IJEAIS) 1(4): 125-137.
61. El Kahlout, M. I., et al. (2019). "Silicosis Expert System Diagnosis and Treatment." International Journal of Academic Information Systems Research (IJAISR) 3(5): 1-8.
62. El-Hissi, H., et al. (2010). "An expert system for endocrine diagnosis and treatments using JESS." Journal of Artificial Intelligence; Scialert 3(4): 239-251.
63. El-Mashharawi, H. Q., et al. (2019). "An Expert System for Arthritis Diseases Diagnosis Using SL5 Object." International Journal of Academic Health and Medical Research (IJAHMR) 3(4): 28-35.
64. Elsharif, A. A., et al. (2019). "Hepatitis Expert System Diagnosis Using Sl5 Object." International Journal of Academic Information Systems Research (IJAISR) 3(4): 10-18.
65. Mansour, A. I., et al. (2021). "An Expert System for Diagnosing Cough Using SL5 Object." International Journal of Academic Engineering Research (IJAER) 5(6): 13-27.
66. Mettleq, A. S. A., et al. (2019). "Expert System for the Diagnosis of Seventh Nerve Inflammation (Bell's palsy) Disease." International Journal of Academic Information Systems Research (IJAISR) 3(4): 27-35.
67. Mrouf, A., et al. (2017). "Knowledge Based System for Long-term Abdominal Pain (Stomach Pain) Diagnosis and Treatment." International Journal of Engineering and Information Systems (IJEAIS) 1(4): 71-88.
68. Nabahin, A., et al. (2017). "Expert System for Hair Loss Diagnosis and Treatment." International Journal of Engineering and Information Systems (IJEAIS) 1(4): 160-169.
69. Samhan, L. F., et al. (2021). "Expert System for Knee Problems Diagnosis." International Journal of Academic Information Systems Research (IJAISR) 5(4):59-66.
70. AbuEl-Reesh, J. Y., et al. (2017). "A Knowledge Based System for Diagnosing Shortness of Breath in Infants and Children." International Journal of Engineering and Information Systems (IJEAIS) 1(4): 102-115.
71. Abu-Saqer, M. M., et al. (2019). "Knowledge Based System for Uveitis Disease Diagnosis." International Journal of Academic Information Systems Research (IJAISR) 3(5): 18-25.
72. Bakeer, H., et al. (2017). "Photo Copier Maintenance Expert System V. 01 Using SL5 Object Language." International Journal of Engineering and Information Systems (IJEAIS) 1(4): 116-124.
73. Dahouk, A. W., et al. (2018). "A Proposed Knowledge Based System for Desktop PC Troubleshooting." International Journal of Academic Pedagogical Research (IJAPR) 2(6): 1-8.
74. Alamawi, W. W., et al. (2016). "Rule Based System for Diagnosing Wireless Connection Problems Using SL5 Object." International Journal of Information Technology and Electrical Engineering 5(6): 26-33.
75. Albatish, I. M., et al. (2019). Modeling and controlling smart traffic light system using a rule based system. 2019 International Conference on Promising Electronic Technologies (ICPET), IEEE.
76. Masri, N., et al. (2019). "Survey of Rule-Based Systems." International Journal of Academic Information Systems Research (IJAISR) 3(7): 1-23.
77. Abueleiwa, M. H., et al. (2022). "Rule Based System for Diagnosing Bean Diseases and Treatment." International Journal of Engineering and Information Systems (IJEAIS) 6(5): 67-74.
78. Al-Ghoul, M. M., et al. (2022). "Knowledge Based System for Diagnosing Custard Apple Diseases and Treatment." International Journal of Academic Engineering Research (IJAER) 6(5): 41-45.
79. AlKayyali, Z. K., et al. (2022). "Prediction of Student Adaptability Level in e-Learning using Machine and Deep Learning Techniques." International Journal of Academic and Applied Research (IJAAR) 6(5): 84-96.
80. Al-Qadi, M. H., et al. (2022). "Developing an Expert System to Diagnose Tomato Diseases." International Journal of Academic Engineering Research (IJAER) 6(5): 34-40.
81. AlQatrawi, M. J., et al. (2022). "Rule Based System for Diagnosing Lablab Problems." International Journal of Academic and Applied Research (IJAAR) 6(5): 249-256.
82. Al-Saloul, N. J., et al. (2022). "A Knowledge Based System for Cucumber Diseases Diagnosis." International Journal of Academic Information Systems Research (IJAISR) 6(5): 29-45.
83. Barhoom, A. M., et al. (2022). "Prediction of Heart Disease Using a Collection of Machine and Deep Learning Algorithms." International Journal of Engineering and Information Systems (IJEAIS) 6(4): 1-13.
84. Barhoom, A., et al. (2022). "Sarcasm Detection in Headline News using Machine and Deep Learning Algorithms." International Journal of Engineering and Information Systems (IJEAIS) 6(4): 66-73.
85. Dheir, I. M., et al. (2022). "Classification of Anomalies in Gastrointestinal Tract Using Deep Learning." International Journal of Academic Engineering Research (IJAER) 6(3): 15-28.
86. El-Habibi, M. F., et al. (2022). "A Proposed Expert System for Obstetrics & Gynecology Diseases Diagnosis." International Journal of Academic Multidisciplinary Research (IJAMR) 6(5): 305-321.
87. El-Hamarnah, H. A., et al. (2022). "Proposed Expert System for Pear Fruit Diseases." International Journal of Academic and Applied Research (IJAAR) 6(5): 237-248.
88. LAfi, O. I., et al. (2022). "A Proposed Expert System for Broccoli Diseases Diagnosis." International Journal of Engineering and Information Systems (IJEAIS) 6(5): 43-51.
89. Megdad, M. M., et al. (2022). "Fraudulent Financial Transactions Detection Using Machine Learning." International Journal of Academic Information Systems Research (IJAISR) 6(3): 30-39.
90. Megdad, M. M., et al. (2022). "Mint Expert System Diagnosis and Treatment." International Journal of Academic Information Systems Research (IJAISR) 6(5): 22-28.
91. Obaid, T., et al. (2022). Factors Contributing to an Effective E-Government Adoption in Palestine. International Conference of Reliable Information and Communication Technology, Springer, Cham.
92. Radwan, H. I., et al. (2022). "A Proposed Expert System for Passion Fruit Diseases." International Journal of Academic Engineering Research (IJAER) 6(5): 24-33.
93. Sababa, R. Z., et al. (2022). "A Proposed Expert System for Strawberry Diseases Diagnosis." International Journal of Engineering and Information Systems (IJEAIS) 6(5): 52-66.
94. Salman, F. M., et al. (2022). "Classification of Real and Fake Human Faces Using Deep Learning." International Journal of Academic Engineering Research (IJAER) 6(3): 1-14.
95. Samhan, L. F., et al. (2022). "Classification of Alzheimer's Disease Using Convolutional Neural Networks." International Journal of Academic Information Systems Research (IJAISR) 6(3): 18-23.
96. Taha, A. M., et al. (2022). "Gender Prediction from Retinal Fundus Using Deep Learning." International Journal of Academic Information Systems Research (IJAISR) 6(5): 57-63.