A Report on Expert Systems Developed for Onion, Barley Pomegranate, and Tomato in the Period from Jan. 1 to Feb. 28, 2013

By Dr. Ahmed Rafea

The following report will give an overview on the activities conducted during January and February 2013. These activities can be categorized into the following tasks:

1. Complete the implementation interfaces of the four expert systems
2. Update the methodology for verification, validation and evaluation of the developed expert systems
3. Comment on the tomatoes expert system as an example

Implementation of the Expert Systems

In a meeting conducted at MCIT premises in January 2013, we were informed that the core of each of the four expert systems have been implemented but not yet published on Kenana site. In this meeting the following recommendations were raised related to implementation:

- The images and textual information related to the expert system knowledge base must be integrated with the expert system online
- The concerns raised in my previous report regarding rules implementation have to be considered
- The publication of the expert system online have to be completed

I received the link to the Tomatoes expert system and hopefully the publishing of the integrated system should have been done during February.

Methodology for Verification, Validation and Evaluation of the Expert Systems

In the same meeting at MCIT premises, the following recommendations appeared in my previous report were approved:

- In the KB document at least two cases for each rule must be generated, one positive and one negative that does not lead to another diagnosis.
- After acquiring the rules, the attributes and their values must be compared with those appearing in the rules. Those attributes and their values that do not appear in the rules must be removed.

- After implementing the rules, the generated test cases must be revised based on the implementation.
- Validation process needs more work as the expert who will validate the system must generate cases from his expertise and not looking in the document of the KB nor the implemented system. Then he/she should run the system using his/her test cases and write a report on his findings.
- Non-expert users should run the system and write their comments on the system. A button on the web site is to be introduced after reaching a diagnosis to enable the user write his/her comment.

I have received a list from CLAES including a comprehensive set of test cases and hopefully other recommendations should have been implemented.

Comments on the Tomatoes Expert Systems

I received the following link for tomatoes expert system:

http://kenanaonline.com/expert_system/16/run

The expert system interface looks good on a desktop computer. However the following comments are noticed:

- Although it runs fine on the mobile but a specialized interface is needed. MCIT implementation group is planning to implement a mobile application. The main problem from my point of view is to display the agenda of causes while the diagnosis process is being performed
- The implementation still lacks the links to images and technical documents.
- It was noticed that the agenda on the left that contains the list of causes of welt in tomatoes still contain more than one cause when it reaches a diagnosis which is a little bit confusing. Does this mean that the extra cause could also be the diagnosis? Or is just the last two causes left? Is there a problem in retracting this second cause from the agenda?
- When you click on unknown, you the diagnosis process extracts causes from the list until you reach "No diagnosis available" with one or two causes still displayed in the agenda. Again the user could be confused about what this means.
- It would also be good to add a hyperlink to the causes in the agenda to display the symptoms provided to the system and allow the user to change any of the symptoms and rerun the system.
- It would also be good to provide an explanation button at the end to generate an explanation report describing the diagnosis process through displaying a textual version of the rules used in reasoning.

Concluding Remarks

Based on the issues raised in the above sections the following actions are recommended:

1. Complete the expert systems by adding links to images, and textual document for symptoms and causes

2. Verify the system using the test cases generated by CLAES team
3. Implement a mobile application of the expert systems
4. Add a hyperlink to the causes in the agenda to display the symptoms provided to the system and allow the user to change any of the symptoms and rerun the system.
5. Provide an explanation button at the end to generate an explanation report describing the diagnosis process through displaying a textual version of the rules used in reasoning.
6. Examine the comments on the implementation of tomatoes expert system and make necessary modifications.