Chapter 2
Application of Fuzzy Expert System for Analyzing Agriculture Data

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ABSTRACT

Agriculture plays a major role in the Indian economy. India is rich in production of crops like rice, cotton, wheat, soybean, sugar; fruits and vegetables like onion, tomatoes, potatoes; dairy; and meat products. India is ranked first worldwide for the production of banana, jute, mango, cardamom, and ranked second worldwide for the production of rice, tomato, potato, and milk. India's agriculture contributed 4759.48 INR billion to the GDP during the first three months of 2018, and it has been reduced drastically during the second three months of 2018 (i.e., it has been reduced to 4197.47 INR billion). The average GDP is 4057.73 INR billion from 2011 until 2018; the agricultural contribution to GDP reached its highest level, that is 5666.82 INR billion, in the last three months of 2017. This chapter explores the application of fuzzy expert systems for analyzing agricultural data.

INTRODUCTION

Agriculture productions have changed into a multifarious commercial necessitating the gathering and incorporation of data and information from several various sources. In order to take necessary decision making actions usually farms depends on advisors and agriculture specialists whereas assistance of agriculture specialist is rarely available to the farmers when they need it.

In order to alleviate this problem, expert systems were identified as a powerful tool with extensive potential in agriculture. There are various expert are already developed to assist farmers and for agriculture products management. Some of them are, POMME (G.N.R. Prasad, et al.,2006), is an expert system for apple orchid management. UNU-AES is an expert system which has been designed for the users of agro- forestry management techniques. The objective of this expert system is to increase the benefits obtained by agro- forestry management techniques.

In order to increase the food production and to improve the usage of resources, the Central Laboratory for Agricultural Expert Systems (CLAES)) has designed number of expert system to help farmers all over the Egypt. Few of them are as follows:

The MANAGE has developed an expert system for managing rice crop by detecting the diseases and suggest preventive measure to cure the disease. In current trend, fuzzy reasoning has been adopted in most of the expert system (Tang.H et al.,2009). The development of fuzzy expert system over the years is briefed in the table 2

The fuzzy expert system is extensively used as expert system in other fields also like an assistant for specifying the acceptance by NOET measures, at PH.D level in which fuzzy-expert system taken advantage of the particle swarm optimization (PSO) evolutionary algorithm to specifying the score of each variable, and eventually the final condition of the candidate(S.M.H.Mousavi, et al.,2017).

Authors like Desai, D.K. Sreekantha & Deepthi, M. (2017) have done extensive review on different expert system for Agricultural Crop Disease Diagnoses. The review includes some of the work like designed and developed an architectural framework of rule based expert system for the management of

Table 1. Expert systems designed by CLAES

Name of the Expert System	Objective of the Expert System
Cuptex	To Increase Cucumber Crop Production
Limex	To support Lime growers and Lime Crop Management
Tomatex	To assist formers for disease diagnosis and necessary treatment for tomato plants
Nepher Wheat	Wheat Expert System. Objective is to reduction of risks to formers during the wheat growing season (A.Edrees., et al.,2003)
Citex	An Expert System for Orange Production

Table 2. Various fuzzy expert system

Year	Proposed by	Purpose of Expert system
2002	Harvinder Singh. Et..al	SOYPEST - Integrated Pest Management
2008	Fahad Khan Et.al	Dr. Wheat - diagnosis of diseases and pest in Pakistani wheat
2009	S.Helen Et.al	'Diagnos-4'- It considered nine different crops of Kerala to deal with the difficulties involved in plant protection
2012	Alavi	Developed a date grading system using rule-based fuzzy inference systems
2010	Kustiyo et. Al	fuzzy expert system was developed to assist in determining the effectiveness of Arbuschular Mychorrizal fungi for biofertilizer
2012	Sangatash et. al	a fuzzy system for classification of raw milk

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