

## Chapter 5

# Diagnostic Analytics on Agriculture with Fuzzy Classification

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### ABSTRACT

*Agriculture is the main domain and need of India. The country is second place in the world in agriculture. Cropping is the main part of agriculture. Various crops like millets, fruits, vegetables, oil seeds are produced and exported to other countries every year. So, various innovative technologies are used to improve the productivity of crops in agriculture. Rainfall is most important for growing crops. The water level for the crops based on rainfall has some uncertainty. Fuzzy regression analysis is one of the methods based on regression analysis that is used to handle fuzzy parameters and crisp data and vice versa. Linear fuzzy regression is one of the methods of fuzzy regression analysis to handle fuzzy parameters. This chapter explores fuzzy classification, which is based on fuzzy regression analysis, and it is compared with other classification algorithms on the agriculture data.*

### INTRODUCTION

Fuzzy logic plays a vital role in handling uncertainty of data and data mining. Fuzzy rules providing clear results according to the data in classification. Classification is one of the data mining tasks to classify data based on its characteristics (dmitry, 2004). There are some effective algorithms such as K-nearest neighbor, C4.5, ID3, SVM, naïve bayes and PRISM. Regression analysis is a method of statistics which deals with the investigation of dependence of a variable upon one or more independent variables. Data Analytics is wing of data science, which can analyze data and establish knowledge from the data. There are various types of analytics methods such as descriptive, diagnostic, predictive and prescriptive. The diagnostic analytics provides reasons for happened based on the data (dmitry, 2004). The process of data

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analytics includes data collection, preprocessing, exploration data analysis (EDA), model building and visualizing the data. EDA is the process of analyzing the data with statistical methods or mathematical model (dmitry, 2004).

## EXPERT SYSTEM

An expert system is an application which contains some of the rules and it uses AI technology that emulates the decision making criteria of human. The expert system is mainly categorized as inference engine and knowledge base (Baskaran o, 2014). The inference engine applies the various rules to already known reality to get new facts. The knowledge base corresponds to fact and rules. The main aim of knowledge base is to provide more significant information needed for the expert system to work explicitly rather than implicit (Baskaran o, 2014).

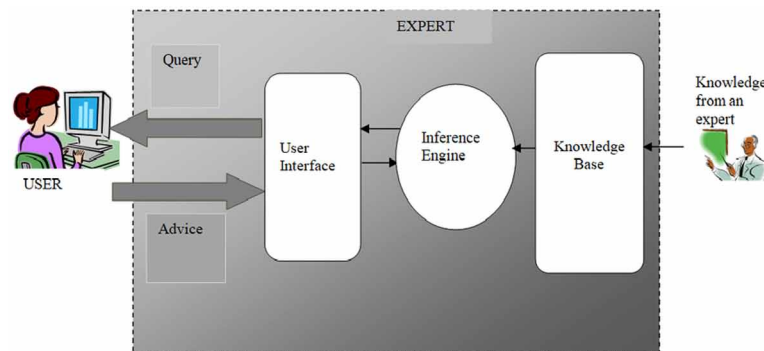
The criterion of the expert system is user interface which provides the interaction between the user and the expert system. The Expert system helps the farmers to handle complex problems such as soil erosion, chemical pesticides loss; yield loses, crop selection and resistance of pests. So, expert system plays an intermediate between the highly knowledge scientists and uneducated people to taking the decisions at the right time (philip, 2014).

## FUZZY EXPERT SYSTEM

Fuzzy logic is main criteria of soft computing. Lotfi A. Jadedh (Zadeh, 1965) professor of California University at Berkeley proposed the theory of fuzzy logic. Fuzzy set is a modified crispest which contains the membership values between 0 and 1. If a member of the set having the value then, it belongs to the set; else the number does not belong to the set.

Fuzzy Expert system uses the fuzzy logic and set of membership functions instead of normal Boolean logic. It handles the uncertainty of information. In defuzzification, the values are converted into linguistic values with membership functions along with the range between (0, 1) and the result of defuzzification

*Figure 1. Components of expert system*



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