Implementation and Design of Fuzzy ID3 to Forecast Seasonal Runoff

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ABSTRACT
Indian agriculture includes a mix of traditional to modern farming techniques. In some parts of India, traditional use of cattle to plough farms remains in use. Traditional farms have some of the lowest per capita productivities and farmer incomes.
"Slow agricultural growth is a concern for policymakers as some two-thirds of India's people depend on rural employment for a living. Current agricultural practices are neither economically nor environmentally sustainable and India's yields for many agricultural commodities are low. Poorly maintained irrigation systems and almost universal lack of good extension services are among the factors responsible. Farmers' access to markets is hampered by poor roads, rudimentary market infrastructure, and excessive regulation."
This paper will be developed by me, a hybrid forecasting technique that is mixture of fuzzy logic and ID3 data mining algorithm. That forecast seasonal runoff on the basis of every day whether conditions. Moreover it to get the authenticity of the system we compare the system with a traditional ID3 based system.

Keywords
Fuzzy logic, ID3, water supply, forecast.

1. INTRODUCTION
With a population of just over 1.2 billion, India is the world's largest democracy. In the past decade, the country has witnessed accelerated economic growth, emerged as a global player with the world's fourth largest economy in purchasing power parity terms, and made progress towards achieving most of the Millennium Development Goals. India's integration into the global economy has been accompanied by impressive economic growth that has brought significant economic and social benefits to the country. Nevertheless, disparities in income and human development are on the rise. Preliminary estimates suggest that in 2009-10 the combined all India poverty rate was 32% compared to 37% in 2004-05. Going forward, it will be essential for India to build a productive, competitive, and diversified agricultural sector and facilitate rural, non-farm entrepreneurship and employment. Encouraging policies that promote competition in agricultural marketing will ensure that farmers receive better prices.
Agriculture has a significant role in socio-economic fabric of India. Here Sikh farmers are deploying a tractor and cane crusher to produce and distribute free cane juice on an Indian festival. There are various system implemented but most of the system initiate for weather forecasting system. There are too few systems for forecasting of seasonal runoff. A few of seasonal runoff systems establish but they are implemented using the following techniques.

1. Neural Network
2. SVM(support vector machine)
3. Simple Fuzzy Logic
4. Simple Decision Trees

The above given techniques having its own advantages and disadvantages, these disadvantages are listed in table 1.

Table: 1

S.No	Method	Description
1	Neural Network	Provide high accuracy but required more training cycle
2	SVM	Provide better accuracy but complex calculations and large amount of memory used
3	Fuzzy system	Accurate results but in opaque model
4	Decision Tree	Having not good accurate results

2. 2. Fuzzy ID3 Algorithm

The recursive tree-building can be described as follow:

1. Compute the

Entropy = $\sum$ p log n (p)

Where p is the probability (estimated from data) and n is the number of unique values belongs to attribute.

2. For each remaining attribute Ai (previously unused), compute the information gain based on this attribute splitting node.

The gain G = probability of occurrence with log n * probability of decision

3. Expand the node using the attribute which maximizes the gain.

The above tree-building procedure in fact creates a partition of the data and problem spaces, with guiding principles such as having "large blocks" and unique classifications of training data in each of the blocks. Training process is belongs to data and its arrangement, It is quite natural to make classification decisions based on those partitions in such a way that a new data element is classified the same way as the training data from the same partition block. This may result from a number of factors, such as an insufficient set of features, no is elements or errors.

3. Accuracy

Accuracy of the system over seasonal data is given the below table and graph

Table: 2

Data set Size	Fuzzy ID3	ID3
100	79.49	77.90
300	76.32	78.83
500	83.29	80.92
700	77.17	79.76
1000	88.27	81.22

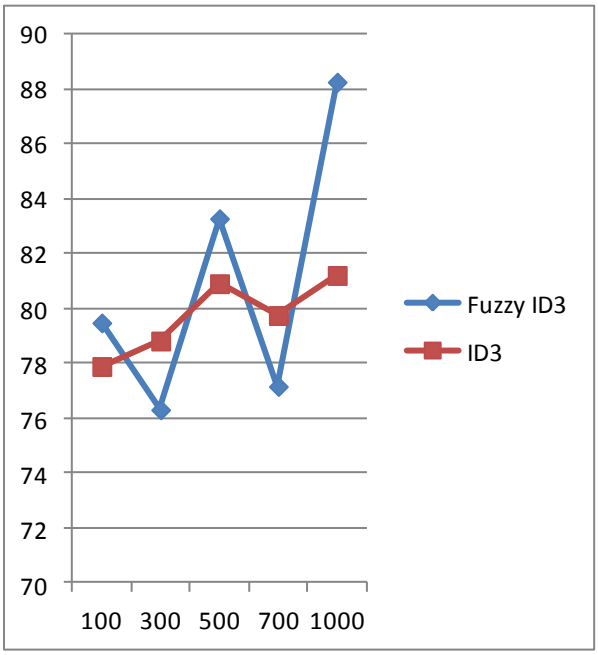

Fig. 1

4. MEMORY

The Memory use of the Designed system is given below in table and graph.

Table: 3

Data set Size	Fuzzy ID3	ID3
100	23336	24032
300	25776	25168
500	24364	26464
700	26108	27536
1000	28324	29348

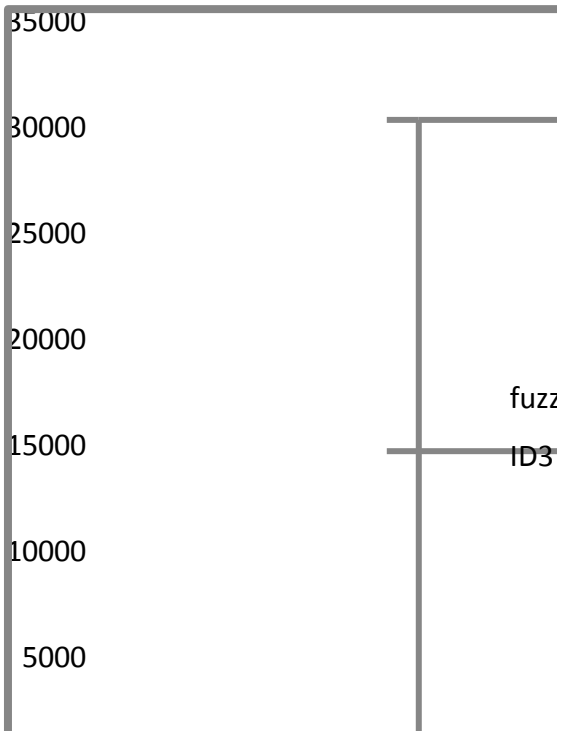

Fig. 2

5. Build time

Build Time of the system is defined as time required Building the model using provided data and graph

Table: 4

Data set size	Fuzzy ID3 (seconds)	ID3 (seconds)
1000	3.273	4.155
700	1.629	2.582
500	1.284	2.114
300	1.732	1.25
100	1.539	1.84

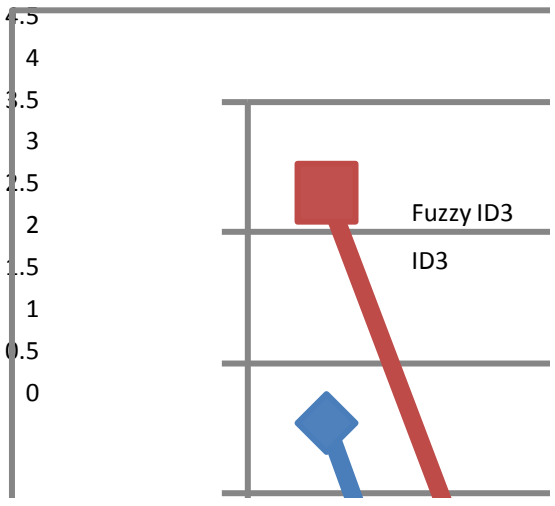

Fig. 3

6. SEARCH TIME

Search time of the system over seasonal data is given the below table and graph.

Table: 5

Data set size	Fuzzy ID3 (seconds)	ID3(seconds)
1000	.2642	.261
700	.1662	.52
500	.1642	.2361
300	.142	.229
100	.242	.103

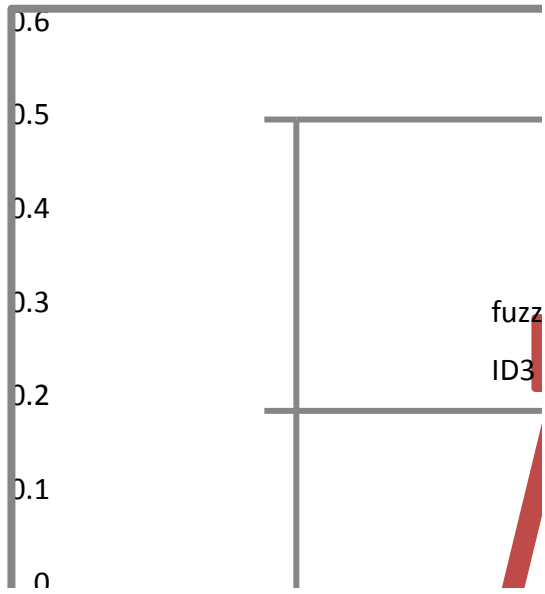

Fig. 4

7. FUTURE WORK

In this paper we make changes over the formula of information gain to calculate suitable decisions. And we got better results from the previous algorithm in future we involve the following work in our work.

1. Identify the decision gaps.

2. Identify the problems and its regions

3. In this time our work is concentrated over seasonal runoff analysis in future we apply this algorithm to other data and find the performance of the designed system.

4. We design a real time data model to predict the seasonal runoff which is based on different other techniques and real time data.

5. This is may be used in cloud to design a new and effective system.

8. CONCLUSION

Here I am proposing the hybrid algorithm for mining the sample data. Hybrid algorithm is designed using fuzzy logic theory and ID3 decision tree. In this hybrid algorithm sample data is processed using fuzzy logic and the output of the fuzzy is supplied to the ID3 decision tree to generate rules from the data model. The system generated rules are used to predict seasonal runoff.

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