

# Design of a Cloud-Based Framework (SaaS) for Providing Updates on Agricultural Products

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**Abstract** Nowadays cloud computing is providing a step which brings technology into all the fields to make them convenient and more useful. Here this technology is used in agriculture field to design a cloud-based framework which provides the updates on mobile phone that would be helpful to the user to get required information anytime and anywhere. The cloud computing technology is provided with a knowledge base expert system and automatic updates, which gives an establishment and recognition to the farmers and their products. In this proposed system, the data will be provided to the cloud. The framework is designed, which may vary from pricing, availability, storage, weather, need of various products on the market and receiving some cropping advices. Here a cloud-based framework gives a great recognition to farmers and the agriculture. It helps to know the best prices for products and varies exact demand in the market. This proposal is the initial step to induce a new green revolution in our nation.

**Keywords** Cloud computing · Agriculture · Knowledge base · SMS updates

## 1 Introduction

Farmers are the backbone of our nation; our whole world population depends on farmer's cultivation. Agriculture contributes a major role of the economical value in India. Growth and wealth of the Indian economy depends on the path of agricultural production. This meets the complete demands of some individuals. In the field of agriculture, marketing is deciding the value of the agricultural products in terms of

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money. Most of the farmers promote their products through village-level marketers/vendors to the local market without knowing their actual price in Indian market. So this brings an economical loss for the farmers and also to the customers. This proposed work discusses everything about providing updates on various agricultural products as per the user requirements on user's mobile phone. Basically, this will be expected to be helpful for farmers around the country. The Internet and mobile networks have the potential to provide agricultural information services that are at affordable, relevant (timely and customized), searchable and up to date. The mobile phone technology benefits the customers to get information anytime/anywhere, with physical contact-less services. Keeping these factors and needs of Indian farmers in mind, various applications and services are provided for agricultural information. The impact of used technology in this project is on cloud computing which is provided with the knowledge base expert system for automatic updating which matches the requirements of the particular farmers. This work is specifically concerned to our farmer that provides a convenient support to them. Here farmer can get the all available information about the marketing transactions on agricultural products on his mobile phone, by which the farmer owns the direct control of the price. In this way, they would be able to establish a relationship of trust and exchange of information without intermediaries. This relationship would be established between producers and consumers that would induce in marginal development of rural areas.

As today's generation, all are moving towards the technology, where it making things with ease of access. This is really trying to help and build a well-formatted environment by which everyone can afford the services through this technology. So somewhere a thought may arise how if the farmer who really supporting our nation's population can get some accessibility with this upcoming technology by which they can get updates on their field-related information which will provide such service to them. That provides anywhere and anytime access based on cloud-based work.

In this proposed system, the application and the computation are moved into Cloud Server. The cloud technology is chosen, because it is a ready to serve high business segment, which is our area of concern. Cloud computing makes it possible to configure general-purpose, online data by giving command to support any software application quickly. These services are commercially used and viable as the costs, which are related to the data centre that can be shared among many users. The leading forecasting institutions are expecting that India will play a bigger role in world markets in future.

## 2 Literature Survey

The work aimed [1] is to provide the characteristics of supply chain, here it focussing on the particular food short chain and highlighted what are the weakness and strengths of the agricultural organizations and industries, in which these analyses are proceeded by the management of the agricultural organizations using

latest IT innovations by specially focusing on the cloud. It is providing the role of improving processes and also market information. The concept is induced for supply and demand of short chain. The essential advantages are economically benefited by direct sales of food, and reduction of energy consumed in packing and transporting process. So the overall applications and services require only governing them to check the business needs in terms of availability, cost and performance agility. Cloud provides the supportive role by giving flexibility, security and scalability to data management and its applications.

The major challenges in agriculture sector bring certain difficulties in green revolution and evergreen revolution which is introduced in supply chains with overregulated of increased cost, risk and uncertainty, slow progress in implementing land reforms and inefficient finance and marketing services, government policy in which taxes often changes without any notice, no storage facility for food which yields to the wastage of agricultural products which tends to a huge amount of loss to the Indian economy with a lack of knowledge and information. So the easy-to-use interface [2] is provided using mobile phones to both the farmers and agencies concern and updates on market status of various products as per the user demand on daily or weekly bases on farmers mobile phones via SMS-based format, where using the Frontline SMS controller design and maintenance of a Backend Database of all the products whose control is given for the dealers.

Green commerce [3] will open farmer's products to a wide market. From earliest times to the till date, the retailers depend on a third party to get their demands. Green commerce has proposed in such a way that it gives an establishment and recognition to farmers and their products, where it provides a direct marketing phase between farmers and retailers which make a good relationship between them. In the current scenario, the farmer fails to get the exact price value of a product which is completely not entertained in Green commerce.

The development of agriculture is still under development from the past few years due to lack of knowledge and environmental changes. Here, the motto [4] is to reach farmers to provide awareness, usage and perception in e-agriculture. The agriculture field in India is currently facing with problems due to inadequate investments, lack of attention, non-given fair prices for farmers crops. The study used in this statistical survey design technique is to collect data from farmers for their awareness in e-commerce. The results obtained indicated that the level of awareness is less such that there is a need for e-agriculture for their support, so this e-agriculture is a platform for supporting marketing of agricultural products and an emerging field in connection of information, development and entrepreneurs related to agriculture. This system uses data mining method of clustering techniques for group of farmer's data. It verifies in terms of clustering efficiency to compare the parameters such as time and accuracy. Clustering technique will be provided to group the data of farmers to make a comparison with a similar substance.

Nowadays, the latest area of ICT is cloud computing, which is providing IT as a service to the cloud user's on-demand basis with greater flexibility, scalability, reliability and availability with utility computing model. The use of IoT [5] paradigm provides advantages of ubiquitous interconnection of billion embedded

devices that can be uniquely identified, localized and communicated. Supply chains are increasingly building as synchronizing supply with demand on competitive infrastructure and measuring the performance. So this concept enhances the virtualization of supply chains in agricultural sector with a propagation technique where farmer can also track up-to-date farming and check the whole process of production and distribution to consumption.

Cloud computing [6] for government in any other organization needs considerations about who the service users will be and who the providers will be, what control and ownership of the services which are made technically possible. Also deals with the implementations across various organizations elaborated on the theoretical framework in which essentially the work has been done by building cloud computing data centres for load balancing and computing virtualization. It brought the great opportunities in China’s agriculture [7], presented the framework applications and promotion of cloud technology, which also provides the tracking and monitoring the quality of the products based on supply chain technology. Need of awareness [8] and promotion among the prime stakeholders is required to acquire the correct and massive information about the agro-sector which gives the awareness to the farmers and have a well-established information base for the nation. This will in return lead to a well-connected world.

### 3 Proposed System

Figure 1, in this proposed system, we are designing a cloud-based framework which can be helpful to the farmer/user to get the information about the monsoonal rainfall, market price, stock availability, and also they can get query processing. Here, we are proposing such system which is merely providing the future prediction

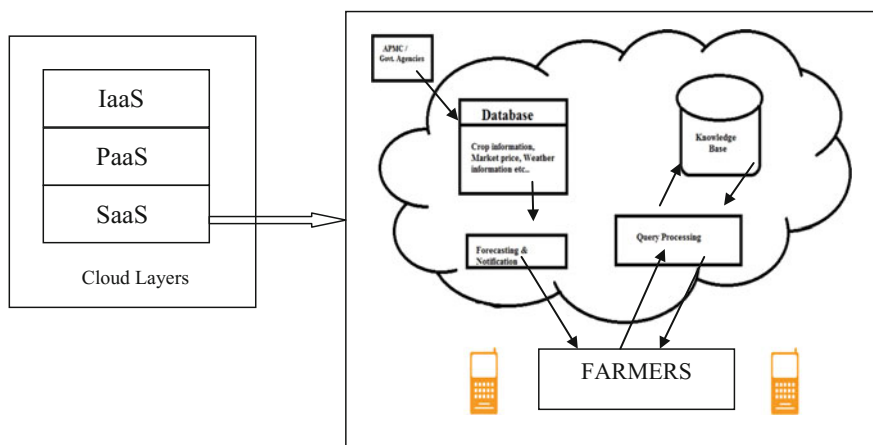


Fig. 1 Proposed architecture

on the particular data by depending on its previous value which are available and already trained as a data set. Forecast model system is used to provide the predicted value based on the data it has been trained and the user requirements. So here, user can login to the system on cloud from anywhere and anytime and get access to it. Where farmer/user can get the values as per their requirements for what they have registered, it may be price, rainfall, so on. And as well user can search the query by giving a query to the system and can get the relevant information by knowledge base system which has been provided with open natural language process (NLP). So with respect to these functions, the proposed system works with aspects of the user requirements.

Following are some of the possible solutions which can be offered by cloud service providers to the farmers.

- Store and maintain a database for the information generated in daily activities
- Database for crop-related information
- Database for market-related information
- Database for production-related data

The following are the implementation of different modules that can be used to implement or propose this project.

### Naive Forecasting

Naive forecasting model is a constraint-based algorithm in which dependency value between two variables will not consider the effect of other variable on their relationship. Forecasting based on this naive function is easily based on the history of weather condition data sets after discretization. It can be vision in cloudy, sunny, windy, raining and so on form. So here in this, we have described this naïve function for predicting the future values provided for monsoonal rainfall which will be helpful for the farmers to plant their crops. **This naive algorithm is effective and efficient for machine learning views to solve the problems by predicting the future views on weather.**

For weather, it can be assumed as:

$$\text{Every } T_i = a_i + a_{i+1}/2;$$

```
DataSet observations = new DataSet();
```

```
ForecastingModel model = new NaiveForecastingModel();
```

### Polynomial Regression Forecasting

Once the polynomial regression function is initialized with a value, then it can be applied to another data set using the forecasting method to forecast the values of the dependent variable. So once it get trained and initialized with the form of dependent variables, it can be helpful for the polynomial method to predict the number of different period sample values, respectively. Here, this function can give up to 10 coefficients of variables. This polynomial regression model is a highly dynamic method. It implements such interface, which can be used for prediction of the market price values for different crops according to the user choice. **This method is**

**effective and efficient, motivated for machine learning views to solve the problems by predicting the future views on market price predictions.**

```
DataSet observations = new DataSet();
ForecastingModel model = new PolynomialRegressionModel("powerconsumption", 4);
```

### **ARIMA Forecasting**

#### **Seasonal and Non-Seasonal ARIMA Forecasting**

“Seasonal ARIMA” Forecasting model is formed by including the additional seasonal terms in the ARIMA models. **It can be used to predict the future values depending on the seasonal terms.** And similarly for “Non-Seasonal ARIMA”, **it will predict the values as per non-seasonal terms depending on the availed data on the particular, respectively.**

```
DataSet observations = new DataSet();
ForecastingModel model = new MovingAverageModel(4);
```

#### **Query Answering/Processing**

Query answering or processing is to be done on the knowledge base system which is basically carrying with machine language views. In this, query processing can be done in the format of natural language processing (NLP) which is provided by the word match score with the comparison of trained database.

```
String searchpath;
searchpath = folder;
TestOpenNLP.load();
```

#### **Knowledge Base**

In this module, it will specify the knowledge base provided to this framework, where it can be designed with the NLP, neural networks, fuzzy logic, etc., which basically provides understanding between the machine and human beings. So by this, it will be helpful by giving a word like adjective as a search to the machine and as it searches for the particular word with the trained dataset and will find the word score for the input which user has given. With the help of that, it can recognize the word containing with the similarity in the data set, and by this, it will be helpful for the user to find his required information from the particular file with collected data score as per his input to the system. In this way, it will find the values for the queries related to it and process it to the user. Knowledge base can be trained with the regular query information; with this, it can be automatically process the query which has given to it and will proceed.

## Advantages and Limitations

### Advantages

- **Economic Benefits:** It provides the direct sales prices of the products which are more profitable for the producers which intercept a greater share of added value.
- **Social Benefits:** The farmer owns the direct control of the price, in this way; they would be able to establish a relationship of trust and exchange of information without any intermediaries. By this, it will form social bonding between producer and consumers.

### Limitations

- With applications moving to the cloud, there is a real risk of the network becoming the single point of failure.
- It should have the existing “ICT” structure to provide such cloud framework on it.
- Because of a large number of connections to the “cloud”, the bandwidth may need to be upgraded to provide a continuous network connection.

## 4 Conclusion

This proposed model, if implemented, reduces the gap between farmers and the retailers, and thereby making a good profit to the farmer’s community. With this proposed model, farmers can get all updates related to agriculture and also the crops that can be cultivated in future.

The service provided by the proposed model will be product- and market-specific. A farmer can choose his products and will get the related information of which he is in need of. Also, this model will create a social bonding between the farmers that are associated with the Agriculture Product Market Community.

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