Price Forecasting System for Crops at the Time of Sowing

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Abstract - We tested the usefulness of past data of price of crops for prediction in India. In regions where these seasonal predictions showed skill we tested if the skill also translated into potato price forecasting skills. Using South-India as region for dates and there price before sowing of seeds, we generated a system that can predict the price of crops on yearly as well as monthly basis. Price prediction of the potatoes and other crops are tested by the ARIMA model with the help of time series analysis. With the help of this model we predict the price of the crops. We have used the rolling mean, standard deviation, dickey fuller test, partial auto-correlation, function and auto-correlation function to assess regions of useful probabilistic prediction.Annual yield anomalies are predictable 2-months before sowing in most of the regions. From the sample data set of price of crops on daily basis, we concluded that, there is potential to use past trend data to forecasts with ARIMA model to predict future price of given crop.

1. Keywords - ARIMA(Auto Regression Integrated Moving Average), Dickey Fuller Test, Rolling Mean, Auto-Correlation, Forecasting

2. Introduction

Agriculture is the major land use across the globe and is of high economic, social, and cultural importance. In its many forms, agriculture remains highly sensitive to both price and other factors trends on a range of time series, particularly in regions where rainfed agriculture supports majority of the population and plays crucial roles in national economies like India.

Improving the prediction of price using ARIMA model will provide a help to both local citizens as well as farmers to know the price whenever they want.

Time Series Analysis is an important field of machine learning which will help to implement many models to know the forecast of anything. But ARIMA is one of the most recommended model to use of predictions.

3. Related Work

There are no such has been done in this field, we are trying to solve this problem by focusing on the following factors:-

4.1 About current Situation

In Indian regions of agriculture, price of crops is dependent on various external factors such as area, yield, production, Household food demand, feed demand, and many other factors. In this regard, a mechanism may be developed which can use the data of past trends and other mentioned factors and bring up the price forecast of the particular crop depending upon sowing, taken into consideration the sowing patterns, weather and other factor mentioned.

4.2 Factors related to this problem

Various factors like food demand, feed demand, climate, soil conditions and current situation of market price affect the price of the crops very frequently. By keeping all these factors in concern, we are trying to develop a price forecasting system which can predict the price of the vegetables, fruits, pulses and grains and the products related to farming on daily basis.

4. Proposed System

On the basis of above mentioned points we are proposing a system which can predict the price of the crops at the time of sowing.

5.1 Our main concern to this problem

We will use time series analysis and ARIMA (Auto Regressive Integrated Moving Average) Model to build the solution this common problem of our farmers and Indian market. This will work on the data sets like data set of weather or climate, daily price of farming products, yearly and monthly yield production of these products and find going to develop an algorithm which will integrate all these factors and came out with the exact solution.

5.2 Scope of this project

It is totally machine learning based project which will be implemented using python. Further a web application is made as a primary user interface to deal with the clients like farmers, state government or any citizens who want to know the price of any commodity. And then, after all the improvements we will shift that to an android app also. Because android app is more preferable than a web app because it is handier and can be portable.

5. Results

We have started using ARIMA (Average Moving Integrated Moving Average) model which is the hero of this system in Time Series Analysis.
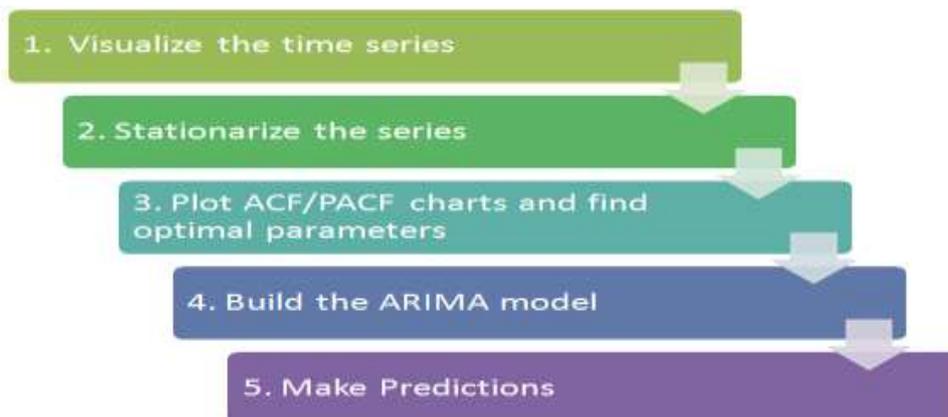
6.1 Time Series Analysis

1). Set of observations taken at specified time usually at equal intervals.

2). It is used to predict the future values based on previous observed values.

3). It is used for:-

     i.Business Forecasting

     ii.Understanding Past trends

     iii.Plan Future

     Iv.Evaluate current accomplishment

6.2 Components Of Time Series

i.Trends

ii.Seasonality

iii.Cyclic

iv.Irregularities

6.3 Hierarchy of Time Series Analysis

1. Visualize the time series
2. Stationarize the series
3. Plot ACF/PACF charts and find optimal parameters
4. Build the ARIMA model
5. Make Predictions

6.4 Stationarity
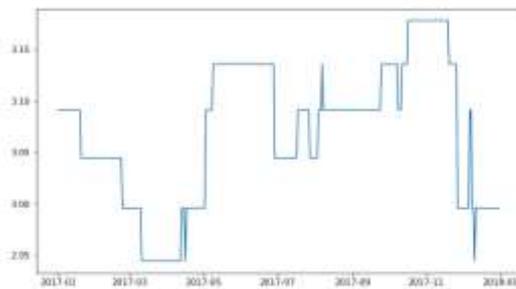
There are three criteria of a data to be stationary:-

1).Mean should not be function of time
2).Variance should not be function of time
3).Covariance should not be function of time
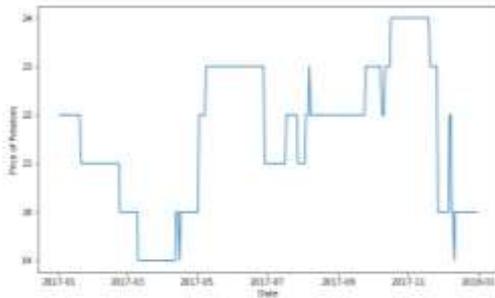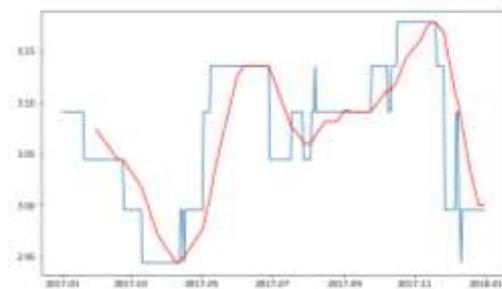

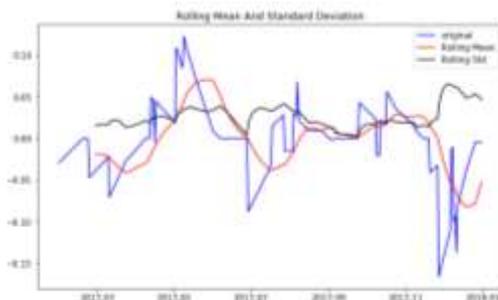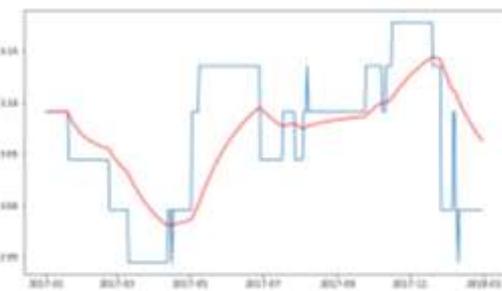a.   Original dataset representation   b.Rolling Mean and Standard Deviation

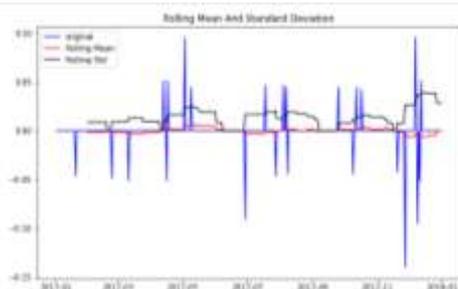c.Log Scale Data representation   d.Moving Average with log data

e.Stationarity test on log data   f.exponential decay weight on log data
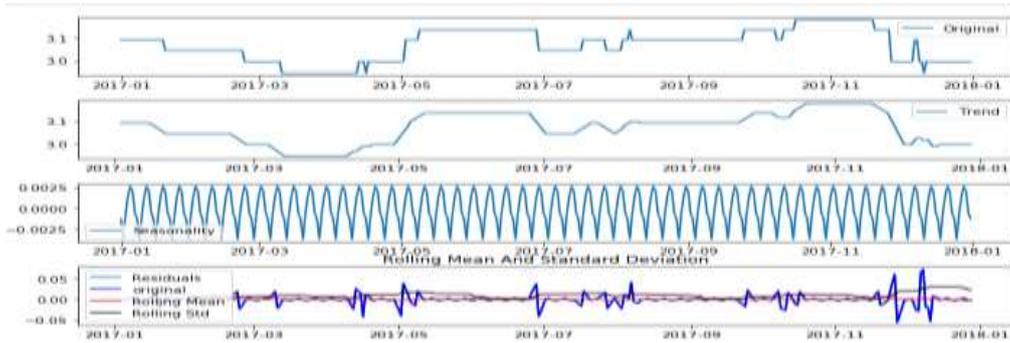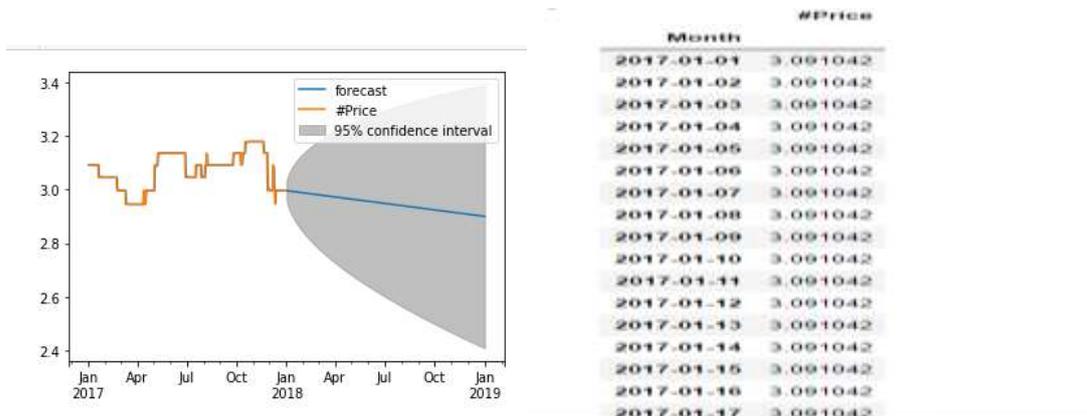


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Result of Dickey Fuller Test
test statistics                   -2.138844
p-value                            0.229185
#lags used                         0.000000
number of observations used      364.000000
Critical value(1%)                -3.448443
Critical value(5%)                -2.869513
Critical value(10%)               -2.571018
dtype: float64
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g.shifting standard deviation and mean   h. Dickey Fuller test

Dickey fuller test representation

J. Graphical forecast result   h. log scale price forecast representation

6. Conclusions

We have shown the potential of price forecasts in combination with a ARIMA model to predict pre-season potato prices.

The study showed that there is potential to predict potato yields for many months before planting dates. Yield forecast skill varies with regions and hence sowing/harvest date combinations, and lead time. Such lead time has potential to influence regional policy and local management decisions related to potato production, such as adjustments of farm management for the upcoming seasons.

While accurate crop calendar data is an essential input into crop models. Incorporating the use of remote sensing to derive dates such as emergence could play a role in improving the planting dates.

This system showed a potential to predict at most 95% confidence in its predictions and will be increased further after getting more data on daily basis.

7. References

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