Nat. Volatiles & Essent. Oils, 2021; 8(5): 4985 – 4998

"Production of commericial crop prediction using arima model"

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Abstract

The purpose of the paper work is to study on production of commercial crop prediction using ARIMA model. A Commercial crop is an agricultural crop which is growing for sales to get a profit. The people usually getting from parties in a farm. There are several kind of crops production were discussed in this article. This article will be very much useful for the people and producers who all are cultivating the commercial crops. Using ARIMA Model we are going to predict the future commercial crops production

Index Terms: ARIMA, Forecasting, Moving Average

Introduction

Commercial crops are one of the most essential part of the agricultural sector. In our Indian people basically reliant on agriculture sector. More than 65 percent of people reliant on agriculture sector. Some people were engaged in commercial crops activities. Some people self-employed in this crops rural and semi-urban livelihood. Seeding, planting, fertilizing, irrigating, and all parts of horticultural trees, are measured a commercial crop and are qualified for cash compensation. Crops charitable comparatively better returns to farmers are acknowledged as commercial crops. Examples: cotton, sugarcane, jute, ramie etc. The harvest of such crops is procured by factories for handing out. Indian farming systems are intentionally utilized, to according to the sites where they are most appropriate. In the farming systems fundamentally pays to

the domestic GDP of India are maintenance farming, organic farming and industrial farming. Different type of farming they have used; some of the things are grounded on horticulture, lay farming, agro forestry and also many more. Environmental location of India's, definite parts of experience changed climates, agriculture productivity very inversely. India is a basically dependent on its monsoon based periodic rainfall. Rainfall is a change in the season to season variations and also significant and the consequence of these are bumper harvests and crop searing. Is one of the main priorities in Indian farming is an irrigation. Indian agriculture production in second position in the world.

Top Most Commercial Crops In India

Here's the synopsis of certainly the most valuable yields in India:

Sugarcane Geographical Conditions of Growth: It is a tropical correspondingly as sub-tropical assemble. Sugarcane in North India is of the sub-tropical plan and has low sugar content. Besides sugar dealing with plants need to stay shut in winter seasons in North India. In addition, sugarcane juice starts to disseminate as a result of the long dry season in north India. Sugarcane in South India is of the tropical assortment and high sugar content and uncommon yield. It fills well in annoying and shabby environment with a temperature of 21°C to 27°C and a yearly precipitation of 75-100cm.Medium and critical soils where water system working environments are open are ideal for its development. It will overall be made on a gathering of soils and needs real work from the hour of planting to social occasion. It is a long making yield planted among February and April. Securing starts in October and November. It is a dirt debilitating harvest and suitably needs standard use of manure or fertilizers.

Basic Producing Areas: India is viewed as the fundamental country of sugarcane and has the best region under sugarcane on earth. India is the second most noteworthy maker of sugarcane only get-togethers. The basic sugarcane passing on states are Uttar Pradesh, Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh, Bihar, Punjab and Haryana.

Cotton: India is recognized to be the chief home of the cotton plant. It is moreover maybe the essential current yields of India.

Topographical Conditions of Growth: Cotton fills well in the drier pieces of the faint cotton soil of the Deccan level. It can in like way be made on alluvial and red soils. It requires high temperature (20-35°C), light precipitation (50 to 80cm) or water system, 210 ice free days and mind blowing daylight for its new development. Clear sky during the picking season is remarkable. It is a Kharif crop and requires 6-8 months to make.

Basic Producing Areas: India is the fourth most noteworthy maker of cotton on earth. China, USA and Pakistan cultivate more cotton than India. Cotton is made in about 45% of the full scale planted district in the country. The gigantic cotton making states are Maharashtra, Gujarat, Madhya Pradesh, Karnataka, Andhra Pradesh, Tamil Nadu, Punjab, Haryana and Uttar Pradesh.

Colossal Varieties: India produces both short staple (Indian) cotton and long staple (American) cotton. American Cotton is called 'Narma' in the north-western piece of the country.

Tea Geographical Conditions of Growth and Production: The tea plant fills well in tropical soaked and subtropical clammy conditions improved with critical and prepared a ton of depleted soils, wealthy in humus and normal matter.150cm summer tempest and 21°C to 27°C reliably temperature are required for its new development. Tea brambles require warm and ice free environment all as the year progressed. Standard showers fairly appropriated over the long haul guarantee steady improvement of the delicate leaves. Tea is occasionally made on the inclination slants so that there is no waterlogging in its key foundations. Its leaves are to be a few times in a year, so accessibility of plentiful and inconspicuous work is major for its development.

Tremendous Producing Areas: Assam, inclinations of Darjeeling and Jalpaiguri locale, West Bengal, Tamil Nadu and Kerala. Alongside these, Himachal Pradesh, Uttaranchal, Meghalaya, Andhra Pradesh and Tripura are in like way tea making states in the country. India is the guideline maker likewise as exporter of tea on the planet. 28% tea of the world is passed on here.

Espresso Geographical Conditions of Growth: Coffee is a tropical home crop.16° – 28°C temperature, 150-250cm precipitation and particularly depleted tendencies are essential for its new development. makes on unpleasant tendencies at the stature of 900-1800m.Low temperature, ice, dry climate for quite a while and primitive daylight are perilous for its plants. Espresso plants fill better in the laterite soils of Karnataka in India.

Colossal Producing Areas: India contributes about 4% of the world's incomparable espresso creation. It positions sixth on the planet in espresso creation. The espresso plant was developed oddly on the Baba Budan Hills (Karnataka) in India. As of now, a large portion of the full scale espresso creation in India is passed on by Karnataka alone, trailed by Kerala and Tamil Nadu. Basic Varieties The Arabica mix at first brought from Yemen is made in the country.

Groundnut land conditions: Groundnut is gotten both as kharif and rabi crops yet 90-95% of out and out region is kharif crops. It succeeds best in the glow and tenacity and requires 200c to 300c. Incredible precipitation condition for groundnut is 50-75cm considering how it is fundamentally powerless against ice, drawn out dry season, persisting tempest and dormant water. especially depleted light sandy soils, red, yellow and faint soil are appropriate for groundnut headway. Andhra Pradesh, Tamil Nadu, Rajasthan and Gujarat are the central maker of groundnut in India and record for 60% of the absolute creation and another 30% comes from Maharastra, Karnataka and Orissa.

Soya bean land conditions: Soya bean is known as the "impressive bean" of the twentieth century. In any case soya bean is a vegetable gather yet it is generally utilized as oilseed. It is the second most prominent oilseed in India after groundnut. It fills in swayed agro climatic condition. Considering its overall differentiation, the general exchange of soya beans spread for what it's worth. two or three nations, for example, Japan, China, Indonesia, Philiphines and Europe nations are gaining soya bean to overhaul their nearby requirement for human use and dairy steers feed. major soyabean passing on states in India are Madhya Pradesh, Maharshtra and Rajasthan.

Review Of Literature

India is one of the global commercial crops exporters and top ten leading countries where India exported commercial crops in the year 2017-18 are Italy, Germany, Russian federation, Belgium, Turkey, USE, Poland, Libya, Spain and Indonesia. The names of countries are arranged in descending order, largest commercial crops importing country from India was Italy of amount 51545 MT. There are 45 Countries name listed where India Exported 277510 MT commercial crop of unit value RS. 157248/ Tonne.

Hence, domestic market for commercial crops cannot be neglected altogether. This suggests that Commercial Crops Board may focus efforts on non-price factors rather than price incentives in their generic commercial crops promotional campaign. The main issue is to withstand the quality of the commercial crops. The determination was to express an improved considerate of the role and costs of knowledge management, learning and message in value chains and their impact on farmers and skill to integrate efficaciously into high value markets. Conversion to organic commercial crops production may, however result in a significant decrease of crop productivity. A key focal point is efficient nutrient management by composting commercial crops husks/ pulps, and green manuring by mixed planting of suitable legumes. It also highlights how commercial crops farmers in southern Mexico have achieved increased earnings through partnership with conversation International, Commercial crops Company and the United States Agency for International Development. Farmers can sell their crops at premium prices to commercial crop company if they adopt the specified practices. Dorsey (1999) in his study, highlights that the research summarized in this article establishes direct links between the scale, process, and output of agricultural production by examining the dynamics of intensification, crop diversification and commercialization. crops for commercial production such as coffee, French Beans, or tomatoes in order to increase farm – generated income while meeting increasing demands for local farm produce and exports crops. The study shows that income per hectare (acre) does not consistently increase with increasing farm size, regardless of the level of commercialization, Smallholders operating at the 1.2 to 1.6 hectare (3 to 4 acre) scale seem to occupy in advanced – risk, more diversified, commercial production policies than those with less area under production.

Arima Model

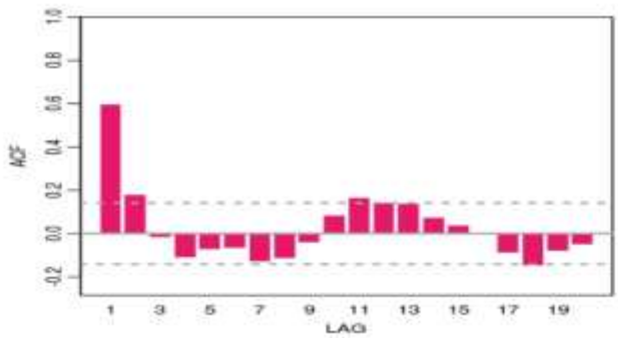
In statistics and econometrics, an autoregressive integrated moving average (ARIMA) model is a generalization of an autoregressive moving average (ARMA) model. These models are fitted to time series data also to better understand the data or to predict forthcoming points in the series (forecasting). The ARIMA models are useful in some cases where data shows suggestion of non-stationarity in the sense of mean (but not variance/auto covariance), where an original differencing step (corresponding to the "integrated" part of the model) can be purposeful one or more times to eliminate the non-stationarity of the mean function (i.e., the trend). When the seasonality shows in a time series, the seasonal-differencing could be useful to eradicate the seasonal component.

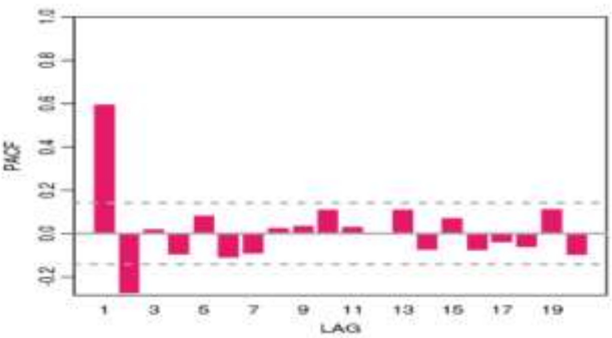
The AR part of ARIMA specifies that the developing variable of attention is regressed on its own lagged standards. The MA part indicates that the regression error is essentially a linear combination of error terms whose values happened contemporaneously and at various times in the past. The I (for "integrated") designates that the data values have been substituted with the alteration between their values and the preceding values (and this differencing process may have been achieved more than once). The determination of each of these topographies is to make the model fit the data as well as conceivable.

Non-seasonal ARIMA models are commonly denoted ARIMA where parameters *p*, *d*, and *q* are non-negative numbers, *p* is the order (number of time lags) of the autoregressive model, *d* is the gradation of differencing (the amount of times the data had past values subtracted), and *q* is the direction of the moving-average model. Seasonal ARIMA models are frequently denoted ARIMA where n refers to the amount of points in each season, and the uppercase P,D,Q refer to the autoregressive, differencing, and moving average terms for the seasonal part of the ARIMA model. How fixes ARIMA forecasting works? ARIMA forecasting is accomplished by plugging in time series data for the variable of attention. Statistical software will identify the suitable number of lags or amount of differencing to be functional to the data and checked for stationarity.

Arima Processes

An autoregressive integrated moving average (ARIMA) process (aka a Box-Jenkins process) adds differencing to an ARMA process. An ARMA (p, q) process with d-order differencing is called an ARIMA (p. q, d) process. Thus, for example, an ARIMA (2,0,1) process is an AR (2) process with first-order differencing.





Autoregressive Integrated Moving Average Model

An ARIMA model is a session of statistical models for analysing and predicting time series Data. It amenably provides to a suite of usual constructions in time series data, and as such distributes a simple yet important method for making skilful time series forecasts. ARIMA is an acronym that attitudes for Auto Regressive Integrated Moving Average. It is a simplification of the simpler Auto Regressive Moving Average and enhances the notion of integration. This acronym is evocative, capturing the key aspects of the model itself. Briefly, they are:

• **AR:** *Auto regression*. A model that customs the dependent relationship between an estimation and some number of lagged comments.

• **I:** *Integrated*. The use of differencing of raw annotations (e. g. detracting an observation from a statement at the previous time step) in order to make the time series motionless.

• **MA:** *Moving Average*. A model that uses the addiction between a comment and a residual error from a moving average model applied to lagged observations.

Each of these mechanisms are explicitly stated in the model as a limitation. A typical notation is castoff of ARIMA (p, d, q) where the parameters are relieved with numeral values to quickly indicate the specific ARIMA model being charity. The parameters of the ARIMA model are defined as follows:

• **p:** The amount of lag notes comprised in this model, also called the lag order.

• **d:** The number of epochs that the raw annotations are differenced, also called the degree of differencing.

• **q:** The size of the moving average opening, also called the order of moving average. A linear regression model is created counting the detailed number and type of terms, and the data is prepared by a degree of differencing in order to make it stationary, i.e. to eradicate trend and cyclic constructions that negatively disturb the regression model. A value of 0 can be used for a parameter, which specifies to not practice that element of the model. In this technique, the ARIMA model can be prepared to complete the part of an ARMA model, and even a simple AR, I, or MA model. Applying an ARIMA model for a time series adopts that the underlying process that produced the explanations is an ARIMA process. This may seem understandable, but helps to stimulate the need to sanction the expectations of the model in the raw explanations and in the enduring errors of forecasts from the model.

Methodology

Box-Jenkins (BJ) Model:

This model is used as a technique of mining predictable movements in a time series manner. This model has 3 components – autoregressive component, moving average, and white noise. The time-series data to be predictable using the BJ model must not comprehend seasonality and must be motionless. The Augmented Dickey Fuller and the Phillips Perron Unit Root Tests will be used to patterned if the time-series data is stationary or –non stationary.

Method of Moving Average:

Method of Moving average models was planned by Slutsky (1927) and Wold (1938). The series of moving average can be transcribed as

$$Y_t = \varepsilon_t - \theta_1\varepsilon_{t-1} - \theta_2\varepsilon_{t-2} - \theta_3\varepsilon_{t-3} - \ldots\ldots - \theta_q\varepsilon_{t-q} \text{ --------------------(1)}$$

This is named as method of moving average in the order q (MA q) here Y_t is the series which comprises unique data and ε_t is the error term of the series.

Method of Auto Regressive Process:

The Auto Regressive process was first proposed by Yule (1926) this regressive process is especially satisfying the following equation

$$Y_t = \emptyset_1 Y_{t-1} + \emptyset_2 Y_{t-2} + \emptyset_3 Y_{t-3} + \ldots.. + \emptyset_p \emptyset_{t-p} \text{ --------(2)}$$

The present value Y_t is called as linear combination for p (AR P) also ε_t is the assumption of independent of $Y_{t-1}, Y_{t-2}, Y_{t-3}, \ldots, Y_{t-q}$.

The Auto Regressive Integrated Moving Average (ARIMA):

The ARIMA methodology was suggested by the author Box and Jenkins in the year 1976. This ARIMA model is also named as Box- Jenkins model. This model is created on the error duration of the time series. To get conclude time series the data should be stationary which means, the mean, variance and covariance are coefficients over the time period. For this we can write the ARIMA model calculation like this.

$Y_t = \emptyset_1 Y_{t-1} + \emptyset_2 Y_{t-2} + \emptyset_3 Y_{t-3} + \ldots \emptyset_p Y_{t-p} + \emptyset_1 Y_{t-s} + \emptyset_2 Y_{t-2s} + \ldots + \emptyset_p Y_{t-ps} + a_1 - \theta_1 a_{t-1} - \theta_2 a_{t-2} -$ (3)

$\ldots - \theta_q a_{t-q} - \Theta_1 a_{t-s} - \Theta_2 a_{t-2s} - \ldots \Theta_q a_{t-qs}$

With a help of back shift machinist (lag) we write the above equation like this:

$\emptyset_p(\mathrm{B})\emptyset_p(B^s)z_t = \theta_q (B)\Theta_q (B^s)a_t$ ------------------------(4)

Here:

$$z_t = (1-B)^d (1-B^s)^D \ln(Y_t)$$

$\emptyset_p(B) -$ *Non seasonal operator of Autoregressive process AR(p)*

Autoregressive Integrated Moving Averages (ARIMA) is a Uni-variate Box-Jenkins (UBJ) Model used to estimate uni-variate time-series data. The basic ARIMA Model is stated as: ARIMA (p, d, q) Where p = auto regressive order P = Seasonal Autoregressive Order d = order of integration (# of unit roots) D = Seasonal Differencing Order q = moving average order Q = Seasonal Moving Average Order The ARIMA Model has four steps that is used as a cycle to determine the optimal ARIMA Model. The four steps are (1) identification stage, (2) estimation stage, (3) diagnostics stage, and (4) forecasting stage. In the identification stage, the time-series data is shown in a line graph. The unit root tests used to identify if the data is stationary or not is also conducted in this stage. A correlogram will also be used to determine which of the components possess an Autocorrelation Function (ACF) or Partial Autocorrelation Function (PACF) which will then show a certain theoretical pattern depending on the result of the ACF and PACF. This will result in the identification of the tentative ARIMA Model. The second stage consists of the estimation of the model' s parameters.

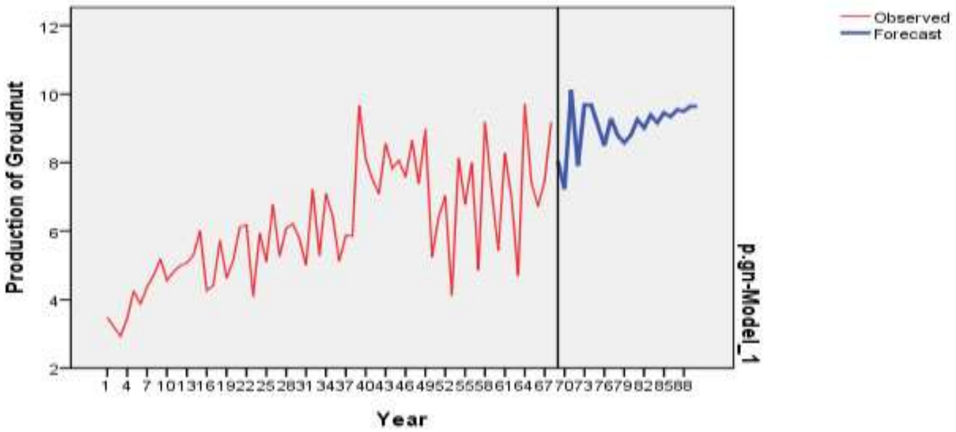
The diagnostics stage determines if the tentative ARIMA Model is a good model by identifying if the model has the characteristics of a good model. These characteristics are included being parsimonious, stationary, invertible, converging, has high quality parameter estimates, and has white noise residual series. If these characteristics are not met, the cycle is repeated from step 1. Step 4 will only be done once the ARIMA model is already adequate. The last stage, the forecasting stage, provides the estimates under the three scenarios – most-likely, worst case, and best case (Rufino, 2016).

Results And Discussion

Graphical Analysis:

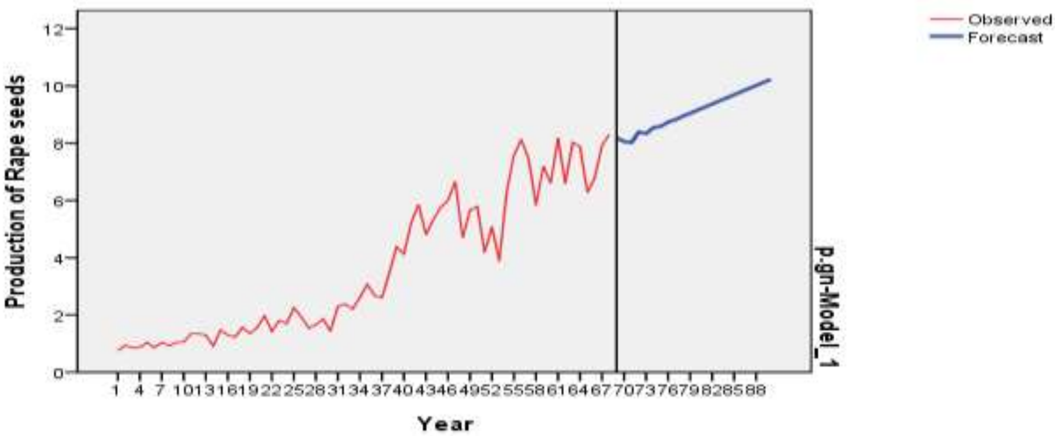
The first method used in the study is to determine whether the time-series data is stationary or not by using the Graphical analysis method. It is shows non-stationary, by taking first difference we made them stationary. Figure 1 clearly explains about Groundnut production (Million tonne) in India and also it explains future growth in India. We took the data from 1951 to 2018. Also we have predicted the production from 2019 to 2040 by using ARIMA (1,1,15) Model.

Figure – I



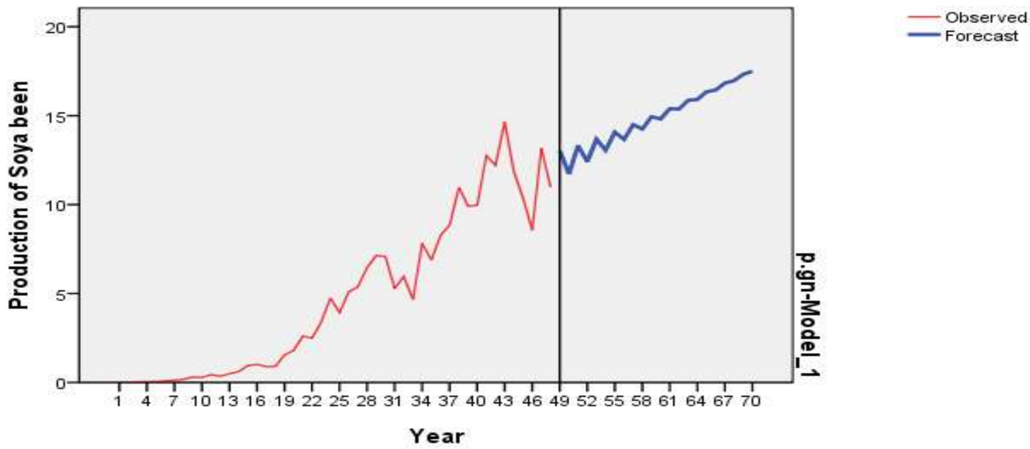
The method used in the study is to determine whether the time-series data is stationary or not by using the Graphical analysis method. It is shows non-stationary, by taking first difference we made them stationary. Figure - II clearly explains about Rape seed production (Million tonne) in India and also it explains future growth in India. We took the data from 1951 to 2018. Also we have predicted the production from 2019 to 2040 by using ARIMA (1,1,5) Model.

Figure – II



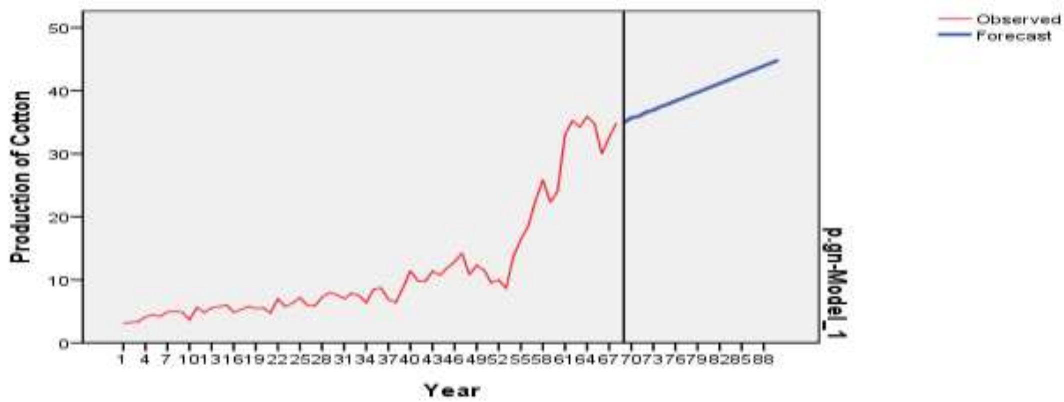
The method used in the study is to determine whether the time-series data is stationary or not by using the Graphical analysis method. It is shows non-stationary, by taking first difference we made them stationary. Figure - III clearly explains about Soya been production (Million tonne) in India and also it explains future growth in India. We took the data from 1971 to 2018. Also we have predicted the production from 2019 to 2040 by using ARIMA (1,1,1) Model.

Figure – III



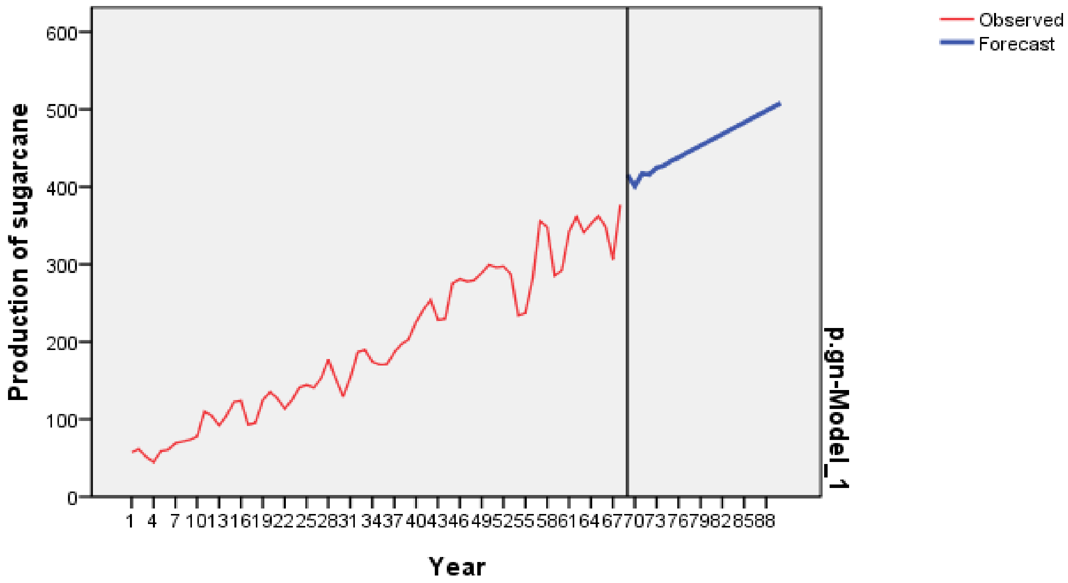
The method used in the study is to determine whether the time-series data is stationary or not by using the Graphical analysis method. It is shows non-stationary, by taking first difference we made them stationary. Figure - IV clearly explains about Cotton production (Million tonne) in India and also it explains future growth in India. We took the data from 1951 to 2018. Also we have predicted the production from 2019 to 2040 by using ARIMA (1,1,5) Model.

Figure – IV



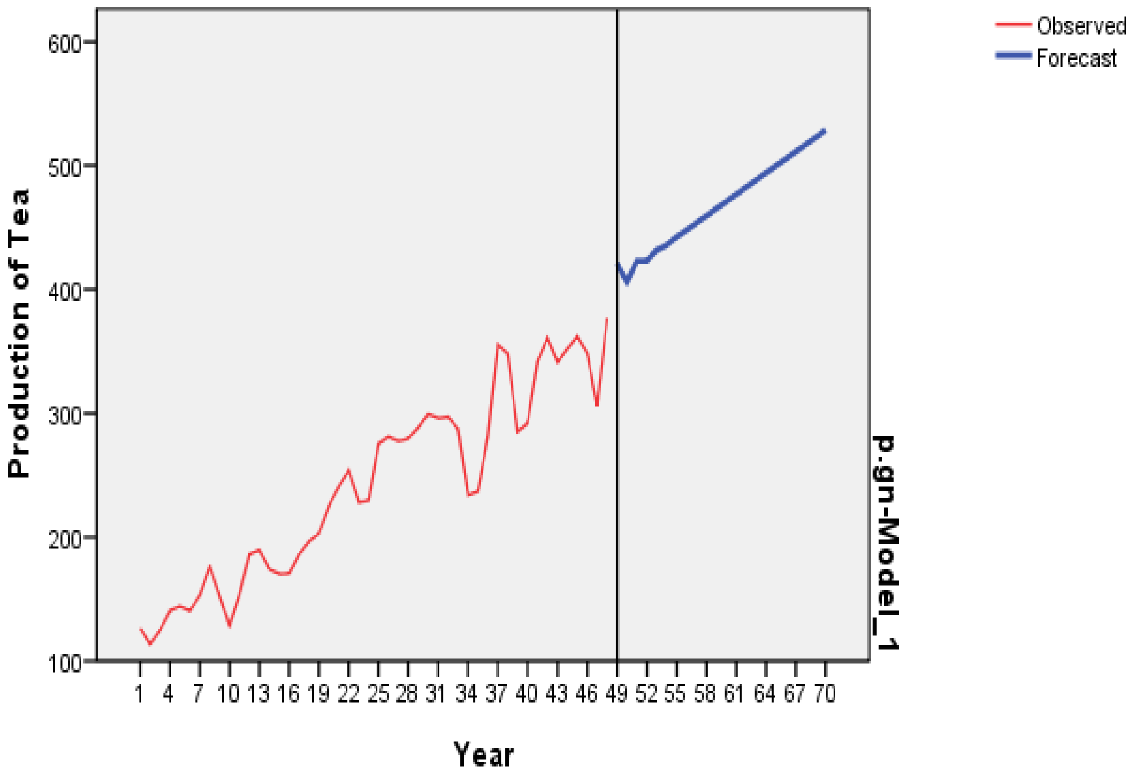
The method used in the study is to determine whether the time-series data is stationary or not by using the Graphical analysis method. It is shows non-stationary, by taking first difference we made them stationary. Figure - V clearly explains about Sugarcane production (Million tonne) in India and also it explains future growth in India. We took the data from 1951 to 2018. Also we have predicted the production from 2019 to 2040 by using ARIMA (1,1,1) Model.

Figure – V



The method used in the study is to determine whether the time-series data is stationary or not by using the Graphical analysis method. It is shows non-stationary, by taking first difference we made them stationary. Figure - VI clearly explains about Tea production (Million tonne) in India and also it explains future growth in India. We took the data from 1951 to 2018. Also we have predicted the production from 2019 to 2040 by using ARIMA (1,1,1) Model.

Figure – VI



Forecasting:

We have generated a forecast for the next twenty years (2019 to 2040). This Forecast is based on the past time serried data that were used in the identification of the ARIMA Model. The time series data has been used to generate the graph and the forecast is shown in the Figure.

Conclusion

In this article, we constructed a model called ARIMA. With a help of this model we conclude that forecasting value of production of commercial crops in India (Million tonne). The Table - I is clearly explains the future production. This indicates that there will be a gradual increase in production commercial crops; we should take the necessary steps in order to improve the production

Table - I

Year	Ground nut	Rape seed	Soya been	Coffee	Cotton	Sugarcane	Tea
1951	3.48	0.76	-	-	3.04	57.05	-
1952	3.19	0.94	-	-	3.28	61.63	-
1953	2.93	0.86	-	-	3.34	51.00	-
1954	3.45	0.87	-	-	4.13	44.41	-
1955	4.25	1.04	-	-	4.45	58.74	-
1956	3.86	0.86	-	-	4.18	60.54	-
1957	4.37	1.04	-	-	4.92	69.05	-
1958	4.71	0.93	-	-	4.96	71.16	-
1959	5.18	1.04	-	-	4.88	73.36	-
1960	4.56	1.06	-	-	3.68	77.82	-
1961	4.81	1.35	-	-	5.60	110.00	-
1962	4.99	1.35	-	-	4.85	103.97	-
1963	5.06	1.30	-	-	5.54	91.91	-
1964	5.30	0.92	-	-	5.75	104.23	-
1965	6.00	1.47	-	-	6.01	121.91	-
1966	4.26	1.30	-	-	4.85	123.99	-
1967	4.41	1.23	-	-	5.27	92.83	-
1968	5.73	1.57	-	-	5.78	95.50	-
1969	4.63	1.35	-	-	5.45	124.68	-
1970	5.13	1.56	-	-	5.56	135.02	-
1971	6.11	1.98	0.01	110.23	4.76	126.37	419.00
1972	6.18	1.43	0.01	68.95	6.95	113.57	435.00
1973	4.09	1.81	0.03	91.07	5.74	124.87	456.00
1974	5.93	1.70	0.04	86.39	6.31	140.81	472.00

1975	5.11	2.25	0.05	92.51	7.16	144.29	489.00
1976	6.76	1.94	0.09	83.98	5.95	140.60	487.00
1977	5.26	1.55	0.12	102.30	5.84	153.01	512.00
1978	6.09	1.65	0.18	125.14	7.24	176.97	556.00
1979	6.21	1.86	0.30	110.49	7.96	151.66	564.00
1980	5.77	1.43	0.28	149.84	7.65	128.83	544.00
1981	5.01	2.30	0.44	118.65	7.01	154.25	569.60
1982	7.22	2.38	0.35	152.10	7.88	186.36	560.40
1983	5.28	2.21	0.49	129.95	7.53	189.51	560.70
1984	7.09	2.61	0.61	105.03	6.39	174.08	581.50
1985	6.44	3.07	0.95	195.11	8.51	170.32	639.90
1986	5.12	2.68	1.02	122.45	8.73	170.65	656.20
1987	5.88	2.60	0.89	192.09	6.91	186.09	624.60
1988	5.85	3.45	0.90	122.71	6.38	196.74	674.30
1989	9.66	4.38	1.55	214.72	8.74	203.04	701.10
1990	8.10	4.13	1.81	118.05	11.42	225.57	684.10
1991	7.51	5.23	2.60	169.73	9.84	241.05	720.34
1992	7.09	5.86	2.49	180.00	9.71	254.00	754.19
1993	8.56	4.80	3.39	169.40	11.40	228.03	703.93
1994	7.83	5.33	4.75	212.09	10.74	229.66	760.83
1995	8.06	5.76	3.93	180.10	11.89	275.54	752.90
1996	7.58	6.00	5.10	223.00	12.86	281.10	756.02
1997	8.64	6.66	5.38	205.00	14.23	277.56	780.14
1998	7.37	4.70	6.46	228.30	10.85	279.54	835.64
1999	8.98	5.66	7.14	265.00	12.29	288.72	855.16
2000	5.25	5.79	7.08	292.00	11.53	299.32	836.86
2001	6.41	4.19	5.28	301.20	9.52	295.96	848.43
2002	7.03	5.08	5.96	300.60	10.00	297.21	851.41
2003	4.12	3.88	4.66	275.30	8.62	287.38	845.97
2004	8.13	6.29	7.82	270.50	13.73	233.86	878.65
2005	6.77	7.59	6.88	275.50	16.43	237.09	906.84
2006	7.99	8.13	8.27	274.00	18.50	281.17	948.94
2007	4.86	7.44	8.85	288.00	22.63	355.52	973.07

2008	9.18	5.83	10.97	262.00	25.88	348.19	987.02
2009	7.17	7.20	9.91	262.30	22.28	285.03	972.77
2010	5.43	6.61	9.96	289.60	24.02	292.30	991.18
2011	8.27	8.18	12.74	302.00	33.00	342.38	966.73
2012	6.96	6.60	12.21	314.00	35.20	361.04	1095.46
2013	4.70	8.03	14.67	318.20	34.22	341.20	1135.07
2014	9.71	7.88	11.86	304.50	35.90	352.14	1208.78
2015	7.40	6.28	10.37	327.00	34.81	362.33	1197.18
2016	6.73	6.79	8.57	348.00	30.00	348.44	1233.14
2017	7.46	7.92	13.16	312.00	32.58	306.07	1250.49
2018	9.18	8.32	10.98	316.00	34.89	376.91	1325.05
2019	**8.04**	**8.19**	**13.02**	**326.15**	**34.92**	**415.42**	**420.92**
2020	**7.23**	**8.05**	**11.73**	**338.42**	**95.72**	**401.16**	**406.33**
2021	**10.12**	**8.02**	**13.33**	**347.93**	**35.92**	**417.22**	**422.91**
2022	**7.91**	**8.39**	**12.41**	**350.84**	**36.59**	**415.86**	**422.92**
2023	**9.69**	**8.34**	**13.68**	**365.72**	**36.9**	**424.5**	**431.74**
2024	**9.69**	**8.54**	**13.06**	**370.71**	**37.48**	**427.4**	**435.87**
2025	**9.1**	**8.59**	**14.07**	**376.29**	**37.85**	**433.59**	**442.5**
2026	**8.5**	**8.74**	**13.67**	**381.84**	**38.39**	**437.89**	**447.8**
2027	**9.29**	**8.82**	**14.49**	**387.39**	**38.8**	**443.29**	**453.8**
2028	**8.79**	**8.94**	**14.25**	**392.94**	**39.3**	**448.05**	**459.43**
2029	**8.58**	**9.04**	**14.94**	**398.49**	**39.74**	**453.17**	**465.26**
2030	**8.8**	**9.15**	**14.82**	**404.04**	**40.23**	**458.09**	**470.98**
2031	**9.25**	**9.26**	**15.4**	**409.59**	**40.67**	**463.13**	**476.76**
2032	**9.01**	**9.37**	**15.37**	**415.14**	**41.15**	**468.1**	**482.51**
2033	**9.39**	**9.48**	**15.87**	**420.69**	**41.6**	**473.11**	**488.28**
2034	**9.16**	**9.58**	**15.91**	**426.24**	**42.08**	**478.09**	**494.03**
2035	**9.45**	**9.69**	**16.35**	**431.79**	**42.53**	**483.09**	**499.8**
2036	**9.34**	**9.8**	**16.44**	**437.34**	**43**	**488.08**	**505.56**
2037	**9.54**	**9.91**	**16.84**	**442.89**	**43.46**	**493.07**	**511.32**
2038	**9.49**	**10.02**	**16.97**	**448.44**	**43.93**	**498.07**	**517.08**
2039	**9.65**	**10.12**	**17.33**	**453.98**	**44.39**	**503.06**	**522.84**
2040	**9.64**	**10.23**	**17.49**	**453.98**	**44.86**	**503.05**	**528.6**

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M Gopinath - Forecasting of Coffee Production in India Using ARIMA Model - International Journal of Science, Engineering and Management (IJSEM) Vol 4, Issue 10, October 2019 - ISSN (Online) 2456 -1304

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