

A Survey to Improve the Product Sales of Michigan Co. using Machine Learning Algorithm

Mehul Jiten Gosar¹ and Sandeep Ravikanti²

¹Methodist College of Engineering and Technology, Hyderabad, India
mehulgosar98@gmail.com

²Assistant Professor, CSE Dept, Methodist College of Engineering & Technology, Abids, Hyderabad, India
rsandeep@methodist.edu.in

Abstract—The major requirement by a Michigan Co. is prediction of product sales, so as to match the demand. The Company produces Tea and Soap. If the demand can be forecasted for its products, the supply for these products can be maintained in the respective month. The demand can be understood by understanding the sales of the Company during previous years. The system proposed uses Machine Learning using Python to build a Regression model that can use the p- value to Come out of Null Hypothesis. Thus, algorithm can understand and increase its accuracy over the period of time.. The Model implements linear regression system to predict the value of sales using the dataset Containing the information about the previous year's sales.

Index Terms— Null Hypothesis, P- value, Linear Regression Model.

I. INTRODUCTION

Michigan Co. was established in year 2015 and within a year, the sales of the Company are seen to be higher than any of the new Comers. And, in order to have a steady growth, the IT department decided to use Machine Learning Predictive Model than the Conventional Excel Sheet to predict the sales of its solely products 'Taka Tea', known for its mixed taste and use of Medicinal Herbs for one's immunity and 'Mojo Soap[3]', known for its effectiveness on any type of skin and fragrance. The Company decided to provide the data of the sales of past two and half years, in order to successfully build a Machine Learning Predictive Model.

II. PROBLEM DESCRIPTION AND ASSUMPTIONS

The major requirement by a Michigan Co. is prediction of product sales, so as to match the demand. The Company produces Tea and Soap. If the demand can be forecasted for its products[2], the supply for these products can be maintained in the respective month[1]. The demand can be understood by understanding the sales of the Company during previous years[5].

A. Existing System

The Conventional system is using the TREND[2] function in the Excel sheet and fails to use the Null Hypothesis.

B. Proposed System

- The system proposed uses Machine Learning using Python to build a Regression model that can use the p- value to Come out of Null Hypothesis[3].
- Thus, algorithm can understand and increase its accuracy over the period of time.
- The report Contains the details of the Michigan CO. and how shift to machine learning model helped the Company results with higher accuracy[4].
- The Model implements linear regression system to predict the value of sales using the dataset Containing the information about the previous year's sales.

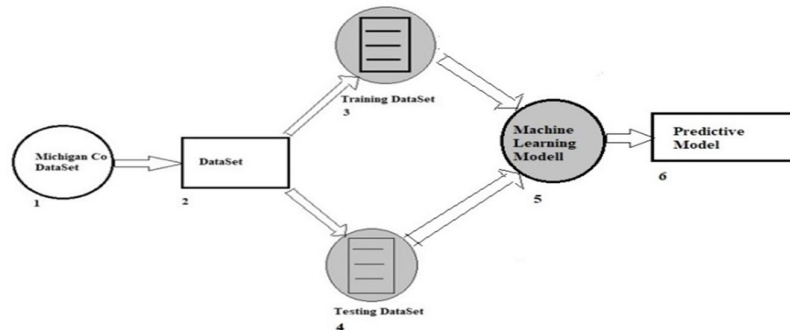


Figure 2.1 Working process

C. Work Flow

1. Michigan Co. provides access to Collect the required Dataset from the Database
2. Dataset is divided to Training and Testing Dataset
3. Machine Learning Model is developed and trained using Training Dataset[4]
4. Predictive Model is then made
5. Predictive Model is then tested with Testing Dataset
6. Expected Output is derived.

D. Function Used

- In Conventional model, 'TREND' Function is used in Excel[5].
- Syntax
 - `TREND(known_y's, [known_x's], [new_x's], [Const])`
- Where
 - **Known_y's**: The set of y-values one already knows
 - **Known_x's**: An optional set of x-values that one may already know
 - **New_x's**: New x-values for which you want TREND to return Corresponding y-values
 - **Const**: Optional. A logical value specifying whether to force the Constant b to equal 0
 - TRUE or omitted, b is calculated normally
 - FALSE, b is set equal to 0

E. linear Regression Algorithm

$$y = a_0 + a_1 * x$$

where, y : dependent variable

x : independent variable

a_0: slope

a_1: y-intercept

The motive of the linear regression algorithm is to find the best values for a_0 and a_1

Data Sets :

All these data sets are Collected from Michigan Co

Dataset of Sales for Tea

Product Name	Month	Sale(Lakhs)	Estimate Sales(Lakhs)
Taka Tea	Jan-16	23.3	#N/A
Taka Tea	Feb-16	22.4	#N/A
Taka Tea	Mar-16	21.2	#N/A
Taka Tea	Apr-16	20.1	#N/A
Taka Tea	May-16	19.8	#N/A
Taka Tea	Jun-16	20.4	#N/A
Taka Tea	Jul-16	21	#N/A
Taka Tea	Aug-16	21.5	#N/A
Taka Tea	Sep-16	21.7	#N/A
Taka Tea	Oct-16	22	#N/A
Taka Tea	Nov-16	22.2	#N/A
Taka Tea	Dec-16	24.2	#N/A
Taka Tea	Jan-17	23.2	#N/A
Taka Tea	Feb-17	22.2	#N/A
Taka Tea	Mar-17	21.2	#N/A
Taka Tea	Apr-17	20.2	#N/A
Taka Tea	May-17	20	#N/A
Taka Tea	Jun-17	21.2	#N/A
Taka Tea	Jul-17	25.3	#N/A
Taka Tea	Aug-17	22	#N/A
Taka Tea	Sep-17	21	#N/A
Taka Tea	Oct-17	22.5	#N/A
Taka Tea	Nov-17	23.1	#N/A
Taka Tea	Dec-17	24.8	#N/A
Taka Tea	Jan-18	25	#N/A
Taka Tea	Feb-18	23.21	#N/A
Taka Tea	Mar-18	23	#N/A
Taka Tea	Apr-18	22.5	#N/A
Taka Tea	May-18	22.3	#N/A
Taka Tea	Jun-18	22.4	#N/A
Taka Tea	Jul-18	23	#N/A
Taka Tea	Aug-18	23.2	#N/A

Figure 2.2 soap sales data set-I

Product Name	Month	Sale(Lakhs)	Estimate Sales(Lakhs)
Mojo Soap	Jan-16	11.3	#N/A
Mojo Soap	Feb-16	11.2	#N/A
Mojo Soap	Mar-16	12.55	#N/A
Mojo Soap	Apr-16	14.1	#N/A
Mojo Soap	May-16	15	#N/A
Mojo Soap	Jun-16	14.4	#N/A
Mojo Soap	Jul-16	13.7	#N/A
Mojo Soap	Aug-16	13.5	#N/A
Mojo Soap	Sep-16	13	#N/A
Mojo Soap	Oct-16	12.2	#N/A
Mojo Soap	Nov-16	12.9	#N/A
Mojo Soap	Dec-16	10.2	#N/A
Mojo Soap	Jan-17	10.4	#N/A
Mojo Soap	Feb-17	11.26	#N/A
Mojo Soap	Mar-17	12.5	#N/A
Mojo Soap	Apr-17	16	#N/A
Mojo Soap	May-17	15.5	#N/A
Mojo Soap	Jun-17	14.3	#N/A
Mojo Soap	Jul-17	13.92	#N/A
Mojo Soap	Aug-17	13.55	#N/A
Mojo Soap	Sep-17	13.7	#N/A
Mojo Soap	Oct-17	12.7	#N/A
Mojo Soap	Nov-17	11.5	#N/A
Mojo Soap	Dec-17	10.2	#N/A
Mojo Soap	Jan-18	11.5	#N/A
Mojo Soap	Feb-18	11.7	#N/A
Mojo Soap	Mar-18	13.2	#N/A
Mojo Soap	Apr-18	14	#N/A
Mojo Soap	May-18	16	#N/A
Mojo Soap	Jun-18	15.75	#N/A
Mojo Soap	Jul-18	15.4	#N/A
Mojo Soap	Aug-18	14.8	#N/A

Figure 2.3 Soap sales data set-II

Prediction Values

Sales Prediction by Excel for Taka Tea

Product Name	Month	Sale(Lakhs)	Estimate Sales(Lakhs)
Taka Tea	Sep-18	#N/A	23.32039979
Taka Tea	Oct-18	#N/A	23.38597286
Taka Tea	Nov-18	#N/A	23.4537317
Taka Tea	Dec-18	#N/A	23.51930477
Taka Tea	Jan-19	#N/A	23.5870636
Taka Tea	Feb-19	#N/A	23.65482244
Taka Tea	Mar-19	#N/A	23.71602397

Figure 2.4 Taka tea Sales

Sales Prediction by Excel for Mojo Soap

Product Name	Month	Sale(Lakhs)	Estimate Sales(Lakhs)
Mojo Soap	Sep-18	#N/A	13.97539136
Mojo Soap	Oct-18	#N/A	14.02256611
Mojo Soap	Nov-18	#N/A	14.07131336
Mojo Soap	Dec-18	#N/A	14.11848812
Mojo Soap	Jan-19	#N/A	14.16723536
Mojo Soap	Feb-19	#N/A	14.21598261
Mojo Soap	Mar-19	#N/A	14.26001238

Figure 2.5 Mojo soap sales

GRAPHS

Sales Prediction by Excel Sheet for Taka Tea:

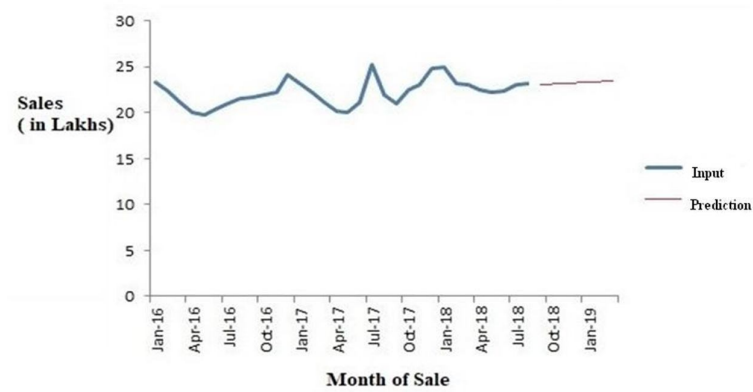


Figure 2.6 Taka tea Sale

Sales Prediction by ML Model for Taka Tea:

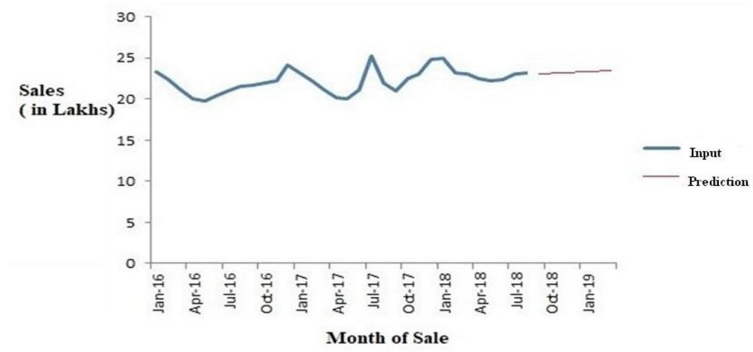


Figure 2.7 Taka Tea Sales With M

Sales Prediction by Excel Sheet for Mojo Soap:

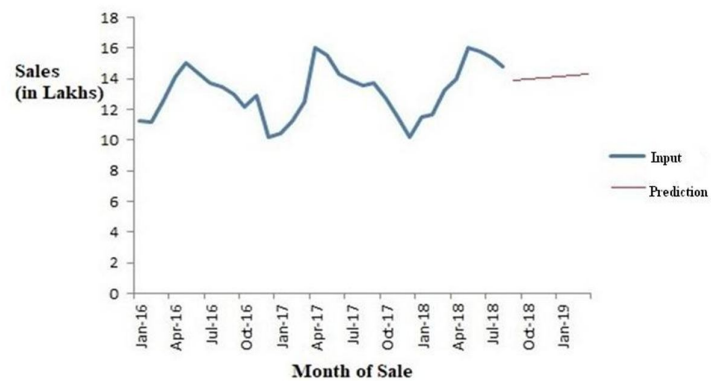


Figure 2.8 Mojo soap sales



Figure 2.9 Mojo soap sales With ML

Sales Prediction by ML Model for MojoSoap:

OBSERVATIONS

- i. Output by Predictive Model shows an increase of sales by amount Rupees52,000/- for Taka Tea
- ii. Output by Predictive Modal shows an increase of sales by amount Rupees75,000/- for Mojo Soap
- iii. Accuracy of 98.88% was observed by using R2 SCore in Scikit: 0.98880231503

III. CONCLUSION

Analyzing predicted volume for Tea and Soap, the Company Michigan Co. can get well equipped for things like The procurement of Raw materials, Understanding the products logistic, Production Quantity, Delivery of the product. Thus the goal of maintaining supply for the demand can be met. Machine Learning predictive model can be beneficial for further expansion of Company, not limiting to their current product Tea and Soap

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- [3] <http://www.numpy.org/>
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- [6] <https://www.techemergence.com/how-to-apply-machine-learning-to-business-problems/>