PREDICTION ON INSPECTION IN SUPPLY CHAIN USING UNSUPERVISED LEARNING

MRS. DEEPIKA.S[1], KRITHIKA.N[2]
MRS. S. DEEPIKA
ASSISTANT PROFESSOR, DEPARTMENT OF B.COM BUSINESS ANALYTICS
PSGR KRISHNAMMAL COLLEGE FOR WOMEN
deepika@psgrkcw.ac.in

N. KRITHIKA
UG SCHOLAR, B.COM (BUSINESS ANALYTICS),
PSGR KRISHNAMMAL COLLEGE FOR WOMEN
krithikanagu2103@gmail.com

ABSTRACT:
The paper mainly aims at the inspection during supply chain process. The inspection has been analysed for every product there might be a failure in the products that is the product may be failed and the number of failures during the inspection have been analysed and predicted in this project. This analyse the inspection period failures in the supply chain using the dataset and predictes the coming year and gives a prediction. This is analysed using the linear regression and clustered using K-Means.

KEY WORDS: unsupervised learning, failure, prediction, linear regression, K-Means.

I. INTRODUCTION

The analysis is made with the python the dataset has been imported to jupyter notebook and the python is a object oriented and a high level programming language. The analysis is made through the Linear Regression and K-Means algorithm. The linear regression gives the output that have been analysed it shows the relationship between two attributes and K-Means shows the similarities between the attributes. The attributes taken for analysing are from the supply chain dataset. This analyse the failure during the process in supply chain. Every manufacturers try to This helps the manufacturers to know the level of failure during inspection.

Companies in any supply chain must make decisions individually and collectively regarding their actions in five areas:

1.Production—What products does the market want? How much of which products should be produced and by when? This activity includes the creation of master production schedules that take into account plant capacities, workload balancing, quality control, and equipment maintenance.

2.Inventory—What inventory should be stocked at each stage in a supply chain? How much inventory should be held as raw materials, semifinished, or finished goods? The primary purpose of inventory is to act as a buffer against uncertainty in the supply chain. However, holding inventory can be expensive, so what are the optimal inventory levels and reorder points?

3.Location—Where should facilities for production and inventory storage be located? Where are the most cost-efficient locations for production and for storage of inventory? Should existing facilities be used or new ones built? Once these decisions are made, they determine the possible paths available for product to flow through for delivery to the final consumer.

4.Transportation—How should inventory be moved from one supply chain location to another? Air freight and truck delivery are generally fast and reliable but they are expensive. Shipping by sea or rail is much less expensive but usually involves longer transit times and more uncertainty. This uncertainty must be compensated for by stocking higher levels of inventory. When is it better to use which mode of transportation?

5.Information—How much data should be collected and how much information should be shared? Timely and accurate information holds the promise of better coordination and better decision making. With good information, people can make effective decisions about what to produce and how much, about where to locate inventory and how best to transport it. The sum of these decisions will define the capabilities and effectiveness of a company's supply chain.[8]

II. REVIEW OF LITERATURE

The traditional supply chains faces several challenges such as uncertainty, cost, complexity and vulnerable problems. To overcome these problems the supply chains must be more smarter. For establishing a large-scale of smart infrastructure to merge data, information, products, physical objects and all processes of supply chain, we applies the internet of things (IOT) in supply chain management (SCM) through building a smart and secure system of SCM. We have prepared a website for suppliers and managers. Analytically, a typical supply chain is simply a network of materials, information and services processing links with the characteristics of supply, transformation and demand.[1]

More than 25% of purchase orders are not shipped as planned or are not delivered as planned. Supply chain execution technology can give visibility from the purchase order through to delivery order. It can provide the way to allocate product in transit. Successful supply chains have top management approval and support.[6]

Supply chain management (SCM) links a firm with its customers, suppliers and other members of the supply chain system, including transportation and warehousing companies. Handfield and Nichols (2002, p. 8) state that supply chain involves all activitites associated with the flow and transformation of goods from the raw materials stage (extraction), through to the end user, as well as the associated information flows. However, Mentzer, et al. (2001) define a supply chain as three or more of the flows of products, services, finances, and/or information from a source to a customer.[2]

The goal of supply chain management is for members in the organisations to work together and build a partnership with each other to increase the competitive advantage of the supply chain as a whole.[7]

Thus, the purpose of this paper is to examine the existing research in an effort to understand the concept of "supply chain management." Various definitions of SCM and "supply chain" are reviewed, categorized, and synthesized. Definitions of supporting constructs of SCM and a framework are then offered to establish a consistent means to conceptualize SCM.[4] Literature on supply chain management (SCM) covers several disciplines and is growing rapidly.[3]

Over the last decade, supply chain management (SCM) has been studied extensively, and its importance to practitioners and academics has received a high level of recognition.[5]

III. METHODOLOGY

ALGORITHM 1:

LINEAR REGRESSION

The linear regression is used to show the relationship between two attributes present in the dataset used. linear regression is a statistical model it helps in finding the relationship between attributes to find the dependent variable with independent variable. The attributes shows the failures and the quantity sold after inspection. The linear regression shows the KDE graph and the bar plot. The KDE graph is shown to know how the attributes have been plotted we can find increase or decrease. The bar plot shows a particular attributes flow and their range. The attributes like quantity sold and no of failures have been taken to analyse the relationship between the two. The analyse is based on no of failures it is applied to know the failures during inspection to help the manufacturers about the increase or decrease in inspection during producing a particular product.

ALGORITHM 2:

K-MEANS

The K-Means is used to find out the similarities between the attributes. The attributes have been taken from the dataset and have shown the nature of the attributes. The attributes is used as a plotting point to represent the similarities between them. The K-Means nature is to show the attempts to classify data without having first been trained with a labelled data.

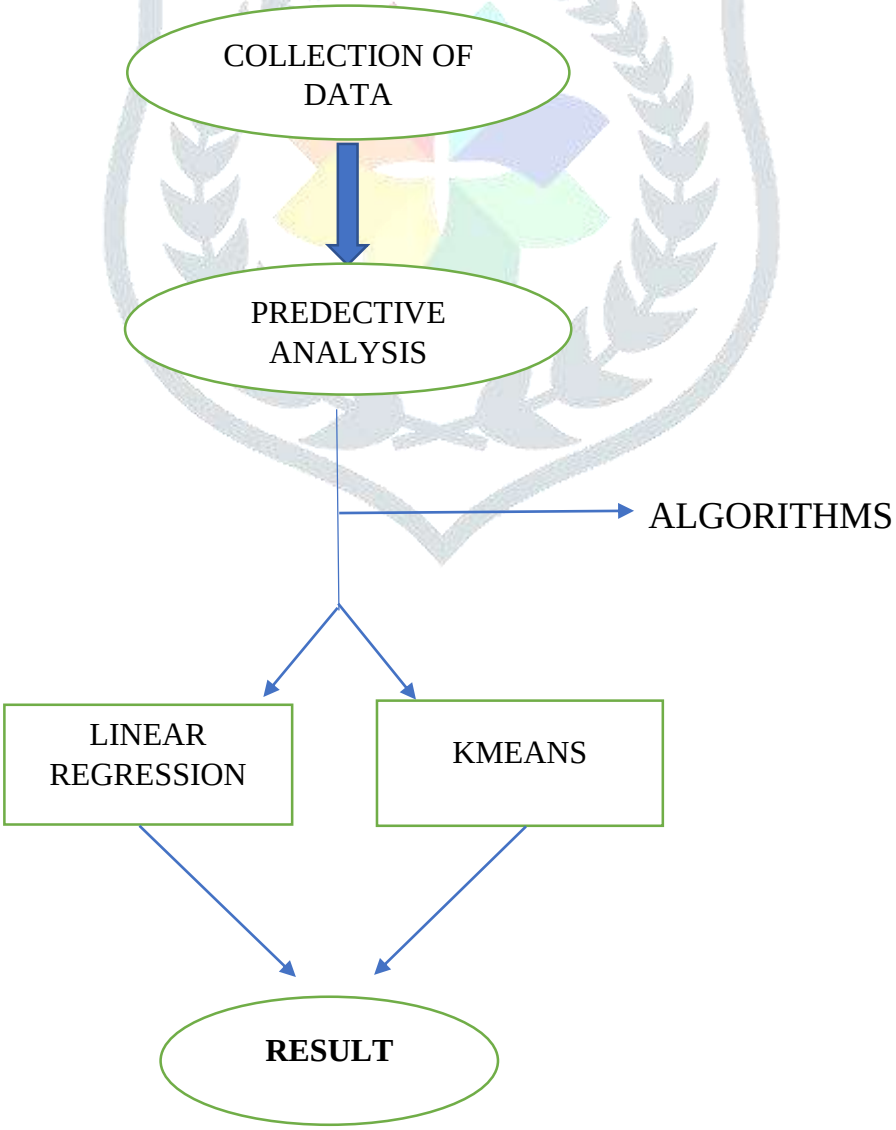
STEP 1: Extracting the data

STEP 2: Take any two attributes to plot

STEP 3: Elbow method to show the average score for clusters

STEP 4: Scatter plot to show the clustering and the plotting of centroids.

WORKFLOW:



IV. RESULT

ALGORITHM 1:

LINEAR REGRESSION

- **KDE GRAPH**

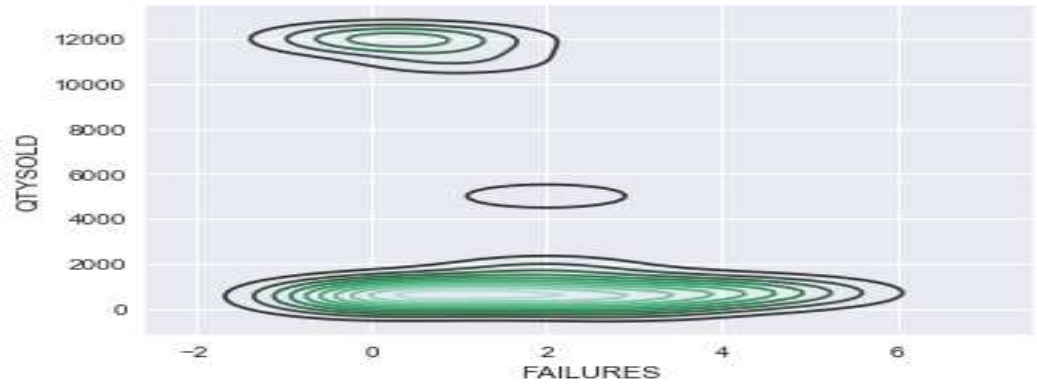


FIGURE: 4.1

The bar graph has represented the attributes that have been allotted like failure as the attribute and it has shown the nature of the attribute in a bar graph representation. It shows the attributes and its level of failure has been gradually increasing for the product as a result. The diagram has been shown in figure 4.1

- **BAR GRAPH**

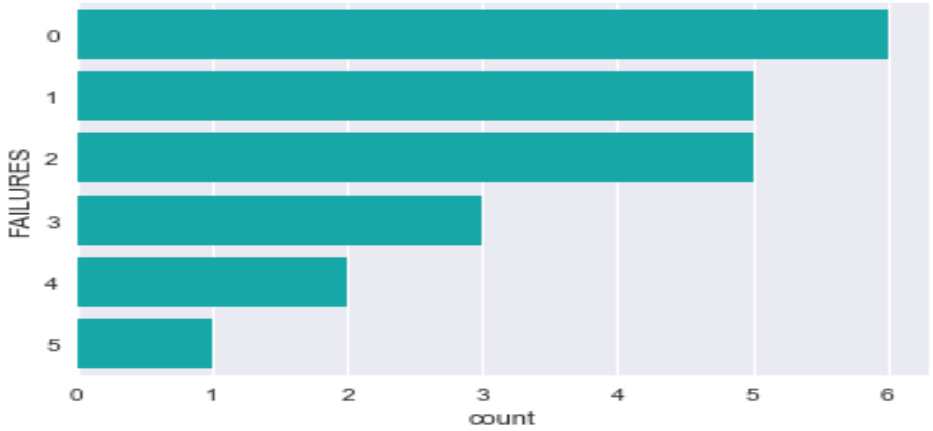


FIGURE: 4.2

The EDE graph in linear regression shows the relationship between two attributes it compare the failures occurred and the quantity sold it has given a clear view of two attributes by plotting the increase in failures it has shown the point of failure may happen in upcoming years as prediction. The result shown in figure 4.2

ALGORITHM 2:

KMEANS

- **ELBOW METHOD GRAPH**

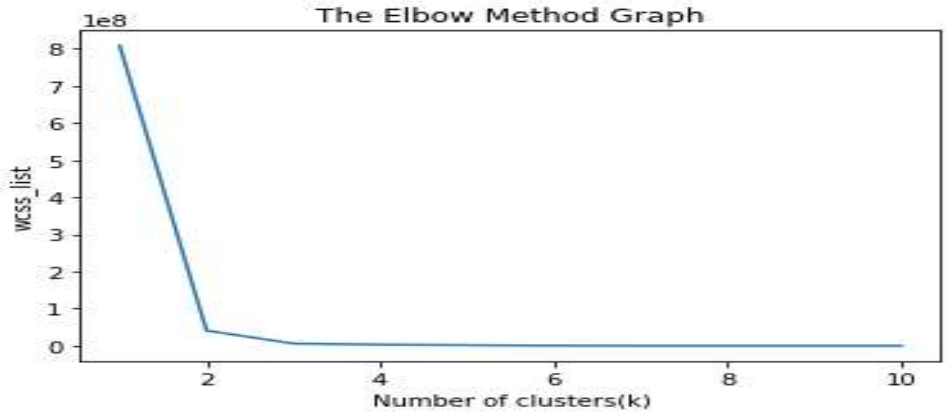


FIGURE 4.3

The elbow graph represents the number of clusters that have been occurred in the given attributes. It computes average score for all the clusters. The graph have been gradually increased. The rate of increase in above figure 4.3

- **SCATTER PLOT**

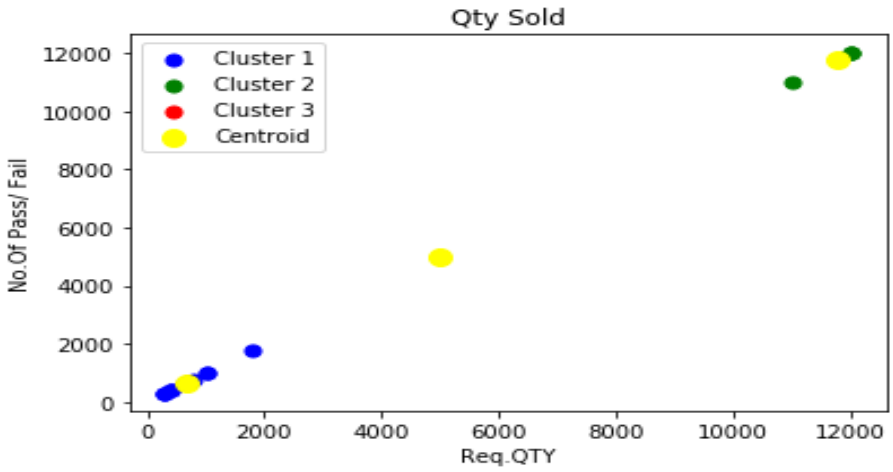


FIGURE 4.4

The clustering is made by the main two attributes present in the dataset. It has been clustered and it has been presented in a different colour to differentiate between different clusters. This represents the required quantity and number of pass and failures. This shows the similar grouping in the figure 4.4.

FINDINGS:

- The prediction is made using the bar plot in linear regression and the range values that might occur have been predicted.
- The values of failure has not many fluctuations it keeps on reducing the range might be **0 to 1**. So the prediction of inspection is the failure results on decreasing.

V. CONCLUSION

This paper shows the chances of failures might occur during inspection in supply chain process the results have been analysed using algorithms and predicted the upcoming periods value or range. It shows the decrease in the failure of product. The paper clearly shows the range values of failure that might occur during inspection.

FURTHER WORK:

It is suggested to use better upcoming method like artificial intelligence method without human being help the computed system can chip the failures. Machines can identify the faults happen in a process without human needs.

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