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Market Analysis of FEA Software using K Nearest Neighbors

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A B S T R A C T

FEA Software sales is having a good scope in Engineering Industries. There are many FEA software available in market for different need of the customers. Software Resellers need to understand the requirement of software in Industries. This study is to identify the sales requirement in FEA software by developing Special Machine Learning Model using K Nearest Neighbors Model. This machine learning model explains the data required for the market analysis, and segmentation type in terms of 2D detailing, 3D Modelling and Finite Element Analysis software based on the complication in design and engineering process.

Keywords: Market Analysis, FEA Market, K Nearest Neighbors, Machine Learning

1. Introduction

Marketing Analysis for FEA software involves number of detailed studies to understand the requirement in industries, identifying the requirement and matching the requirement with the software capability is very important. There is continuous development in Engineering Industries with update in testing procedures and standards. To meet the demand in Industries for different type of customers, appropriate FEA software is required.

It is required to identify the Industries that require different types of FEA software to improve sales in FEA software. Using different types of Machine Learning programs can help to identify the industries that require FEA software. In this Journal, detailed study is made on K Nearest Neighbors model for FEA software requirement.

Raw dataset collected from different types of industries and usage of different types of software can be used. Hence development of different categories can help to segment the industries based on different criteria using datasets available and KNN Leaning Model can be used with the dataset available to identify the FEA software requirement.

2. Literature Review

Manish Suyal & Parul Goyal conducted a study on analysing the K-Nearest Neighbors Supervised Learning Model. It explains how a small scale data is used for a large scale data analysis. Students dataset of marks with pass or fail criteria is used to check for a new dataset whether a student is pass or fail is taken as an example to explain the Supervised Learning Model using KNN.

Boni Octaviana carried out a research in combining K-Means Cluster and K-Nearest neighbor on prediction of customer spending rate in Ecommerce. When the data sets are not directly available to use K-Nearest neighbors. K-Means Cluster can be used into group datasets in to multiple clusters and labelling each cluster to use K-Nearest neighbors, the labelling was according the centroid characteristics of dataset.

Priyam Saha, Nitesh Gudheniya, Rony Mitra, Dyutimoy Das, Sushmita Narayana & Manoj K. Tiwari made a study on demand forecast in a MNC retail company with frameworks of Deep Learning. This study uses forecasting strategies using LSTM and LGBM models. First raw sales dataset is used, and then LSTM & LGBM algorithms for perdition and training. LGBM performs better than LSTM.

D.A. Adeniyi, Z. Wei & Y. Yongquan developed a methodology to use KNN model to ease the searching process in online purchase. The research study is based on using automatic web usage data mining and recommendation based on current user behavior by using Really Simple Syndication(RSS) in user click without asking the customer. KNN model is used to provide such recommendations.

Dr. T. Praveen Blessington1, Gaurav Pawar, Shrinivas Pawar, Onkar Davkare & Rutuja Javalekar performed a study to use KNN Machine Learning model for detection of fake reviews in Amazon. It explains the disturbances for both customers and sellers because of fake reviews, it uses KNN machine learning model to identify the trustworthy of the reviews. It says SVM classification provided better accuracy of results.

3. Methodology

3.1 Machine Learning Model to Predict Sales

Data collected from the previous sales data for different types of software, machine learning model can be developed to understand the requirement for FEA software in industries.
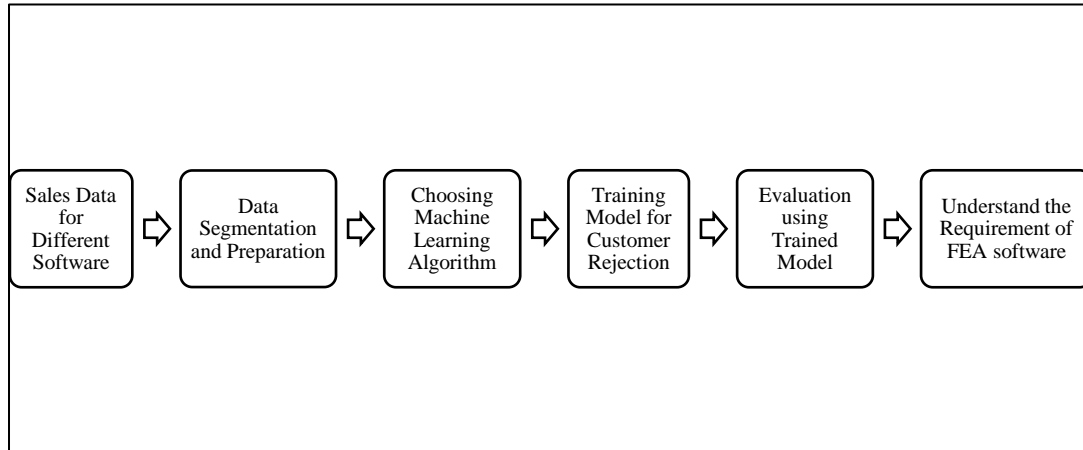

Fig. 2. Machine Learning Flow Chart

3.2 K Nearest Neighbors Machine Learning Model

   K Nearest Machine Learning Model is a Supervised machine learning model that have different types of applications. It uses a dataset collected from past history. The dataset can be trained with different parameters and can be segmented into different categories. From the dataset available, a new dataset can be tested using KNN Supervised Machine Learning Model.

4. Modelling and Analysis

4.1 Software in Product Design

There are different types of CAD/CAM/CAE software used in the Industries. 2D Detailing which are used for only creating 2D Detailing drawing, 3D Modelling, Assembly & Detailing used of developing 3D Models and Assembly, Finite Element Analysis is used for validate any product and comply standards. When the complication in design is less, or when there is not much development in the R&D, then the usage of software can be only 2D detailing. Next level of development in Industries is using 3D modelling and Detailing Software, and then the next level of development in R&D consists of FEA software with 3D Modelling & 2D Detailing when there is requirement for product validation.

Sl. No.	2D Detailing Software	3D Modelling, Assembly and Detailing	Finite Element Analysis
1	AutoCAD	Creo	Ansys
2	Gstar	Solid Works	Abaqus
3	ZWCAD	Catia	Nastran
4	IronCAD	Inventor	Cosmos
5	ActCAD	NX CAD	Hyper Works

Table 1. List of different types of Software

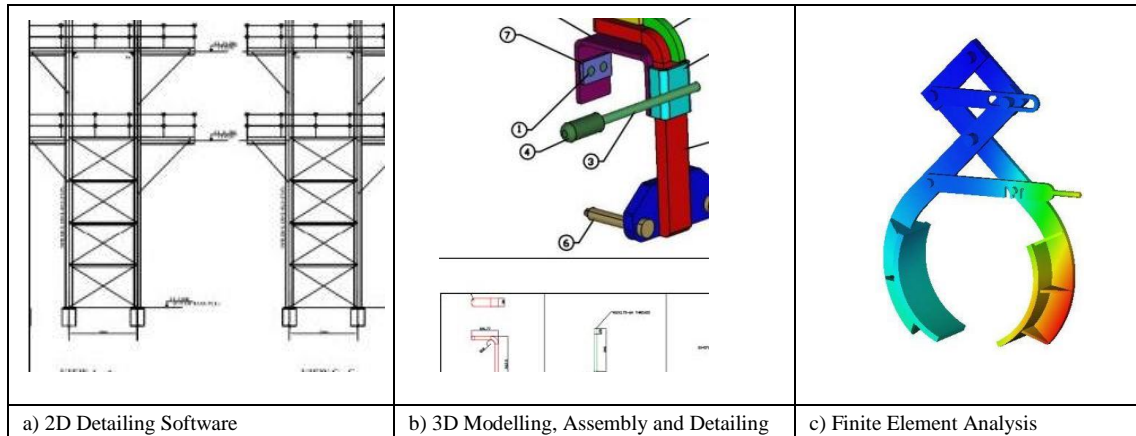| a) 2D Detailing Software | b) 3D Modelling, Assembly and Detailing | c) Finite Element Analysis |

Fig. 1. Usage of different types of Software

4.2 Finite Element Analysis

Finite Element Analysis is a software program used for validating a product stability under different types of loads. There are different types of modules available for different applications in Industries. Application of Finite Element Analysis is in developing stage in many industries. It depends on the complication of the product design and standard validation procedures required. Finite Element Analysis plays an inevitable role in Product Design Life Cycle in many Industries.

5. Results and Discussion

5.1 KNN Application in FEA Requirement Prediction

Different types of Industries are using different types of software for their R&D department depending on parameters such as complication of products in product design, product validation, testing standards, validation of product stability in static and dynamic loads, quality criteria, design standard norms, etc. Manufacturing Industries tries to develop R&D team step by step with high end software for its development activities tries to implement FEA software when it is required.

By grouping the Industries using such parameters and plotting along X&Y directions in graph and using K Nearest Neighbors Learning Model can help to identify the FEA Software requirement. Say for example, Industries can be classified into 3 categories that uses, 1. Only 2D software, 2. 2D & 3D software and 3. FEA with 2D&3D software.
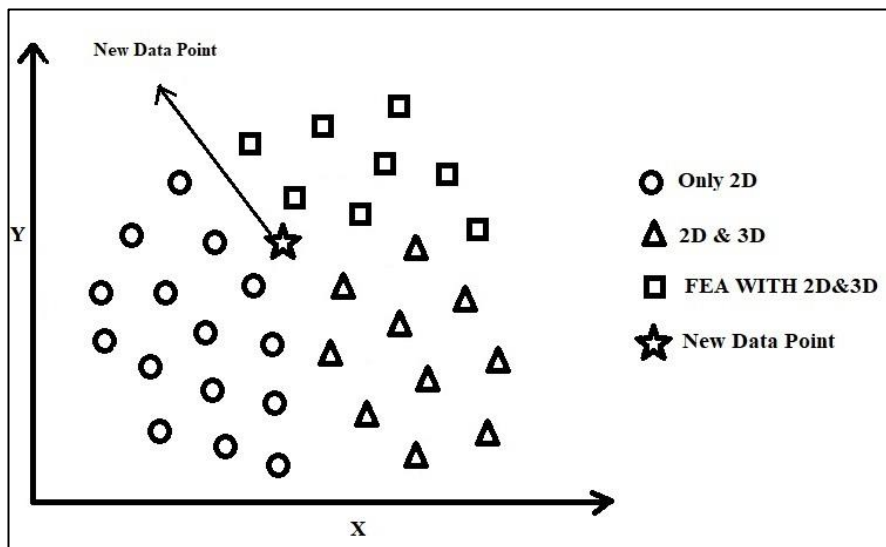
Fig. 3. KNN Machine Learning Model

In the above sample graph shown in Fig.2 Three categories are shown with different symbols. Using this data, we can identify the industries need FEA software.

6. Conclusion

It is found that, K-Nearest Neighbors Supervised Machine Learning Model can be used for predicting requirement for FEA software in Industries with more precision. Categorizing the Industries based on the usage of different types of software in product design helps to identify the FEA software requirement.

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