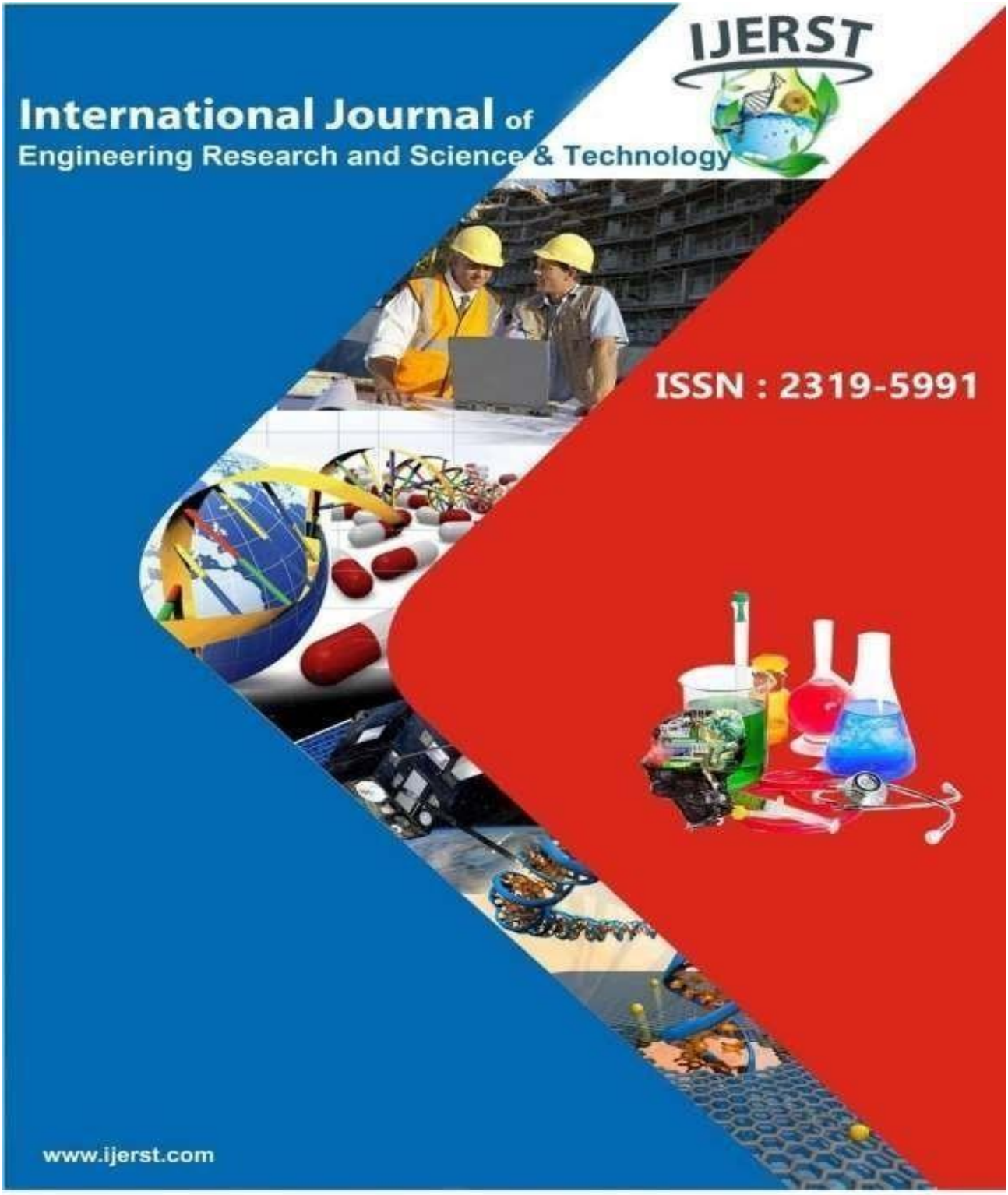


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B2B SALES SUCCESS PREDICTION WITH MACHINE LEARNING

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ABSTRACT

The objectives of this project are two-fold: One is to use statistical modeling techniques to help a Fortune 500 paper and packaging company classify what drives sales success and second one is to develop a model that can predict sales success with a reasonable degree of accuracy. The goal is to help the company increase revenue and profits by improving sales close rates, shortening sales cycles, and reducing the cost of sales. The research team used various models to predict the likelihood of winning sales opportunities, selecting the most powerful one to serve as the basis for a client tool. They analyzed data from Salesforce.com, identifying key factors influencing sales success. The team experimented with several techniques including binomial logit and various decision tree methods, including boosting with gradient boost and random forest. The best model achieved 80% accuracy in predicting win probability, with precision and recall of 86% and 77%, respectively, surpassing current sales forecast accuracy.

1. INTRODUCTION

This initiative has two main goals: There are two main goals here: first, to assist a Fortune 500 paper and packaging firm codify what drives sales success using statistical modeling approaches; and second, to construct a model that can reasonably forecast sales success. By improving sales closure rates, cutting cost of sales, and shortening sales cycles, the long-term goal is to help the organization increase top-line revenue and bottom-line profitability. After developing many models to forecast the

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Vol. 20, Issue 2, 2024

likelihood of success for certain sales prospects, the research team settled on the most powerful and insightful model to serve as the foundation for a client tool. The group was able to do this by making use of both structured and unstructured data stored in the company's CRM, Salesforce.com. Among the many strategies tested by the group were binomial logistic regression and decision tree techniques like gradient boost and random forest. Sales success is most affected by a small number of client factors, opportunity attributes, and internal documentation techniques. A significant increase over the accuracy of existing sales forecasts was achieved by the top model, which predicted win propensity with an accuracy of 80%, recall of 77%, and precision of 86%. The data for this study was given by a paper and packaging firm with extensive sales experience. The intuition of salespeople, many of whom have been there for 20 years or more, is where this knowledge is mostly stored. But since it's not simple to capture and distribute intuition across a whole sales force, one of the most important resources of the firm is unavailable to the rest of the organization. Consequently, the organization assigned this group the responsibility of mining their CRM data for the most salient variables contributing to sales performance and predicting the likelihood of a transaction closing. The majority of the previous research and development in this field has been carried out by private firms. These companies have either created their own proprietary technology for internal use or provide business-to-business services pertaining to predictive sales modeling. So, most field studies are off-limits to the general population. Implicit, a data automation and predictive modeling firm that Salesforce.com has bought, and Insight Squared, a software vendor with a sales forecasting capacity, are two such instances. Existing academic work either relies on bespoke algorithms that aren't part of the industry standard toolset for data scientists or is concerned with predicting total sales rather than opportunity level propensity scoring. The first paper that is pertinent to the topic is from 2015, when a group of researchers from institutions in China and the United States used a two-dimensional Hawkes Process model to determine the likelihood of a sale. Additional pertinent studies have focused on describing the results of black-box machine learning models and using very precise machine learning algorithms to sales pipeline data in order to incorporate the insights they provide into an

International Journal of Engineering Research and Science & Technology

ISSN 2319-5991 www.ijerst.com

Vol. 20, Issue 2, 2024

organization's operations. This study aims to provide a foundational knowledge of the topic, which is important since there is a lack of insight into the work that predicts sales outcomes. The bulk of the popular approaches used for tendency classification and scoring in this study are decision tree models, which are both used and compared.

2.LITERATURE SURVEY

Title: Applying Machine Learning to Forecast Sales Pipeline Performance. Predicting the win-propensity of a sales pipeline is essential for good sales management. We provide a state-of-the-art machine learning methodology to predict the win probability of sales leads instead of relying on subjective human evaluation. In order to capture the impact of the seller's actions on their leads on the win result and the leads' individual profiles, a profile-specific two-dimensional Hawkes algorithms model is created. The two observations that inspired it are: i) In most cases, sellers will devote a disproportionate amount of time and energy to pursuing a small number of leads at a time.

I) the pending opportunity is likely to achieve its win conclusion quickly after such temporally concentrated contacts, which are borne out by their concentrated interactions with the pipeline, such as logging in, browsing, and updating the sales leads that are recorded by the system. One case study shows that our methodology is being used by a Fortune 500 multinational technology company that operates on a worldwide scale and specializes in business-to-business transactions. The model's generalizability and adaptability make it potentially useful for a wide range of different real-world situations.

B2B sales forecasting is an example of how machine learning insights may be integrated into organizational learning

When making decisions, businesses rely on a variety of sources, including internal and external data, defined rules, subjective judgment, and tacit organizational knowledge, in the case of business-to-business (b2b) sales forecasting. Gain or loss is the yardstick by which its effects are evaluated. By presenting a new method based on machine learning methods, this work aims to reduce the gap between projected and actual performance.
We provide preliminary findings of machine learning model performance, with an

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Vol. 20, Issue 2, 2024

emphasis on simplified visualizations that generate strong insights that are both human-comprehensible and practical, fostering an environment conducive to reflection and aiding in the organization's ongoing process of learning.

Title: A Comprehensive Overview of Machine Learning Models for Sales Forecasting

Many times, decision-makers are compelled to rely on subjective mental models that mirror their own experiences due to the intricacy of business dynamics. But when businesses use data-driven decision-making, they do better, according to the report. This motivates the development of smart, data-driven decision models that are all-encompassing and enable the interactive assessment of choice possibilities vital to the corporate world. The explanation of cutting-edge black-box prediction models has recently been bolstered by the proposal of a new general explanation technique. To back up what-if analysis, uniform explanations are created at the model/instance level. We showcase an innovative use of this concept inside an AI system in a real-life scenario involving B2B sales forecasting, a challenging endeavor often handled subjectively. The provided explanations may help users confirm their assumptions, and the what-if parallel graph representation can help them test their hypothesis. The findings show that the approach is effective and may be used. The ability to assess the seller's activities and provide broad suggestions for sales strategy is a major benefit of the offered technique. The approach's adaptability and clear explanations make it ideal for a wide range of applications.

One issue with decision support is that the most effective black-box models cannot be accessed or analyzed by humans; our well-documented real-world instance demonstrates how to address this. This has the potential to broaden the use of AI beyond the domains where they have been underutilized so far because of their fixation on understandable models. By making it easier to evaluate and transition between different models, explanations that aren't exclusive to any one prediction model boost the corporate world's adoption of new and complicated models.

3. EXISTING SYSTEM

The packaging firm that supplied the information for this study has extensive

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Vol. 20, Issue 2, 2024

experience in sales. Salespeople rely heavily on their gut feelings to convey this level of knowledge. One of the most precious resources of the firm is unavailable to the rest of the organization since intuition is hard to capture and distribute across a whole sales force. Therefore, this group was given the responsibility by the corporation to identify the most crucial aspects.

The current system has a number of drawbacks:

Private enterprises have done the majority of the work in this area before.

The general public is usually not allowed access to the field study.

Academic studies that have been conducted either focus on predicting overall sales rather than evaluating the likelihood of specific opportunities or use proprietary algorithms that do not align with the tools often used by data scientists in the business world.

3.1 PROPOSED SYSTEM:

Prior to modeling, the team filtered out all entries when the system was initially introduced for the firm in order to clean the data and remove unnecessary information. In order to guarantee a suitable sample size, variables having a high proportion of null values were subsequently eliminated. Conversations between the team and key corporate stakeholders helped establish the potential relevance of the remaining factors, which were then further vetted.

Data investigation also uncovered a number of openings for feature engineering and custom variables, which may capture influences that were missed by the default fields.

The system's proposed advantages are:

A record's total number of filled-out fields.

The total amount of tasks linked to an opportunity for the client account.

4. OUTPUT SCREENS

Index page: This page is the home page

International Journal of Engineering Research and Science & Technology

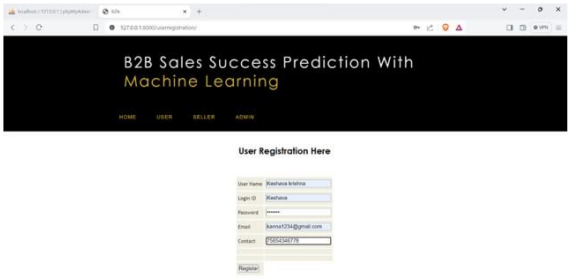
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Vol. 20, Issue 2, 2024

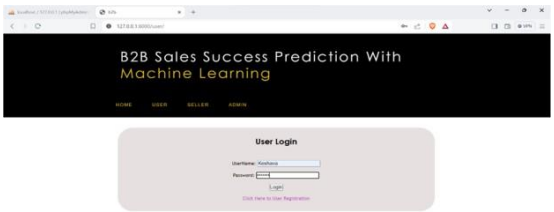


User slides:

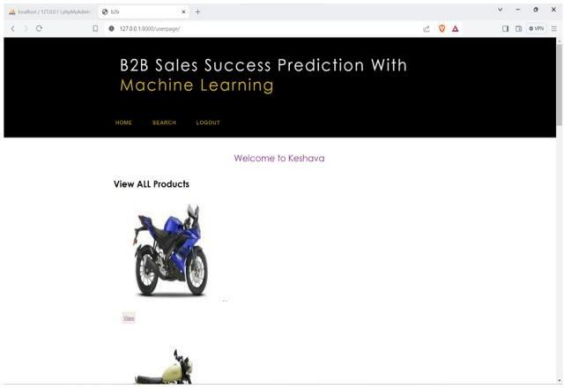
User registration: The user can register here before logging in



User login: Authorised users only can login here.

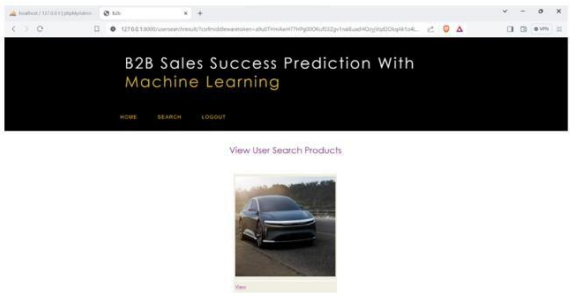


View products: Users can view the available products here.



Search Products: Users can search the desired products here.



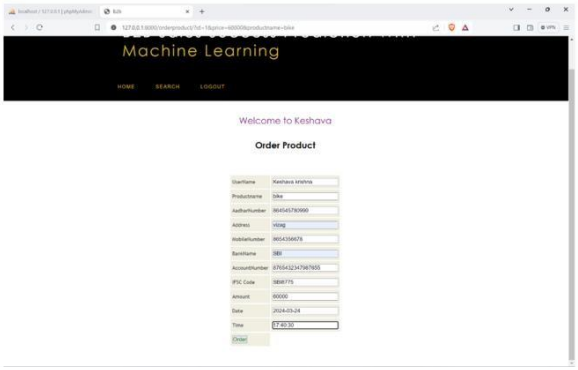


Buy Products: User can buy products by specifying their details.

International Journal of Engineering Research and Science & Technology

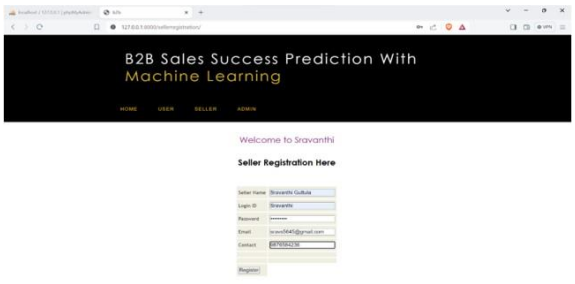
ISSN 2319-5991 www.ijerst.com

Vol. 20, Issue 2, 2024

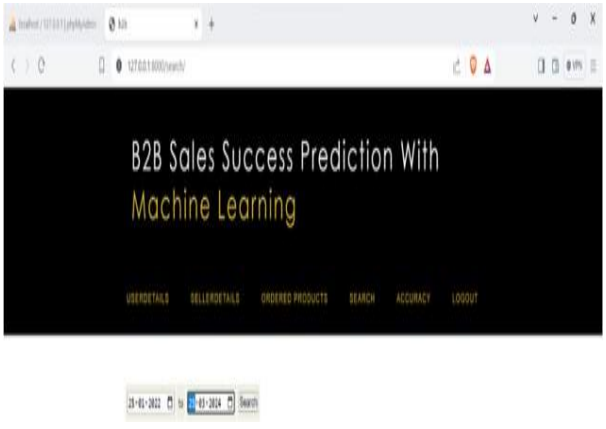


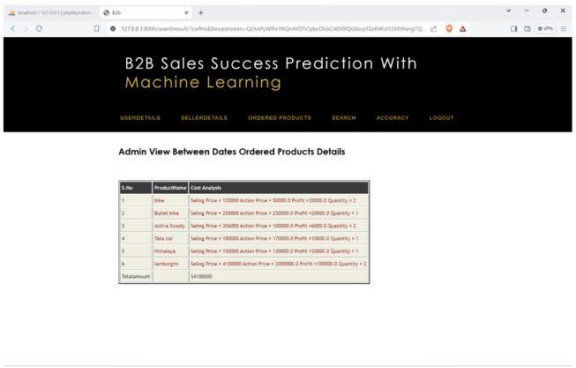
Seller slides:

Seller Registration: Seller can register here.

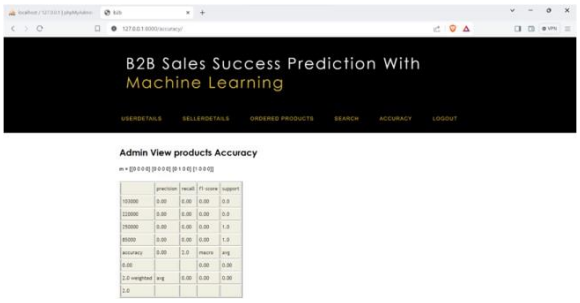


Search Ordered Products: Admin can view ordered products within dates.





Accuracy: The products sales accuracy can view here.



5. CONCLUSION

An enterprise in the Fortune 500 paper and packaging industry used this study as a springboard for a larger effort to put predictive modelling on sales performance into motion. Therefore, as with any major corporation, the issues generally include creating deep local understanding of the data and corralling a vast team to help with reliable data collecting. Despite some data discrepancies at the outset, the overall accuracy seemed good, suggesting that

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Vol. 20, Issue 2, 2024

improvements may be achieved with higher-quality and more plentiful data, further feature-related analysis and tuning, or other approaches like neural nets.
Other crucial findings on sales performance were also revealed by the research. When we gain new insights, we frequently find ourselves asking new questions: So, how can we enhance the model's prediction power by collecting the right data? How can we alter our culture to better collect data? This domino effect is inevitable since the larger project is so well-suited to an iterative approach. It might feel like there's an endless supply of possible strategies to use moving forward in this situation. Accordingly, there are a few that the group thinks would be best to think about in this situation.
The non-meta-variable model is now a viable option for the organization to try to forecast prospects for those divisions where the accuracy is sufficient. It would be wise to gather and simulate the evolution of opportunity fields over time, maybe via periodic snapshots, in order to improve the goal of forecasting open opportunities. Improving current "bottom-up" approaches and incorporating predictions from reliable models into aggregate sales estimates are both worthwhile endeavors. Nevertheless, data operations resources would need to complete a number of crucial activities before these applications could be addressed: Persist in developing and refining the model to enhance its correctness, set up a routine for updating the models and adding new types of data, and collaborate with other departments to comprehend top operationalization goals.

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