Data Mining methods for effective CRM at Acmeflex Sleep Solutions

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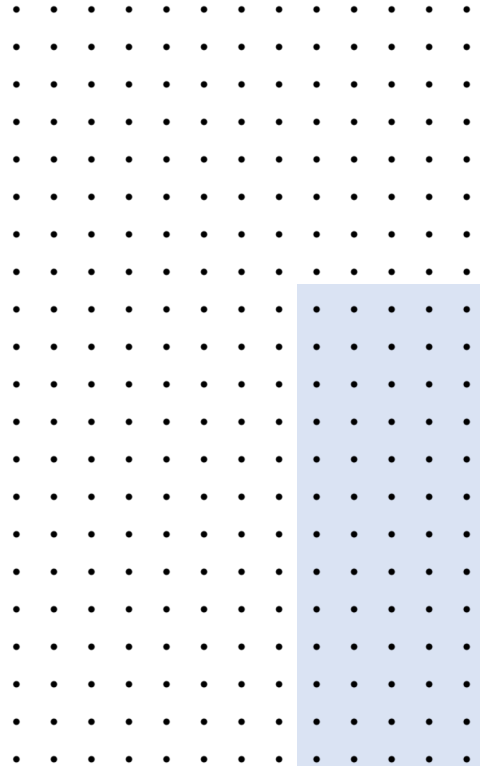
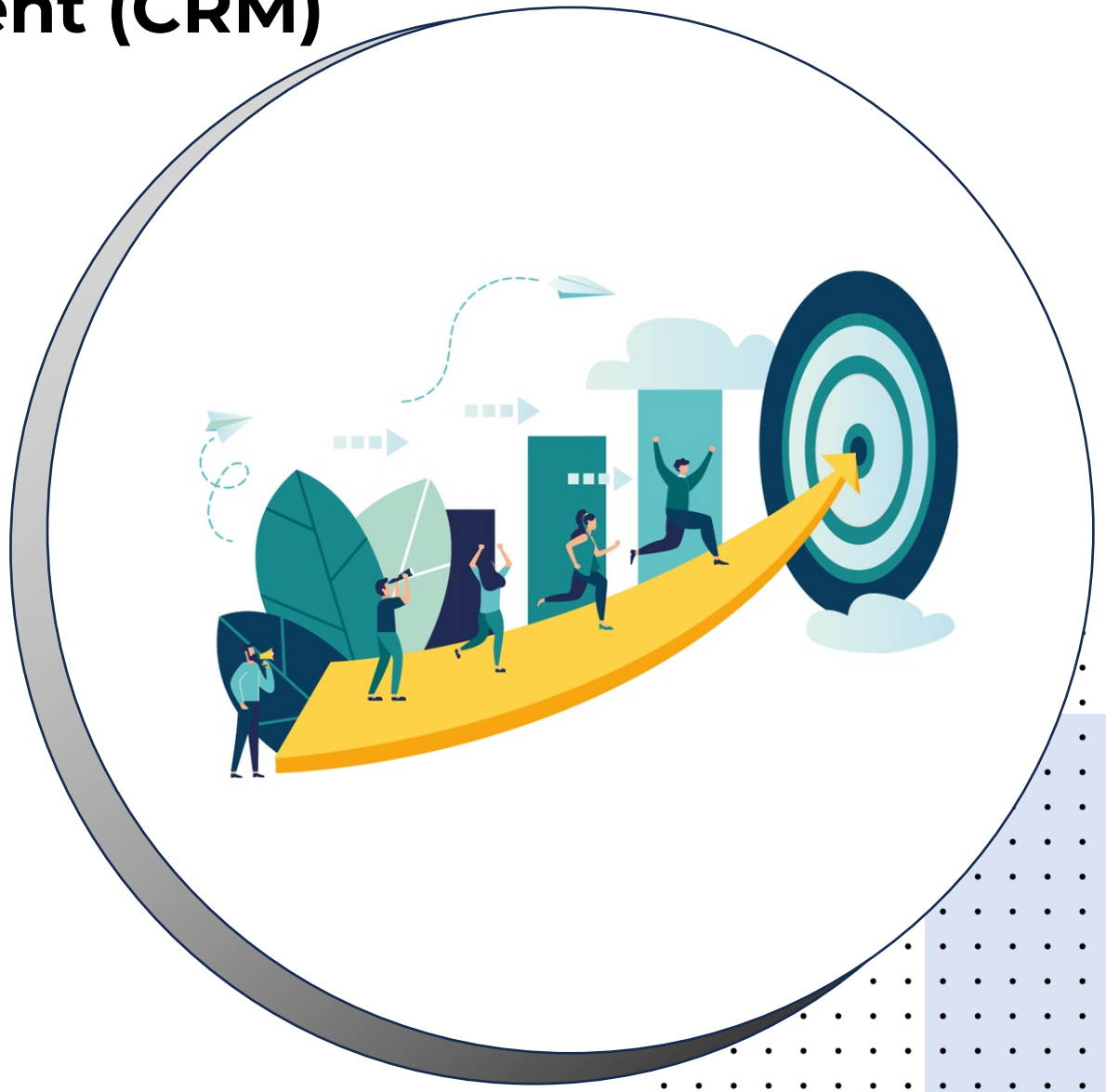
Content



Customer Relationship Management (CRM)

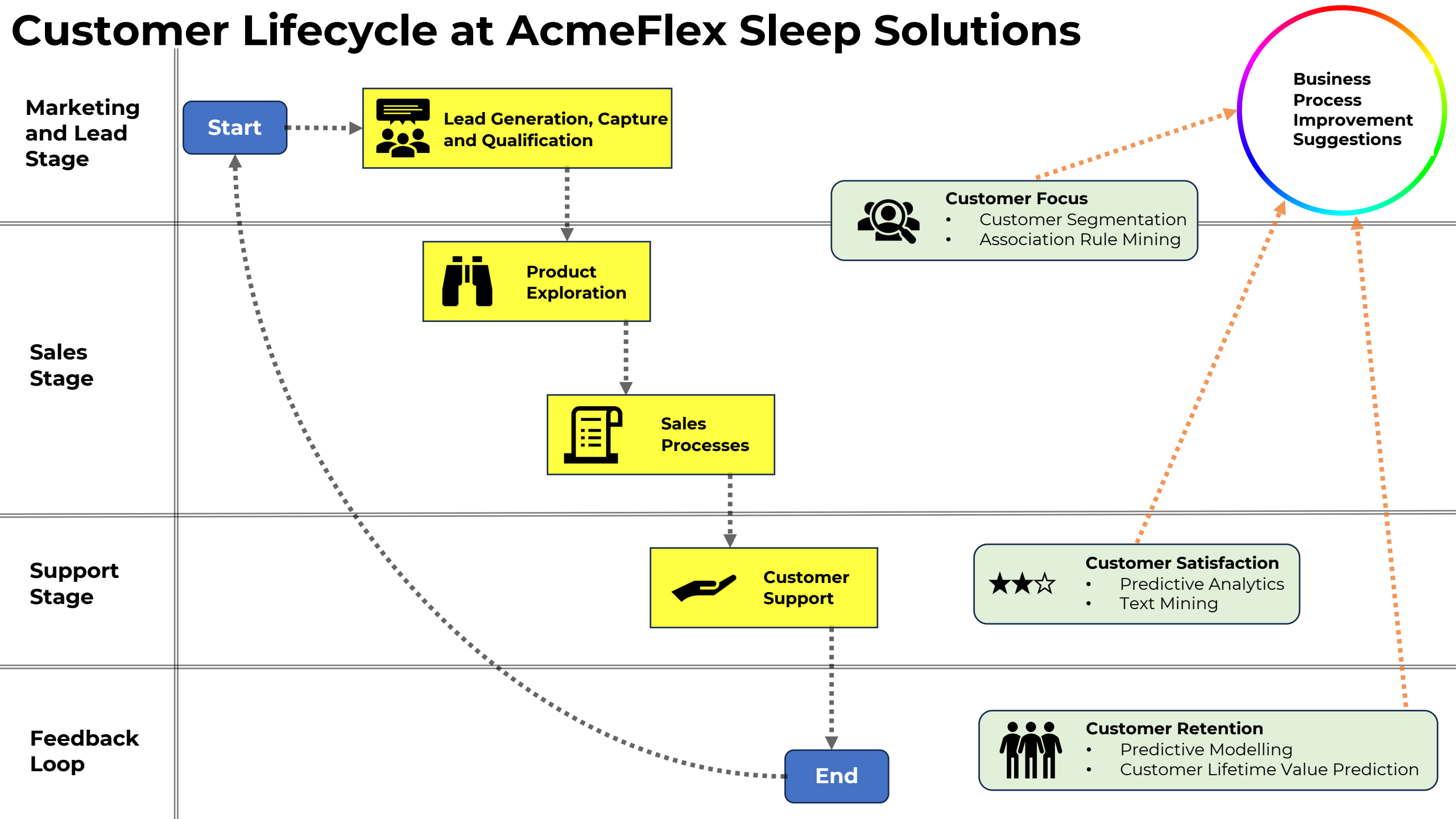
CRM encompasses a guiding philosophy, policy, and coordinating strategy facilitated by information technologies. It centers on establishing interactive communication channels with customers, gaining insights into their needs, wants, and purchasing patterns. This customer-centric culture involves a strategy to acquire, enhance profitability, and retain customers through IT applications, aiming for mutual benefits between the organization and customers(Rababah, 2011).



The goal of this portfolio is to suggest an effective CRM software solution based on the weaknesses found in the present business process of Acmeflex Sleep Solutions which sells pillows, mattresses, sleep aid and accessories via in store and online sales.

While assessing Acmeflex as a manager, it became evident that CRM plays a crucial role in handling customer data through a comprehensive and data-centric approach. However, the analysis reveals a potential underutilization of CRM data, indicating a missed opportunity to leverage it comprehensively for informed decision-making, tailored marketing strategies, and overall enhancement of customer satisfaction.

Customer Lifecycle at AcmeFlex Sleep Solutions



Current Business Process Weaknesses

Lead Generation and Product Exploration Stage:

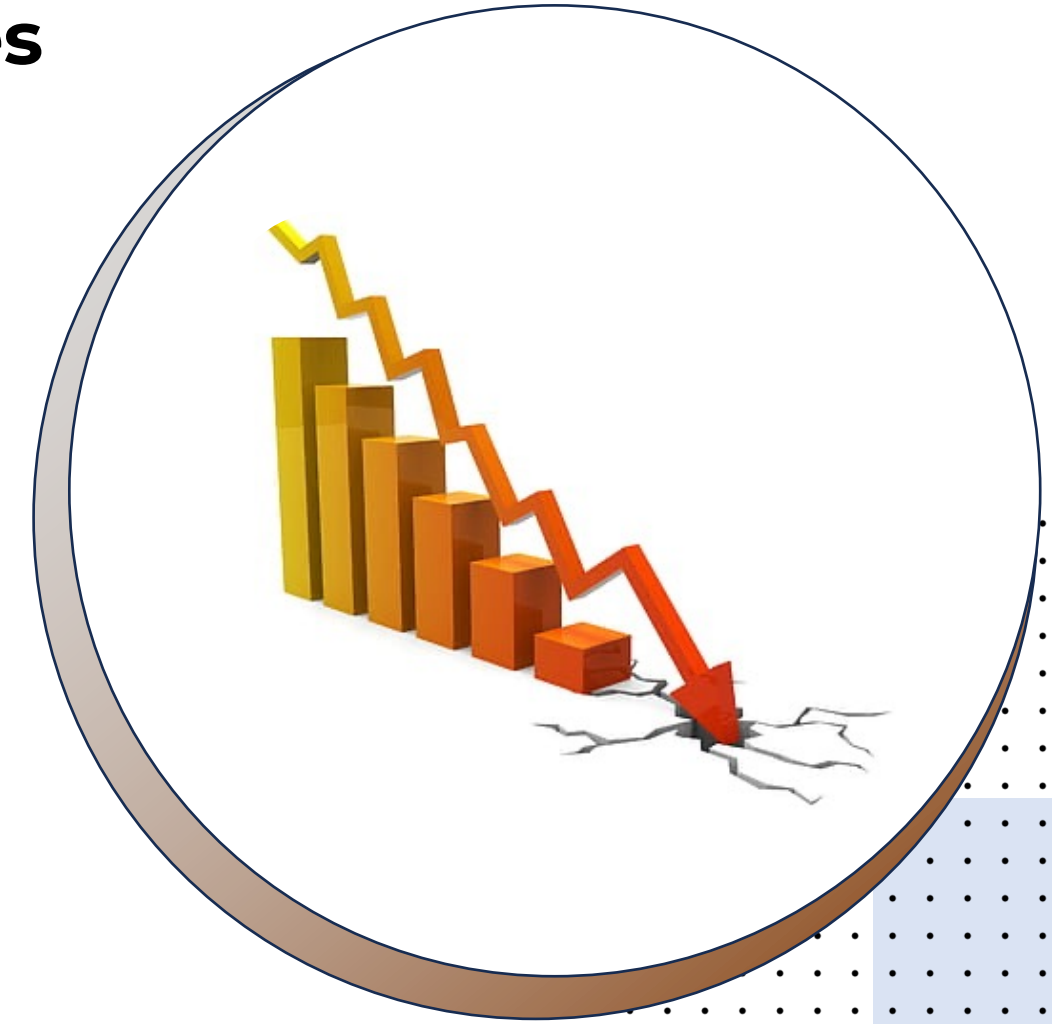
- Ineffective marketing efforts due to the absence of Tailored Marketing.
- Unsuccessful customer purchases attributed to a lack of suggested personalized offers during the product exploration stage.

Customer Support Stage:

- Customer satisfaction is impacted by inefficiencies in support processes, leading to delayed query and issue resolution.

Post-Purchase Stage:

- Potential customer churn is overlooked with inadequate analysis of customer data, support interactions, and sales data.
- Insufficient execution of reengagement campaigns contributing to unaddressed customer churn.



Main Tasks of CRM

Customer Focus: Improve customer focus during lead generation and sales phases by incorporating tailored marketing and personalized offers in customer transactions.

Customer Satisfaction: Address inefficiencies in customer support processes by enhancing query resolution and overall satisfaction.

Customer Retention: Reduce customer churn by analyzing post-purchase customer data, identifying potential churners, and guiding marketing and retention strategies for customer retention.

Methods Derived

Methods to facilitate tailored marketing during the lead generation stage and methods supporting the delivery of personalized offers in the product exploration stage.

Techniques to tackle inefficiencies in the customer support process.

Methods to analyze customer data and identify potential churn, enabling effective and targeted intervention.

Data Mining Models

Data mining tools can play a prevalent role in analyzing customer data within the framework of analytical CRM. These tools can enable organizations to discover concealed insights within vast datasets(Ngai et al., 2009).

Objectives

- Leverage data mining models that facilitate stronger customer focus during the lead generation and product exploration phases.
- Implement data mining models to effectively address inefficiencies in customer satisfaction processes.
- Leverage data mining models that enables implementation of effective customer retention strategies based on post-purchase data.

Data Sources

The data collected from Acmeflex Sleep Solutions CRM system comprises the following:

Customer Data: Information related to customers, such as Customer ID, age, sleep preferences, and customer demographics.
Sales Data: Data related to sales transactions, order details, and product information to track sales performance.
Customer Satisfaction Data: Information related to customer support interactions, issues raised, and resolution times to track customer satisfaction.

How can we enhance Customer Focus?

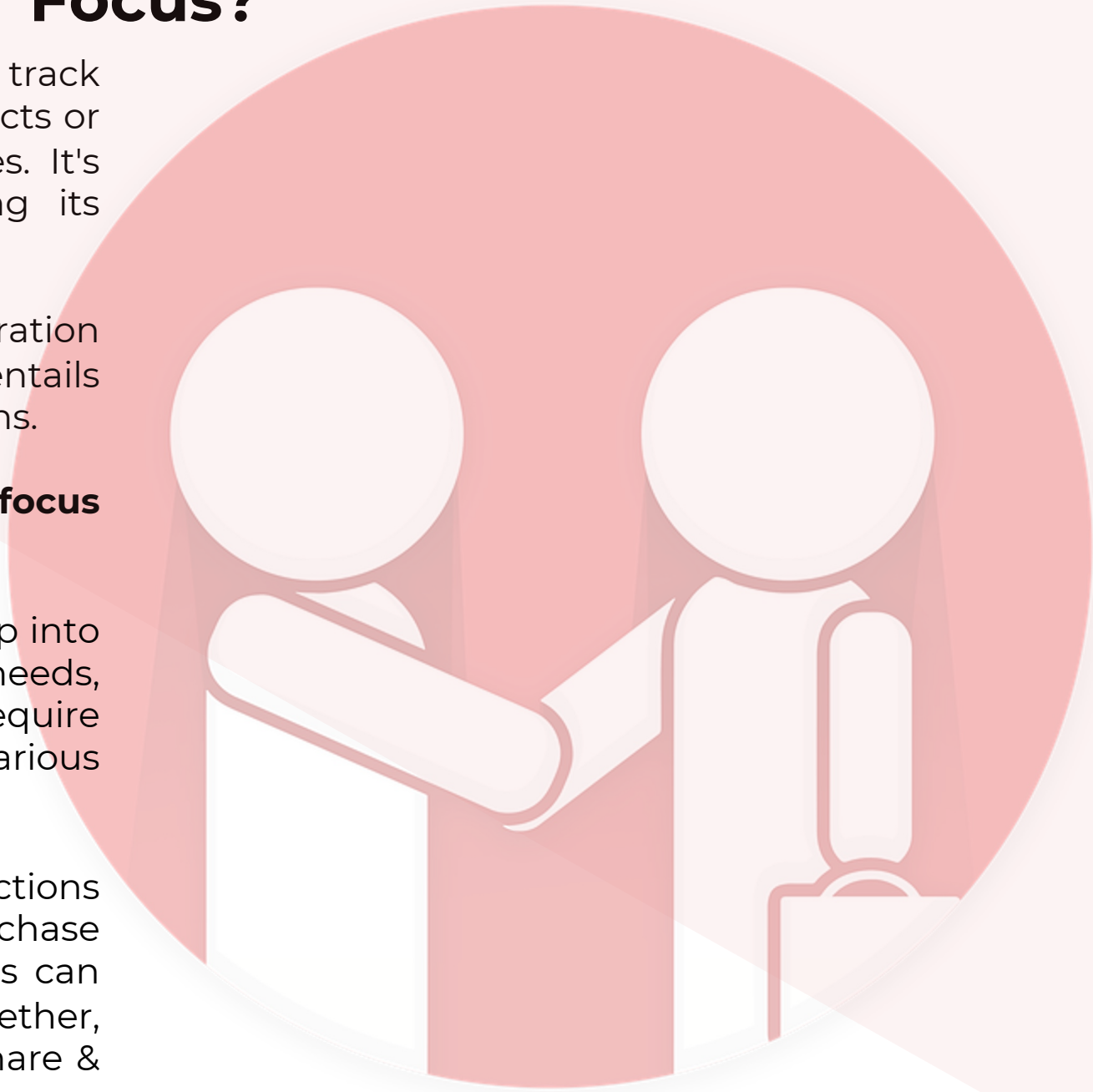
Customer focus goes beyond acquiring CRM softwares to track purchases. It extends beyond designing advanced products or processes that incorporate customer-requested features. It's an attitude deeply ingrained in a company, shaping its identity, actions, and core values(Vandermerwe, 2004).

At Acmeflex, enhancing customer focus in lead generation involves integrating tailored marketing, while in sales, it entails implementing personalized offers in customer transactions.

Data mining models that support customer focus encompass the following:

Customer Segmentation: It involves categorizing a group into distinct segments of customers with varying needs, characteristics, or behaviors. These segments may require separate products or respond differently to various combinations of marketing efforts(Cooil et al., 2007).

Association Rule Mining: It involves exploring connections between variables, particularly how customers purchase different products. Through association rules, businesses can discern which products are commonly purchased together, utilizing this information for marketing purposes(Kumbhare & Chobe, 2014).



Customer Segmentation with K-Means Clustering

The calculation of Spending Score is derived from the available columns using the following formula:

$$Spending\ Score = NumPurchases + TotaTrxnVal + FreqOfTrxn + AvgTrxnVal$$

This formula should ideally be further adjusted and refined by incorporating necessary/additional features and applying specific weights to the variables.

Implementing clustering techniques to group clients facilitates the recognition of unique customer groups for customized marketing strategies and targeted campaigns.

As depicted in the chart, we have opted for 3 clusters to classify customers into "Luxury Shoppers," "Essential Spenders," and "Budget Buyers" according to their assigned clusters. The forthcoming targeted marketing initiatives and campaigns should align with these designated labels.

Framework hyperlink: https://en.wikipedia.org/wiki/K-means_clustering

Association Rule Mining with Apriori Algorithm

	antecedents	consequents	support	confidence	lift
0	Aromatherapy Diffuser	Adjustable Bed Base	0.0115	0.116162	1.150115
1	Adjustable Bed Base	Aromatherapy Diffuser	0.0115	0.113861	1.150115
2	Bedding Set	Adjustable Bed Base	0.0105	0.107692	1.066260
3	Adjustable Bed Base	Bedding Set	0.0105	0.103960	1.066260
4	LED Reading Light	Adjustable Bed Base	0.0110	0.107843	1.067754

Implementing this technique uncovers patterns and relationships in customer behavior to identify frequently purchased product combinations, enabling the creation of bundled personalized offers.

The table displays the top 5 association rules mined, indicating the support, confidence, and lift for each rule, showcasing relationships between antecedent and consequent products in customer transactions.

Antecedents: They represent the items or conditions that precede or are associated with the occurrence of another set of items or conditions.

Consequents: They represent the items or conditions that are predicted or follow based on the presence of the antecedents.

Support: It indicates the proportion of transactions that contain both antecedents and consequents. For instance, in the first rule, "Aromatherapy Diffuser" and "Adjustable Bed Base" appear together in approximately 1.15% of transactions.

Confidence: It represents the likelihood that the consequents will occur given the presence of the antecedents. For example, in the first rule, there's a 11.62% confidence that if a customer purchases an "Aromatherapy Diffuser," they will also purchase an "Adjustable Bed Base."

Lift: It measures how much more likely the consequents are to occur when the antecedents are present compared to when they occur independently. For instance, In the first rule, the lift is slightly above 1, indicating a mild positive association.

Framework hyperlink: https://www.geeksforgeeks.org/apriori-algorithm/

How can we improve Customer Satisfaction?

Customer satisfaction is the customer's response indicating their level of fulfillment. It is an evaluation of whether a product, service feature, or the entire product or service has delivered a satisfactory level of consumption-related fulfillment, encompassing both under- and over-fulfillment(Oliver, 2010).

At Acmeflex, increasing customer satisfaction involves mitigating inefficiencies in customer support process by enhancing query resolution time and overall satisfaction.

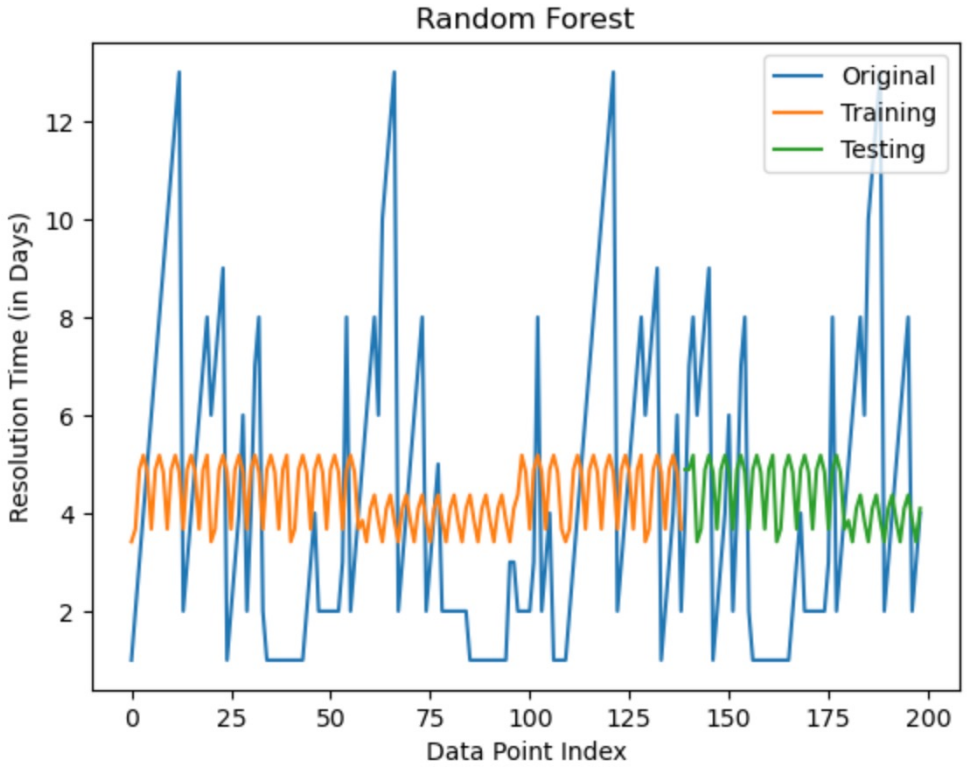
Data Mining models that improve customer satisfaction include the following:

Predictive Analytics: Leveraging predictive analytics can enable companies to enhance current processes, gain deeper insights into customer behavior, discover unforeseen opportunities, and foresee potential issues before they arise(Eckerson, n.d.).

Sentiment Analysis: Sentiment analysis, also known as opinion mining, is a field within computer science and computational linguistics that involves studying how opinions, evaluations, and subjectivity are expressed in text, particularly in online contexts(Taboada, 2016).

Predictive Analytics with Random Forest

date	issue_type	product_category	resolution_time_in_days
01.04.16	Delivery Delay	Sleep Aid and Accessories	1.0
01.04.16	Delivery Delay	Mattress	2.0
01.04.16	Incorrect Item	Pillow	3.0
01.04.16	Return Request	Sleep Aid and Accessories	4.0
02.04.16	Pillow Defect	Pillow	5.0
...	...	...	...
03.07.16	Delivery Delay	Pillow	7.0
04.07.16	Incorrect Item	Mattress	8.0
05.07.16	Return Request	Pillow	2.0
06.07.16	Delivery Delay	Sleep Aid and Accessories	3.0
07.07.16	Delivery Delay	Pillow	4.0



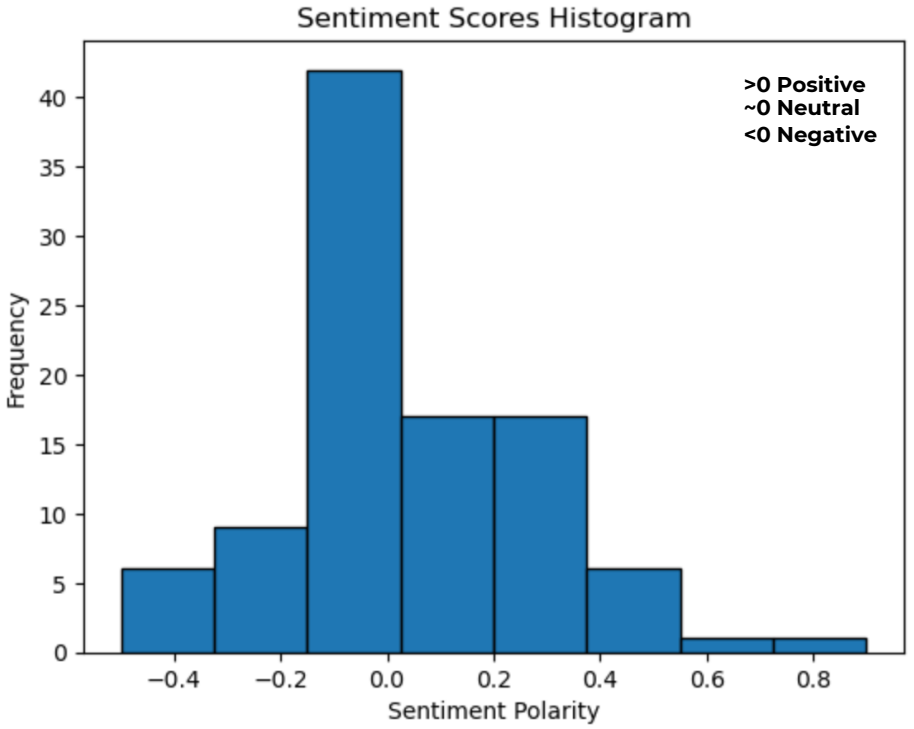
Regression models can be employed to predict resolution times for each customer issue from various combinations of issue types and corresponding product categories, utilizing historical data. The management can focus on identifying and reducing the resolution time for combinations that are experiencing prolonged delays. This proactive approach can enhance customer satisfaction and operational efficiency.

The regression plot is based on features such as issue type and product category, utilizing the Random Forest algorithm. To enhance prediction accuracy, additional data on issues and refinement of the algorithm can be undertaken.

Framework hyperlink: https://scikit-learn.org/stable/modules/generated/sklearn.ensemble.RandomForestRegressor.html

Text Mining (Sentiment Analysis)

email	message	processed_message	sentiment
alice.johnson@email.com	The mattress delivery was delayed	mattress delivery delayed	0.00
david.smith@email.com	Having trouble understanding the warranty details	trouble understanding warranty details	-0.20
sophie.turner@email.com	Ordered a pillow	ordered pillow	0.00
chris.harris@email.com	The customer support team was responsive and a...	customer support team responsive addressed con...	0.00
rachel.miller@email.com	Exploring different mattresses online	exploring different mattresses online	0.00
...	...	...	...
noah.white@email.com	Product information on the website is outrageo...	product information website outrageously incon...	-0.30
ava.smith@email.com	I'm seriously concerned about the durability o...	seriously concerned durability pillows urgentl...	-0.33
lucas.wilson@email.com	I experienced an unacceptably long delay in re...	experienced unacceptably long delay response c...	0.38
sophie.harris@email.com	I'm intensely interested in sleep-related cont...	intensely interested content urgently looking ...	0.31
ethan.turner@email.com	Product descriptions are alarmingly unclear, a...	product descriptions alarmingly unclear urgent...	-0.10



Analyzing customer email communications using text mining method to understand the sentiment aids in gauging sentiment trends, addressing concerns proactively, improving email responses and tailoring communication based on customer sentiments. This approach is instrumental in measuring customer satisfaction levels and understanding their expressions of contentment or disappointment with the products.

The table displays extracted keywords from some of the customer emails alongside corresponding sentiment scores, processed using the textblob framework. Rules can be established such as scores greater than 0 are deemed positive, scores equal to 0 are neutral, and scores less than 0 are negative sentiments. The histogram illustrates the distribution of scores across the dataset after processing.

Framework hyperlink: https://textblob.readthedocs.io/en/dev/quickstart.html

How can we enhance Customer Retention?

Customer retention refers to the strategic focus on maintaining and preserving existing customer relationships, recognized as a pivotal goal in relationship marketing. This emphasis stems from the economic advantage associated with retaining current customers, as it typically incurs lower costs compared to acquiring new ones(Ahmad & Buttle, 2002).

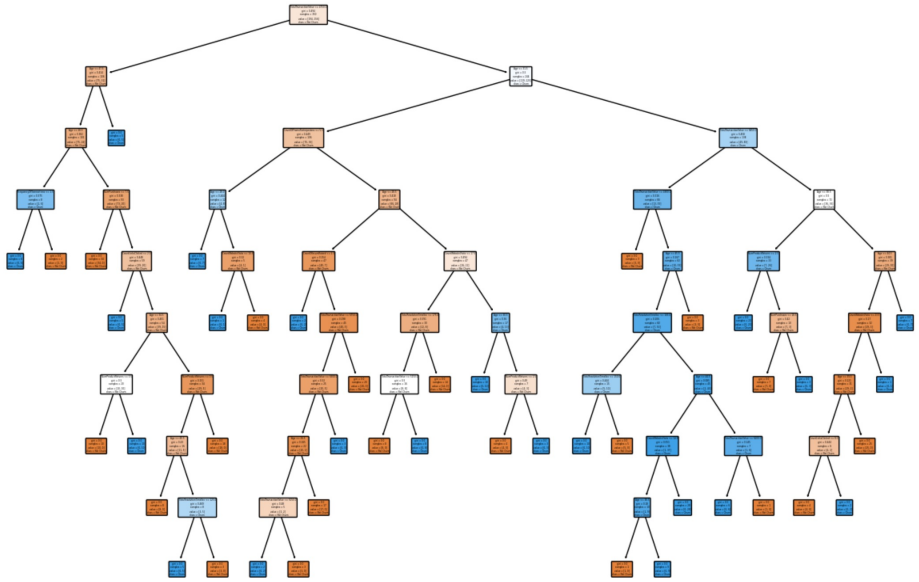
At Acmeflex, enhancing customer retention involves analyzing post-purchase customer data to identify potential churners and implementing re-engagement campaigns.

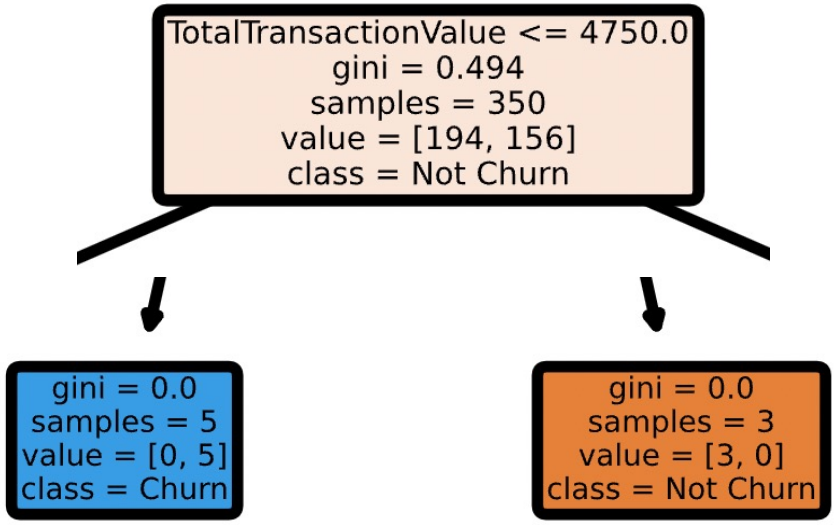
Data Mining models that support improving customer retention include the following:

Predictive Modeling: Predictive modeling aims to create a model capable of forecasting values or classes for new data by leveraging a set of known data (training instances). Predictive modeling focuses on utilizing observed variables (features) to make predictions based on the assumption that patterns in the training data can be applied to new data(Brooks & Thompson, 2022).

Customer Lifetime Value Prediction: Customer lifetime value prediction involves estimating the current and future value of a customer by considering factors such as the expected duration of the customer relationship, future purchasing patterns, and the associated profit from each customer behavior(Cheng et al., 2012).

Predictive Modeling with Decision Trees





Utilization of classification techniques such as decision trees to examine customer data for predicting the probability of churn. These models can be trained by utilizing past information encompassing various attributes of customers such as demographics, purchase behavior, support interactions, and lifetime value. Implementing targeted retention strategies for customers identified as having a high risk of churn can effectively reduce customer turnover rates. Additionally, these strategies can be refined based on their cluster, determined through other data mining methods, categorizing them as 'Luxury Shoppers,' 'Essential Spenders,' and 'Budget Buyers'.

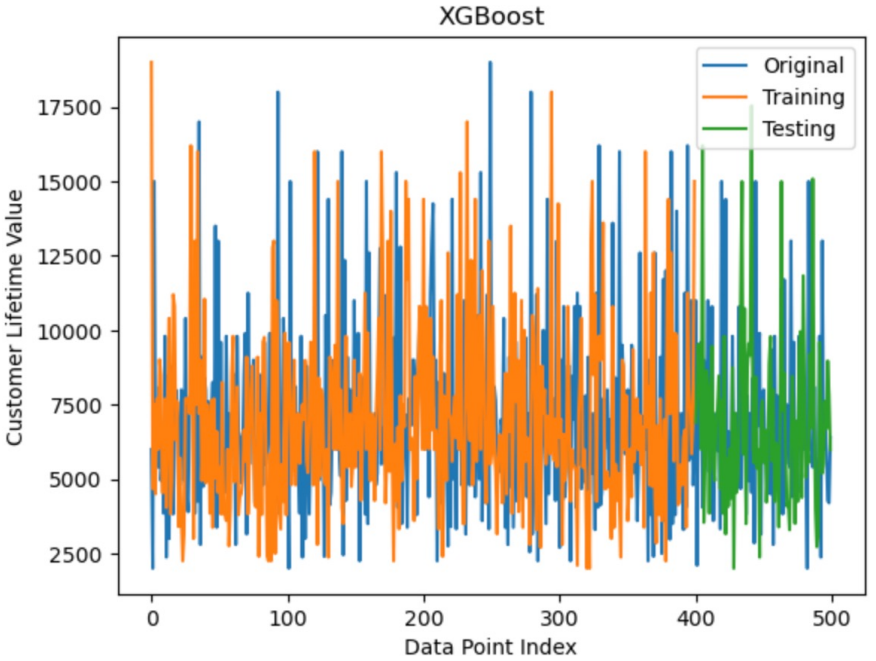
The decision tree plot illustrates the algorithm's creation of a tree-like structure with numerous branches to categorize features with different criteria.

Zoomed-in images of the topmost and bottom-left buckets are included to provide a sample of the algorithm's functioning.

Framework hyperlink: https://scikit-learn.org/stable/modules/tree.html

Customer Lifetime Value Prediction with XGBoost

cust_id	age	num_purchases	tot_trxn_val_euros	freq_of_trxn	chrun	avg_trxn_val_euros	days_since_last_purc	clv
C2002	35	10	5000	2	1	120	10	6000
C3030	45	5	3000	1	0	80	25	2000
C4505	30	15	8000	3	0	200	5	15000
C5506	40	8	4000	1	0	150	15	6000
C6107	28	12	6000	2	0	100	30	6000
...	...	...	...	...	...	...	...	...
C21554	26	16	8500	3	0	90	23	7200
C21681	34	10	5200	2	0	120	16	6000
C21806	44	9	4600	2	0	95	29	4275
C21931	32	7	3400	1	0	120	9	4200
C22056	41	16	7800	3	0	80	27	6400



Building regression models using customer data, including metrics like purchase frequency, total transaction value, customer lifespan, lifetime value of previous customers(churned customers) etc., to forecast the monetary value that a prospective customer is anticipated to generate throughout their entire relationship with the company. This enables organizations to guide marketing and retention strategies to retain customers who demonstrate a likelihood of generating long-term profits.

The presented table includes few of the selected columns utilized by the model for predicting customer lifetime value, alongside the actual lifetime value of both existing and previous customers. The XGBoost regression model is employed for prediction, and the accompanying figure illustrates the accuracy of training and testing values in comparison to the actual values.

Framework hyperlink: https://www.analyticsvidhya.com/blog/2018/09/an-end-to-end-guide-to-understand-the-math-behind-xgboost/

Conclusion

Implementing a customer-centric CRM approach at Acmeflex Sleep Solutions, based on our recommendations, enhances relationships, provides outstanding experiences, and fosters sustainable business growth.

This strategy focuses on elevating customer satisfaction, improving focus, and boosting retention, ultimately enhancing overall customer experiences.

Thoughtfully chosen data mining models unlock valuable insights and drive business growth. Aligning these models with CRM challenges is crucial for addressing weaknesses in customer relationship management.

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