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Customer Relationship Management (CRM) in Automobile Industry

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Abstract: **Automobile industry is one among those spheres where manufacturing process involves a lot of people responsible for quite different production aspects. Thus, the implementation of a proper Customer Relationship System is a necessity. It can obviously help automate working process and make the interaction among dealers, manufacturers and their customers more efficient. Embedded CRM solutions prevent managers from lack of information and incorporate in one system data about buyers' needs, desires and customer service. Manufactures and dealers get a full picture of marketing efficiency, clients' involvement into different activities and outcome of the sale thanks to CRM systems. As a result, they have no difficulties to change the situation for the better making more revenues and leaving customers more satisfied. Customer Relationship management is the strongest and the most efficient approach in maintaining and creating relationships with customers. Hosted CRM, a web-based service, integrates the application service provider (ASP) model with cloud computing and is popular in small organizations without established CRM infrastructures. In-house SFA provides greater customization but is more expensive than hosted CRM SFA packages. Customer relationship management is not only pure business but also ideate strong personal bonding within people. Development of this type of bonding drives the business to new levels of success. Sugar CRM and Gold Mine are popular SFA products.**

Keywords: **Customer Relationship Management; SFA CRM SFA packages; Cloud computing; Application service provider (ASP).**

1. INTRODUCTION

Automobile industry is one of those spheres where manufacturing process involves a lot of people responsible for quite different production aspects. Thus, the implementation of a proper Customer Relationship System is a necessity. CRM stands for "Customer Relationship Management" and its software that stores customer contact information like names, addresses, and phone numbers, as well as keeps track of customer activity like website visits, phone calls, email, and more. CRM also includes features like contact management, sales management and productivity. Customer relationship technology is a technology that manages all your company's relationships and interactions with customers and potential customers, processes, and improve profitability.

The goal is simple. Improve business relationships. A CRM system helps companies stay connected to customers, streamline processes, and improve profitability.

When people talk about CRM system, a tool that helps with contact management, sales management and productivity. A CRM solution helps you focus on your organization's relationships with individual people — including customers, service users, colleagues, or suppliers — throughout your lifecycle with them, including finding new customers, winning their business, and providing support and additional services throughout the relationship.

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Figure 1: Customer Relationship Management

Who is CRM for?

A CRM system gives everyone — from sales, customer service, business development, recruiting, marketing, or any other line of business — a better way to manage the external interactions and relationships that drive success. A CRM tool lets you store customer and prospect contact information, identify sales opportunities, record service issues, and manage marketing campaigns, all in one central location — and make information about every customer interaction available to anyone at your company who might need it. With visibility and easy access to data, it's easier to collaborate and increase productivity. Everyone in your company can see how customer have been communicated with, what they've bought, when they last purchased, what they paid, and so much more. CRM can help companies all sizes drive business growth, and it can be especially beneficial to a small business, where teams often need to find ways to do more with less. CRM helps managing all your company's relationships and interactions with customers and potential customers. Processes, and improve profitability.

Why CRM matters to your business?

CRM will be the single largest revenue area of spending in enterprise software. If your business is going to last, you know that you need a strategy for the future. You have targets for sales, business objectives, and profitability. But getting up-to-date, reliable information on your progress can be tricky. How do you translate the many streams of data coming in from sales, customer service, marketing, and social media monitoring into useful business information?

A CRM system can give you a clear overview of your customers. You can see everything in one place — a simple, customizable dashboard that can tell you a customer's previous history with you, the status of their orders, any outstanding customer service issues, and more. You can even choose to include information from their public social media activity — their likes and dislikes, what they are saying and sharing about you or your competitors. Marketers can use a CRM solution to better.

Though CRM systems have traditionally been used as sales and marketing tools, customer service teams are seeing great benefits in using them. Today's customer might raise an issue in one channel — say, Twitter — and then switch to email or telephone to resolve it in private. A CRM platform lets you manage the inquiry across channels without losing track, and gives sales, service, and marketing a single view of the customer.

Running a business without CRM can cost you real money:

More administration means less time for everything else. An active sales team can generate a flood of data. Reps are out on the road talking to customers, meeting prospects, and finding out valuable information – but all too often this information gets stored in handwritten notes, laptops, or inside the heads of your salespeople.

Details can get lost, meetings are not followed up on promptly, and prioritizing customers can be a matter of guesswork rather than a rigorous exercise based on fact. And it can all be compounded if a key salesperson moves on. But it's not just sales that suffers without CRM.

Your customers may be contacting you on a range of different platforms including phone, email, or social media — asking questions, following up on orders, or contacting you about an issue. Without a common platform for customer interactions, communications can be missed or lost in the flood of information — leading to a slow or unsatisfactory response.

Even if you do successfully collect all this data, you're faced with the challenge of making sense of it. It can be difficult to extract intelligence. Reports can be hard to create and they can waste valuable selling time. Managers can lose sight of what their teams are up to, which means that they can't offer the right support at the right time – while a lack of oversight can also result in a lack of accountability from the team.

What does a CRM system do?

A customer relationship management (CRM) solution helps you find new customers, win their business, and keep them happy by organizing customer and prospect information in a way that helps you build stronger relationships with them and grow your business faster.

CRM system start by collecting a customer's website, email, telephone, social media data, and more, across multiple sources and channels. It may also automatically pull in other information, such as recent news about the company's activity, and it can store personal details, Such as a client's personal preferences on communications. The CRM tool organizes this information to give you a complete record of individuals and companies overall, so you can better understand your relationship over time.

A CRM platform can also connect to other business apps that help you to develop customer relationships. CRM solutions today are more open and can integrate with your business tools, such as document signing, accounting and billing, and surveys, so that information flows both ways to give you a true 360-degree view of your customer. And a new generation of CRM goes one step further: Built-in intelligence automates administrative tasks, like data entry and lead or service case routing, so you can free up time for more valuable activities. Automatically generated insights help you understand your customers better, even predicting how they will feel and act so that you can prepare the right outreach.

Here's how a CRM system can help your business today.

1. MAKE IMPROVEMENTS TO YOUR BOTTOM LINE:

Introducing a CRM platform has been shown to produce real results – including direct improvements to the bottom line. CRM applications have a proven track record of increasing:

2. IDENTIFY AND CATEGORIZE LEADS:

A CRM system can help you identify and add new leads easily and quickly, and categorize them accurately. By focusing on the right leads, sales can prioritize the opportunities that will close deals, and marketing can identify leads that need more nurturing and prime them to become quality leads.

With complete, accurate, centrally held information about clients and prospects, sales and marketing can focus their attention and energy on the right clients

3. INCREASE REFERRALS FROM EXISTING CUSTOMERS:

By understanding your customers better, cross-selling and upselling opportunities become clear — giving you the chance to win new business from existing customers.

With better visibility, you'll also be able to keep your customers happy with better service. Happy customers are likely to become repeat customers, and repeat customers spend more — up to 33% more according to some studies.

4. OFFER BETTER CUSTOMER SUPPORT:

Today's customers expect fast, personalized support, at any time of day or night. A CRM system can help you provide the high-quality service that customers are looking for.

5. IMPROVE PRODUCTS AND SERVICES:

A good CRM system will gather information from a huge variety of sources across your business and beyond. This gives you unprecedented insights into how your customers feel and what they are saying about your organization.

Here's what cloud-based CRM offers your business:

CRM and the cloud computing revolution have changed everything. Perhaps the most significant recent development in CRM systems has been the move into the cloud from on-premises CRM software. Freed from the need to install software on hundreds or thousands of desktop computers and mobile devices, organizations worldwide are discovering the benefits of moving data, software, and services into a secure online environment.

Cloud-based CRM system such as sales force mean every user has the same information, all the time. Your sales teams out on the road can check data, update it instantly after a meeting, or work from anywhere. The same information is available to anyone who needs it, from the sales team to the customer service representatives.

2. WORK FROM ANYWHERE

REDUCE COSTS

CRM can be quick and easy to implement. A cloud-based system doesn't need special installation, and there's no hardware to set up, keeping IT costs low and removing the headache of version control and update schedules.

Generally, cloud-based CRM systems are priced on the number of users who access the system and the kinds of features you need. This can be very cost-effective in terms of capital outlay, and is also extremely flexible — enabling you to scale up and add more people as your business grows. Sales force is flexible in terms of functionality, too — you're not paying for any features that are not useful to you.

A CLOUD-BASED CRM PLATFORM OFFERS YOU:

- Faster deployment
- Automatic software updates
- Cost-effectiveness and scalability
- The ability to work from anywhere, on any device
- Increased collaboration

Customer relationships are key to your organization's growth, so you need to manage them as efficiently and effectively as possible. Here's how relationship management technology can help you be more connected to customers, improves business performance, and grows your company bigger and faster than ever:

1. Find the right customers:

"Without a CRM system, 79% of all marketing leads are never converted to sales."

You've spent time and resources attracting and generating new leads, but now what? Are they getting passed on to your sales team, and if so, do your reps know which opportunities are the best? Time is of the essence when you're small and growing fast. Make the most of your marketing tools — email, social, marketing automation — by connecting them to a CRM platform. Both sales and marketing will have a complete view of leads and prospects so they can create and target engaging communications to turn prospects into customers and reach key decision makers faster.

2. Build more sustainable relationships:

"46% of sales leaders say deeper customer relationships are a key objective for sustaining success."

SALESFORCE, "STATE OF SALES"

Develop a deep understanding of a customer's business — beginning with a complete view of their history with your company — and you'll build a strong relationship founded on trust and mutual success. A CRM system can help an organization:

Explore their challenges: Find out what matters to your customers — their goals, challenges, and preferences — at the end of every exchange and make sure you have a follow-up action. Record these notes in your CRM system so next time you can pick up exactly where you left off with a quick review.

Engage with relevancy: After you understand a customer's business challenges and goals you can recommend appropriate products or special promotions, or other content that's relevant to their business interests, at the right time. With CRM, you'll also know what they've purchased and how they're using your products or services, so you can provide the most relevant content and information.

Scale your 1-to-1 relationships: As a small (but mighty) business, your customers love you for the personal experiences you provide; but it becomes more challenging to know the details of each and every customer — and when to follow up with them — when high growth kicks in. A CRM platform can host email templates, set up task reminders, and enable phone calls to help you connect with customers faster and easier.

3. Reduce the cost of sales:

MARKETING METRICS

New customers are a key ingredient of continued growth, but they're not easy — or cheap — to come by. The good news is you can offset new customer acquisition costs through sales to your existing customer base. Gain greater visibility into the upsell, cross-sell, and renewal opportunities in your customer portfolio and you'll see an increase in repeatable sales thanks to the trust you've already earned.

A CRM system can help you improve business performance by:

- **Improving sales efficiency**: Prioritize leads and opportunities that are highly likely to convert and close based on customer interactions with your company.
- **Boosting sales effectiveness**: Know which customers are engaged and the right time to reach out for optimal response.
- **Increasing upsell and cross-sell opportunities:** See all the opportunities that are a good fit for add-on deals already in progress.
- **Uncovering referral business:** Find untapped opportunities in existing relationships instead of paying for dead-end leads or wasting time cold calling.

4. Increase employee productivity:

Adopting the right technology frees up your team from process-heavy tasks and gives them more time to connect with customers. Manual operations like hunting for contact information or entering data can be automated or eliminated from customer-related processes. Automation across sales, service, and marketing will free your employees so they can spend more time talking to prospective customers and strengthening relationships with existing ones, moving the needle for your business.

5. Offer better customer service:

Even the best product is only as good as the service that comes with it — both before and after the sale. Don't hit up your prospects with multiple marketing promotions that will annoy or scare them away. Drop the ball after a sale and you've wasted the time and effort that went into winning a valuable customer. When your entire team has immediate access to a customer's complete history, everyone can quickly provide personalized messages and solutions, with the right resources. Smoother interactions build trust and encourage repeat business.

3. INDIAN AUTOMOBILE INDUSTRY

The automobile industry in Indian country is one of the largest industries in the world. According to IBEF (India Brand Equity Foundation) . The industry accounts for 7.1 per cent of the country's Gross Domestic Product (GDP). The Two Wheelers segment with 81 per cent market share is the leader of the Indian Automobile market owing to a growing middle class and a young population. Moreover, the growing interest of the companies in exploring the rural markets further aided the growth of the sector. The overall Passenger Vehicle (PV) segment has 13 per cent market share. In April January 2016, exports of Commercial Vehicles registered a growth of 18.36 per cent over April-January 2015. In addition, several initiatives by the Government of India and the major automobile players in the Indian market are expected to make India a leader in the Two Wheeler (2W) and Four Wheeler (4W) market in the world by 2020

I. ROLE OF CRM IN AUTOMOBILE INDUSTRY:

CRM is important to every firm as they seek to make profit through long-term relationships with customers. Automobile industries faces unique challenges in the modern economy, there is a strong competition between new and used car market. Customer have incredible information available to them through internet, review system, social media and more so building relationship requires more effort. Customer relationship management is the strongest and most effective approach in maintaining and creating relationship with customers. Customer relationship management is not only important for business but also for creating a strong personal bonding relation with in people. Development of this type of relationship builds the business to new level of success. Once such a relation is built it is easy for the organization to identify the actual needs of the customer and to know their expectation and that lead to serve them in a better way. Some of the effective tool used in most of the renowned organization are batch book, sales force etc.

II. CRM FEATURES AND FUNCTIONS IN AUTOMOBILE INDUSTRY:

CRM solutions influence a lot automobile industry providing dealers with certain customers' demands, increasing the flexibility of the manufacturing process and improving greatly relationship between manufacturer , a dealer and a client.

The functional base of CRM systems for automotive industry developed and customized as follows:

- Customer database where it is possible to store information concerning owner with data on their service expenditures, preferences in vehicle models and on the stage of engagement into company's activities.
- Contact management system that serves to record necessary contact information of customers in an accessible place.
- Appointment scheduler where the data on all the meetings with customers are entered including follow up calls, test drives and e-mail correspondence. Consequently, it is easier to plan future appointments.
- Sales lead tracking and management system which allows to be aware of clients' buying opportunities and to foresee the sales cycle.
- Work order management that allows receiving and assigning all clients' requests timely and in the end getting a full report on completed tasks.
- Analytics that features sales potential and buyers' behavioural characteristics.
- Customer invoicing system that manages the process of sending invoices to clients.
- Document management and archiving which help store documents in one place.
- Integration with other communication services that gives an opportunity to create automatic messages concerning current working process, remind about scheduled diagnostics and congratulate clients on holidays.

III. BENEFITS CRM CAN BRING TO AUTOMOBILE INDUSTRY:

Customer Relationship Management solutions will undoubtedly develop system approach to customer relations. Instead of a general development, marketing and dealer teams get a big boost for improving their job and for increasing payoffs. With CRM system in automotive sphere one is likely to:

- Have an access to complete customer information anytime.
- Contact a client on the right time in the right place with a proposal the one can be interested in.
- Plan further acts according to analytical data
- Change marketing activities on the base of analytical reports
- Improve processing data rate
- Remain aware of internal working process.

4. CUSTOMER RELATIONSHIP MANAGEMENT SYSTEMS OPTIMIZATION BY USING DATA MINING TECHNIQUES:

A customer relationship management system (CRM) is a bucket of IT applications and procedures whose target is to identify the main expectations and preferences of the clients and to use efficiently the gathered information in order to improve the relationships between the business and the customers. The implementation of such system implies two components:

• The managerial component, consisted of the total methods and techniques used for the integration and usage of data related to the customer behaviour;

• The IT component, which includes the hardware and software equipment used for data collection, storing and management.

The main components of CRM systems are:

• A stop shop is the input point in the system for the data, meaning the requests and claims of the clients, which then are processed within a document management system process;

• Contact Centre/ Help Desk offers special assistance to the clients who ask for information regarding the specific products and services. Developing such a component provides many advantages: reducing the number of missed calls by intelligent distribution of calls, increasing the productivity of the marketing and sales departments, enhancing customer satisfaction by increasing the value that he perceives, monitoring the satisfaction of customers.

• e-CRM meaning the internet technology using specific instruments, such as: personalized e-mail addresses, chat or interactive dialogs, forums.

According to [3], CRM consists of four dimensions:

(1) Customer Identification.

(2) Customer Attraction.

(3) Customer Retention.

(4) Customer Development.

They share the common goal of creating a deeper Understanding customers to maximize customer value to organization in the long term. Data mining techniques, therefore, can help to accomplish such a goal by extracting or detecting hidden customer characteristics and behaviours from large databases.

The main advantage of CRM implementation are: more efficient activities of the orders received from consumers, improving the quality of services provided to the clients, a qualitatively higher level communication with the client by using multiple communication channels (telephone, stop shop, web, e-mail), reducing the communication costs with clients, reduce time consuming for claims, achieving a better image of the organization in front of clients.

In practice, especially in the large companies, applying CRM techniques implies the following steps:

1. Identify the organization's clients and including them in different categories depending on their preferences and behaviors. We can split the clients in four categories:

a) Clients with general requirements and an uniform character;

b) Clients with specific requirements and an uniform character;

c) Clients with general requirements and no uniform character;

d) Clients with specific requirements and no uniform character

2. Establishing the necessary information and design the system architecture. In this phase, there

Is planning the clients management database which includes, in general, information related to: identification of person, professional training, social status, membership in a particular category of clients, attitudes and perceptions, behaviors in different situations, requests, complaints submitted by customer.

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3. Identifying ways of information gathering which involves developing a toolbox of methods and techniques whereby information describing customer behaviors to be collected and entered into the database.

4. Gathering information and updating the database that consists of applying the techniques defined in the second stage, with the scope of the consolidation of customer database.

5. Operationalization of changes in the organizational plan for enhancing the customer satisfaction by improving and diversifying provided services, acting simultaneously both in terms of coverage general requirements and individual ones. Studies reveal that the amplification of satisfaction degree generates an improved image of the organization on the market, but only up to a maximum point, beyond which the image begins to deteriorate.

Data mining plays an important role in CRM by identifying customer behavior patterns from customer usage data and predicting which customers are likely to respond to cross-sell and up-sell campaigns, which is very important to the business [4]. Regarding former customers, data mining can be used to analyze the reasons for churns and to predict churn [5].

Optimization also plays an important role in CRM and in particular in determining how to develop proactive customer interaction strategy to maximize customer lifetime value. A customer is profitable if the revenue from this customer exceeds company's cost to attract, sell and service this customer. This excess is called the customer lifetime value [6].

E.W.T. Ngai in [7] proposes a graphical classification framework on data mining techniques in CRM as shown in figure:

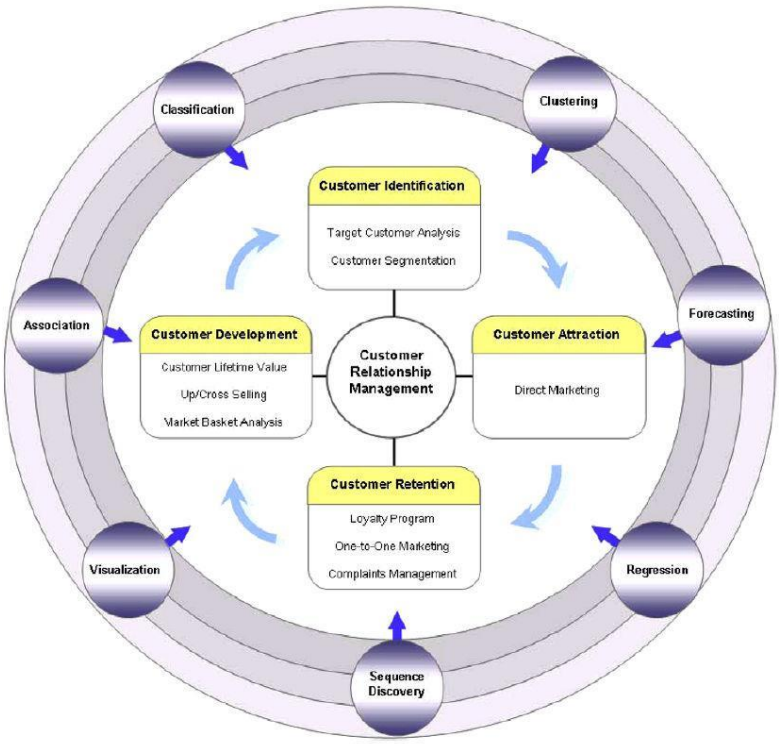

Figure 2: Classification framework for data mining techniques in CRM.

Data mining techniques can be used successfully, especially because CRM implies a multidimensional approach which can, by instance, include three dimensions:

- hierarchy of products (brand, class, category, product);
- hierarchy of periods (years, quarters, months, dates);
- customer hierarchy (regions, areas class customers).

In practice, this approach is successfully performed through a modern concept that stands today in the majority of process support systems decision, namely the OLAP (On-Line Analytic Processing), which is based on technical multidimensional data analysis [9], [10].

If we refer to the CRM user demands, OLAP systems provide support for real-time satisfaction of specific

Claims, because they anticipate the timing and content of the interrogation and provides the optimal combination between pre-calculated results and those calculated at the time of information requested. OLAP systems use a specific tool, reason for which most experts believe that they represent the best environment for implementation of functional information models based on systems dynamic principles.

At present, almost all large organizations hold an intranet platform which, together with some extensions and instruments, provide the basic functionality of Business Intelligence applications, such as organizing information in data warehouses and processing them using data mining techniques. Numerous specific data mining functions are already implemented as components of the Intranet architecture or like specific solutions such as CRM.

5. CUSTOMER RELATIONSHIP MANAGEMENT ARCHITECTURE

In addition to building sales and increasing profits through the gathering of data, CRM systems are also valuable for maintaining and nurturing a loyal customer base.

CRM categories

CRM system architecture can be broken down into 3 broad categories:

1. Collaborative
2. Operational
3. Analytical

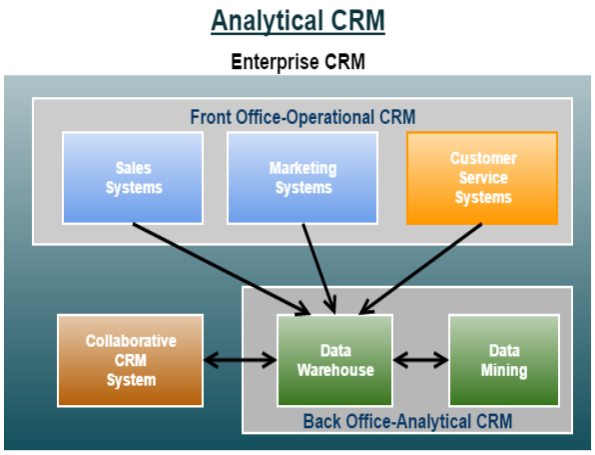

Figure 3: Architectural design of CRM

1. Collaborative:

All communications between a business and its customers are recorded, organised and processed in the collaborative section of the software. This means communication by telephone, in person, and by email.

Customer relationships can be nurtured using data already provided by them which demonstrates their shopping patterns and behaviours, likes and dislikes, the times they are most likely to buy, and how much they spend on average.

Businesses use this information to provide enhanced customer service, cross-sell products based on previous buying history, and offer targeted deals to segments of their customer base. Customers can be segmented by various criteria including geographical location, age, gender, and profession, and can be targeted via personalised emails or newsletters offering discounts and deals.

2. Operational:

This category within a CRM system deals with the automation of business processes including customer service, data on competitors, industry trends, customer account information and management.

Data is collected and stored within the database, ready for use in day-to-day operations such as management of customer accounts, in addition to overall strategic planning. Detailed information about special customer needs, destined for the sales force, is also stored here. Use of this type of data further enables a business to personalise its approach to customers.

3. Analytical:

Analytical CRM might result in cross-selling certain items to particular customers based on their previous buying habits, or imparting information relevant only to certain segments of a customer base.

This part of the CRM architecture is also invaluable for identifying changes in the industry as a whole, so that businesses remain agile and respond quickly to changing market demands. Data can be analysed in a number of ways, and graphs, reports and diagrams produced to

better illustrate the results.

This is the basic architecture of a customer relationship management system, but the rise of social media and mobile working has brought other, more defined systems to the market. Popular 'add-ons' to the basic structure of a CRM solution might include cloud based systems that are accessible from any device.

The key word in CRM is **integration** – integration of data so that it can be put to use in a way that benefits not only the business, but also customers, suppliers and the workforce. Using mobile technology and social media was the obvious next step in this process, and targets a whole new potential customer base.

6. OPTIMIZATION ALGORITHMS FOR DATA MINING-SUPPORTVECTOR MACHINES (SVM)

SVMs were developed by Cortes & Vapnik (1995) for binary classification and they are based on the Structural Risk Minimization principle from computational learning theory. The SVM technique has been applied in many financial applications recently, mainly in the area of time series prediction and classification.

The algorithm is considering the following steps:

A) Class separation: we must find the optimal separating hyper plane between the two classes. Linear programming can be used to obtain both linear and non-linear discrimination models between separable data points or instances (Mangasarian,1965). The problem is to determine a best model for separating the two classes.

If this hyper plane exists, then there are many such planes. The optimal separating hyper plane is the one that maximizes the sum of the distances from the plane to the closest positive example and the closest negative example.

B) Overlapping classes: data points on the wrong side of the discriminant margin are weighted down;

C) Nonlinearity: when we cannot find a linear separator, data points are projected into a higher-dimensional space where the data points effectively become linearly separable (this projection is realized via kernel techniques);

D) Problem solution: the whole task can be formulated as a quadratic optimization problem which can be solved by specific techniques.

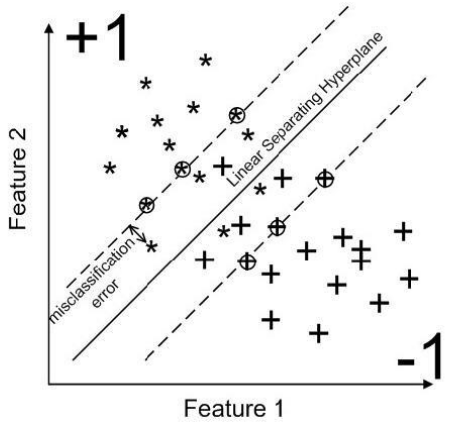

Figure 4: Illustration of a support vector machine in a two dimensional feature space.

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Here is a briefly description of a SVM method:

There is an input space, denoted by X, an output space, denoted by Y, and a training set, denoted by S:

$$S=((x_1, y_1), (x_2, y_2), \ldots, (x_l, y_l)) \subseteq (X \times Y)^l$$

Where l is the size of the training set.

SVM belongs to the type of maximal margin classifier, in which the classification problem can be represented as an optimization problem. The hyper plane H can be defined in terms of its unit normal w and its distance b from the origin. So, H = { x ∈ Rm : x · w + b = 0}, where x · w is the dot product between two vectors. The aim of support vector machines is to orientate this hyper plane in such a way as to be as far as possible from the closest members of both classes.

$$\min_{w,b} < w, w >$$

$$s.t. y_i(< w, \phi(x_i) > + b) \geq 1,$$

$$i = 1, \ldots, l$$

Vapnik showed how training a support vector machine for pattern recognition leads to a quadratic optimization problem with bound constraints and one linear equality constraint:

$$\max W(\alpha) = \sum_{i=1}^{l} \alpha_i - \frac{1}{2} \sum_{i,j=1}^{l} y_i y_j \alpha_i \alpha_j < \phi(x_i), \phi(x_j) >$$

$$= \sum_{i=1}^{l} \alpha_i - \frac{1}{2} \sum_{i,j=1}^{l} y_i y_j \alpha_i \alpha_j K(x_i, x_j) s.t. \sum_{i=1}^{l} y_i \alpha_i$$

$$= 0, \alpha i > 0, i = 1, \ldots l.$$

Where a kernel function, K(xi, xj), is applied to allow all necessary computations to be performed directly in the input space (a kernel function K(xi, xj) is a function of the inner product between xi and xj, thus it transforms the computation of inner product < /(xi), /(xj)> to that of < xi, xj >). Conceptually, the kernel functions map the original data into a higher-dimension space and make the input data set linearly separable in the transformed space. The choice of kernel functions is highly application-dependent and it is the most important factor in support vector machine applications (Z. Huanga et. al 2004).

Let's formulate the dual program:

$$\max W(\alpha) = \sum_{i=1}^{l} \alpha_i - \frac{1}{2} \sum_{i,j=1}^{l} y_i y_j \alpha_i \alpha_j < \phi(x_i),$$

$$\phi(x_j) >= \sum_{i=1}^{l} \alpha_i - \frac{1}{2} \sum_{i,j=1}^{l} y_i y_j \alpha_i \alpha_j K(x_i, x_j) s.t. \sum_{i=1}^{l} y_i \alpha_i$$

$0 \leq \alpha i \leq C$, C is a constant that measures the penalty, i = 1, … l.

The standard SVM formulation solves only the binary classification problem, so we need to use several binary classifiers to construct a multi-class classifier or make fundamental changes to the original formulation to consider all classes at the same time.

7. CONCLUSION

CUSTOMER RELATIONSHIP MANAGEMENT (CRM) IN AUTOMOBILE INDUSTRY is undertaken to study the level of relationship with the customers. Majority of customers are satisfied with the services provided by different company such as Tata, Mahindra and Mahindra, Honda etc. serving the customers is important, customer is the king in the market and retaining them in this competitive world is more important. By proper analysis company can provide better service and maintain a good customer relationship.

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