ABSOLUTE WIN LOSS

"Win or lose, I always learn something" - Bianca Andreescu

A Project Report

submitted solely and in good faith for

the award of the degree of

MSc Computer Science - Big Data Analytics

submitted by

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(2018MSBDA015)

Under the guidance of

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Certificate

This is to certify that the submitted project titled “Absolute Win Loss” is a bonafide work done by Mr. Arkaprabha Majumdar bearing enrollment number 2018MSBDA015 in the 4th semester at Central University of Rajasthan during the year 2019-20 in the partial compliance with the award of Masters of Computer Science Big Data Analytics from Central University of Rajasthan.

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Declaration

I, Arkaprabha Majumdar, hereby declare that my thesis “Absolute Win-Loss” is based on my own work carried out during my internship at Tata Consultancy Services under the kind supervision of Mr. Harish P. The work contained in this report is original and is compliant with all the rules and regulations of both the university and TCS. The work was not submitted for any other degree / diploma / certificate at this university or at any other university in India or abroad.

In composing the study, we pursued the instructions given by the college. The data used in the study is highly sensitive and pertaining to a specific bank, the disclosure of which may be potentially harming to its clients. Therefore, under the Non-Disclosure Agreement signed with that institution, I’m unable to give the name or data regarding the real specifics of the project. It’s unfortunate, but a necessary measure to secure client information. I will however try to circumvent that by detailing the process and discussion around that project.

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Acknowledgement

I am thankful to God for the life He has thus provided, and my parents for the support. The achievement and results of this internship needed a ton of advice and help from many individuals, and I am highly lucky that this has been achieved throughout this internship and final reporting cycle. All I did is because of all the individuals concerned.

I would also like to thank my TCS squad, in particular to my regional managers, Mr. Harish P and Mr. Jitesh Nair, for offering me countless chances to work on and learn from this internship.

I am grateful to have learnt from and met the other regional managers, Mr. Naresh Unagar, Ms. Deepti Bhosle, Mr. Alok R. and Mr. Pankaj.

Special thanks to Mr. Farhan Siddiqui and Mr. Vaz Daniel, who've been my mentors throughout my internship. I'm also thankful to Ms. Varuni, Ms. Rucha for getting us the access so soon. It's been a learning experience and it's a shame I won't be able to continue working with this team.

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M.Sc. Computer Science Big Data Analytics

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Chapter 1

About The Organization

1.1 General Info:

Tata Consultancy Services (TCS) is an MNC spread across 46 countries, which specializes in consulting and providing business solutions to its clients within and outside Tata Group. TCS operates in 46 countries as of now, which is headquartered in Mumbai.

Company Name	Tata Consultancy Services
Founded	1968
Founders	J.R.D. Tata
Chairman	Natarajan Chandrasekaran
C.E.O	Rajesh Gopinathan
Revenue	22.031 billion (2020)
Parent	Tata Sons

Stock Price	2,166.85 INR (24/04/2019)
Employees	448,464 (March 2020)
Website	www.tcs.com

Table 1.1: Company Details

1.2 Company's Background:

"Umta, Ubda, Uvrashtra"

which roughly translates to " Good words, Good faith, Good deeds ".

Before delving into the project,it is first important to know the history and background of this great institution that is the TATA group. This was exactly what we were taught in our onboarding, which I would like to share with the reader.

JN Tata was a scholar from Elphinstone College, and travelled to China to learn more about the prevalent opium traders. Here he saw an opportunity in the trade of cotton and the industrial boom in cotton mills. He suffered massive business losses and yet by his impeccable reputation for honesty and integrity, he recovered his losses, going on to establish the first cotton mill in Nagpur, named "Empress Mills". Having previously visited factories and mills in Great Britain, Manchester and Pittsburg, he was appalled at the squalid working conditions during the Industrial Revolution. With a vision to establish a major steel producing centre in probably the whole of Asia, he procured the help of Mr. Charles Page Perrin and Mr. Julian Kennedy, two of the best metallurgists who finally helped him to establish a major steel center in India in Jamshedpur.

J. N. Tata established for India

(1) a major steel plant,

(2) a major Tata Hydroelectric Power Company, and

(3) a major center for scientific education, namely the establishment of the Institute of Science in

Bangalore (which was completed seven years after his death).

Mr. J. N. Tata before his death, also gifted the city of Bombay with two architectural wonders, namely the Taj Mahal Hotel at Apollo Bunder, and his own home, the Esplanade Court in Bombay. He believed that freedom without economic independence is worthless.

Mr. Naval Hormusji Tata (a relation of Mr. J. N. Tata but not a direct heir) to the Tata household who for many years was the 'face' of the Tata household and who handled several management crisis with his charming abilities and his expertise in various sports activities, until the secure reigns were handed down to Mr. J. R. D. Tata, who greatly expanded the Tata business in many business avenues, first establishing the "Imperial Airways", a first of a kind air mail delivery system in India between Karachi, Bombay and Madras and later established a world renowned airline, named AIR INDIA. Other members of the Tata household established the Prince of Wales Museum in South Bombay, the Tata Institute of Social Sciences, again in Bombay and the Tata Institute of Fundamental Research and the Tata Institute of Cancer with a host of other social programs.

I have resonated well with the TCS Values (also known as, LERIL values):

- Leading change
- Excellence
- Respect for individual
- Integrity
- Learning and sharing

1.2.1 TCS A&I:

Organizations have been focusing on tactical information needs for several years and have used technology to fuel these needs. Today they are questioned by complicated company settings resulting from enhanced rivalry and longer consumer life cycles.

There is an immediate need for organisations to create capacity to turn data into knowledge and then into company outcomes. This implies that businesses need to capitalize on enormous quantities of information by deploying the correct information leadership tools and continually invest in making more efficient and quicker choices using the best-fit analytics methodologies across various company divisions.To discover concealed trends and correlations that drive actionable intelligence, TCS Analytics and Insights Services provide a holistic perspective of big quantities of information. Our analytics alternatives include historical and predictive perspectives to support companies in strategic, tactical and operational choices and assist them to develop into a smart business.

1.3 About the Industry:

Deploying analytics is becoming more and more essential in all the job sectors to fix minute to enormous daily issues. The information technology industry in India was anticipated to achieve $1.15 billion by 2015, according to Avendus Capital (in 2012), and account for a third of India's $5.6 billion information system outsourcing (KPO) industry.

Furthermore, this was anticipated to double and become $2.3 billion by 2017-18, as per a latest study released by NASSCOM (in 2014). Most of this income would come from top businesses such as Mu-Sigma, Fractal, AbsolutData, LatentView, etc.According to Everest Group studies, the volume of worldwide analytics facilities in 2013 is between $2 2.5 billion, meaning that India owns 35% 50% of the worldwide analytics services industry.

While Bengaluru Delhi NCR has traditionally been India's analytics center, fresh towns such as Pune, Hyderabad and Chennai are coming up quickly on the map. SAS would still dominate the industry share in terms of instruments, as most banks, mobile competitors, and CPG competitors depend on SAS.

However, start-ups and consultancies have obviously begun to focus on R and Python.

Therefore, this may be up for a shift, particularly considering the trend in the U.S. Currently, there are only a restricted number of businesses operating on true big data development issue.While Big Data has created a ton of excitement, in contrast to analysts, most work opportunities today focus on designers.

In hiring the top talent straight from universities, the sector is going through really hard rivalry. This has led to a very good rise in premium institutes ' pay packages to the finest talent.A lot of intervention is anticipated in the country's heated ecommerce room in analytics in the coming moments. Data resources are anticipated to generate a distinction in the coming moments with the likes of Flipkart and Snapdeal setting up their own analytics facilities and Amazon being Amazon.

1.4 About the Department:

Tata Consultancy Services ' analytics and insights division works primarily in Gurgaon, Bangalore, Mumbai, and Chennai. AI deals with information analytics, company applications and application accelerators.

1.5 About the course:

In any undertaking, data is the most significant component. Data provides us an insight into the past, current reality, and strengthens us to forecast the future.

"**Data is the future"** in today's sense.

This project of Tata Consultancy Services (TCS) has produced notable progress in developing talent aligned with information assessment, company specifications and seamless shared

advantages for the academic and industry globe.The aim of this course is to add to the general growth of the student society by channeling practical sector understanding to the school to improve the performance and reliability of talent production.

The course has received excellent appreciation and reverence from all over the nation from academics, teachers and multiple stakeholders. We are happy to announce that the curriculum for Big Data Analytics has been created by Padma Shri Dr. Bimal Roy, former director of the Indian Statistical Institute.The course job includes Statistical Methods, Probability Stochastic Process, Linear Algebra Linear Programming, Data Science Computing, and Database Management. This program is a cooperative undertaking of the faculties of computer engineering, mathematics and statistics at Central University of Rajasthan.

1.6 Organization of Report:

Initially, beginning with some general information on TCS as a service based company and the far reaching consequences that has prevailed due to their actions. For the short time I have been in this grand institution, I have been treated like family.

Next, we delve into the nitty-gritty literature review of the project, comprising of explanations of how and why win-loss analysis should be implemented by various companies, following which is the third section with an overview of the mock data that is similar to our original data and which we cannot show for confidentiality purposes.

Then giving a brief explanation of some of the hierarchy in our data columns, we shift to our problem and discussion. In this section, I write a brief note on the lack of intuition in analysts today and how that is hampering their potential.

1.6.1 Hardware Specifications:

Ram Memory	4 GB
Screen Size	17.5’
OS	UBUNTU

Storage	1 TB HDD
Processor	Intel® Core™ i3-6006U CPU
Hardware connectivity	HDMI, USB 3.0
Graphics processing	Integrated
Processor Spd	2 GHz

Table 1.2: Hardware Specification

1.6.2 Software Specifications:

The software is nothing extraordinary, just any other commodity hardware. The language used is **Python**, a general-purpose language, which means it can be used to build just about anything - made easy with the right tools/libraries.

- Easy to Understand
- Very Flexible
- Scalable

Python packages Used:

1. Pandas targets to be an essential high-level constructing block for doing practical, real world data analyses in Python. Additionally, it has the broader intention of becoming the most powerful and flexible open source statistical evaluation/manipulation tool available in any language.
2. NumPy is the fundamental bundle for computing with Python. It contains among different things:

- an effective N-dimensional array object
- sophisticated (broadcasting) functions
- tools for integrating C/C++ and Fortran code
- beneficial linear algebra, Fourier transform, and random number capabilities.

Besides its obvious scientific uses, NumPy can also be used as an efficient multi-dimensional container of commonplace data. Arbitrary data-types can be defined. This permits NumPy to seamlessly and speedily integrate with a wide sort of databases.

3. Matplotlib is a library for making 2D plots of arrays in Python. Although it has its origins in emulating the MATLAB graphics commands, it is miles independent of MATLAB, and may be used in a Pythonic, object oriented manner. Although Matplotlib is written more often than not in natural Python, it makes heavy use of NumPy and different extension code to offer proper performance even for large arrays.

Chapter 2

Domain Knowledge

There are primarily these modules for Trade and Treasury Services:

Payments & FX	Liquidity	Client Service & Implementations
Escrow Services	Digital Channels	Receivables

(again changed for confidentiality)

Most of these are automated except liquidity structure and recommendations.

Data is pooled in from large data lakes like the GIW and GECD, and the Vanguard Business Analytics suite is used to simplify scaling and visual modeling of raw big data and in automating forecast models. It provides real time monitoring, call quality analytics and multi-vendor monitoring.

Combining demographic and market data from prospects, third party reviews of competitor products, and forums, we're to form competitor differentiation strategies for product positioning and pricing info.

We also have sales team win/loss ratio, sales rep tenure, experience of prospect, timing of sales process, etc.

Annual revenue	Industry	Employee count
Job title	Tenure	Content download website view Emails clicked

Quantitative Data:

Overall win rate	Win/Loss ratio	Win rate in presence of a competitor
Win rate by sales segment	Loss rate by reason	No. of interactions

Qualitative data, on the other hand, is always incomplete because people remember what customers said most vocally (mainly that the price is too high, service delivery issues or misalignment with customer needs). But, quantitative data finds no relationships between the price and deal renewals, and only slightly related to service delivery.

The common analysis paths for win/loss that we looked into are:

- Customer segmentation: segmenting the customers by the level of their profitability to the company (profit waterfalls) and revisiting effort allocation.
- Downward sales trend: product lines where we are losing business
- Price impact: whether a higher price affects the win/loss.
- Check for revenue targets.

Also, common win/loss errors are:

- Often wins on unprofitable dealing are treated as wins, whereas they could actually be considered as a loss. We could ,here, check for reasons such as an improvement in price.
- Over focusing on only one aspect of wins or losses.
- Not looking for product associations.

Chapter 3

Win/Loss explanations

Obviously this has no real significance in the business world. Here winning and losing is everything. But understanding how the game is played is paramount. Yet, many companies have failed to implement a proper win-loss program to make future strategies. Question is, what do you do if you lose a deal? Do you focus on continuous improvement or simply try again with the same sales approach on a larger populace?

This is where TCS steps in using its resources, skill, ingenuity and experience and tries to manage the client's win-loss analysis for them.

Benefits to win-loss:

- Foster strategic alignment
- Enable sales and boost win rates
- Hone product strategy
- Capture market and competitive intel
- Refine messaging and content

A win-loss analysis done properly should answer most of the following questions:

- How many products are in our sales pipeline?
- Are they stuck there?
- What are some of the reasons that customers refrain from buying our products?
- Detailing the reasons, what are some of the steps to mitigate or rectify them?
- Why did our prospect prefer the competitor's product over ours?
- Were there product shortcomings or the competitor was better positioned?
- What are the perceptions of the customer towards both our client and its competitors?
- Whether the sales and marketing team is even effective enough in presenting our company, its products and its value propositions?

Most companies assume the answers to the above are obvious, based on loose observations and notes from their sales teams. It is often the notion that deals are lost due to the lack of features. Yet if we study statistical data from various companies, we can find a host of reasons that are often overlooked and can be easily fixed. The impact of a good win/loss analysis is far reaching – beyond our enterprise and sales team. It can often paint a complete picture into sales channels, competitor products, price, services and marketing, in addition to the customer evaluation process.

So what is win-loss analysis?

To clarify, it is not a customer satisfaction survey. It is a process to differentiate why one sales effort wins while another falls short. The purpose is to learn the pros, cons, competitive advantages, likes, dislikes, and disadvantages from those people who are responsible for the purchase decision. Ideally it increases the rate at which new businesses are won.

2.1 Overview of the data

Our data consisted of ~30 columns that have been extracted using a CRM tool and Oracle BIEE. I have had preliminary exposure to both tools.

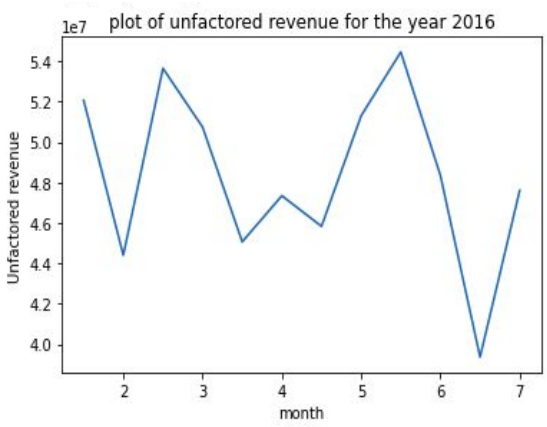
- Customer Relationship Management - it facilitates data gathering, performance analysis, and usually focuses on gratifying the consumers' needs. Especially, this is critical for banks which generally face a lack of brand loyalty and need to pay more attention to enticing and retaining. Ideally, banks ought to foresee what their customers want. Hence,
  - CRM in banking will become essential.
  - CRM helps in tracking and remembering all leads like smartphone calls, emails, and different requests from users.
  - It is an all-in-one solution to do away with chaos and bring the entirety together. Obviously, this enhances performance.
  - It also establishes unified databases which integrate essential customer info like contacts and orders. [1]
- OBIEE - it's the enterprise edition of a platform that clients can use to uncover new insights and make faster, better and knowledgeable business choices by supplying fast visual analytics and self-service discovery alongside best-in-class business analytics. Instant flexible and highly interactive dashboarding tools, powerful operational reporting, just-in-time alerts, content and metadata search, strategy management, native access to Big Data sources, sophisticated in-memory computing, and streamlined systems management combine to create Oracle BI a comprehensive solution that reduces the whole cost of ownership and increases return on investment for the entire organization.[2]

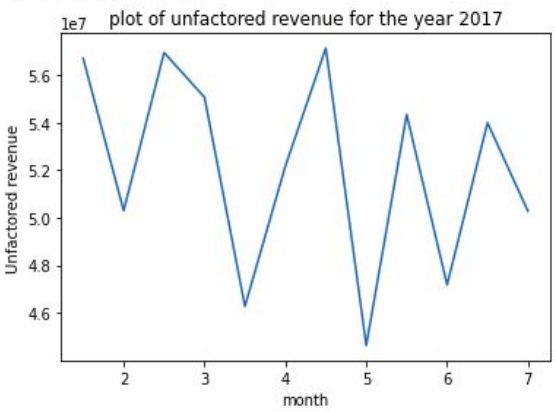
There were a few columns that we focused on after thorough discussion on the different paths we could take:

- customer reviews
  - At the end of a sales deal, the sales team generally is supposed to take a review from the client trying to figure out why it lost the deal, and if product quality was inferior or if competitor may have better relationship with the client.
  - VoC (Voice of Customer) - this is a form based review that is a part of many companies' procedures. Unfortunately, there had been a similar process here that was proposed but never implemented.
- call records – we had furnished call records between the bank and its customers for the duration of the deals, the sales team lead and its members. We could use this to primarily determine if the number of interactions between the client and customer would influence winning the deal. We could also combine this with,say, observations on which sales team mostly cited "customer relationship issues" and if their frequency of calls differed from more successful teams.

- sales team details
- company regions

Regions:[3] LATAM,CEEMEA,NAM, APAC, EMEA *(names changed for confidentiality)*





2.2 Data unfolded:

We looked into the following aspects of the data

1. Whether deals that were grouped with multiple products had better win ratios than fewer products.	2. Whether the insights held while transitioning from one market to another
3. Insert a contingency for “non competitive” reasons, like when the customer backs out AND doesn't take the deal at all.	4. Account for product shortcomings, market availability and integration of digital tools
5. Detailed commentary of sales wasn't present, so we had to combine various sources to get the remaining information.	6. Provide solutions with regards to product packaging, and long term investment worth.

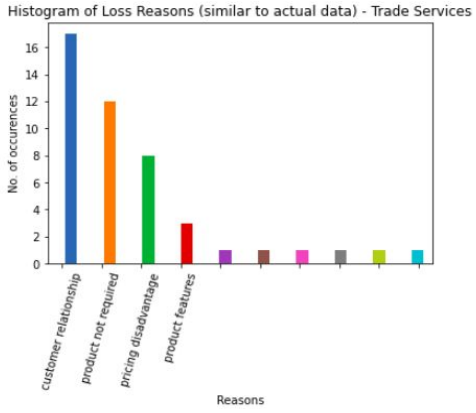
- There were 37 reason codes that were consolidated to 12 for effective reporting, including -
  - Response turnaround
  - Escalation, and
  - Language of interaction
- The deals ranged in value from 0 to a few millions, so we put an initial threshold of 500 for all deals to be even considered for analysis.

- The pricing is measured in “bps” which stands for “basic points”, which is a measure of the percentage rise in price.
- The pipeline was weighted, which meant it did not consider repeat business, and we had to find ways to incorporate that.

2.3 Looking for our problem

There’s been an increasing trend of looking at data analytics as a pipeline of models that are simply applied on to any dataset that comes forth – neural networks, GANs, sequence models, etc. In trying to apply the biggest name models, analysts often fail at the first step – analyzing the domain specific significance of every step that is done.

When speaking of a domain like banking where a lot of money is at stake, it is simply a blunder to take a dataset, label it as a simple classification or regression problem and pass it through complex neural networks without understanding exactly what the significance of such a process will be.



We aimed to find a soft niche for our client’s products, to predict the win/loss of a deal beforehand in the early pipeline stages. We checked for similar prices deals and regions to see if such deals were won or lost.

Mostly, two situations needed to be considered - a new customer, and as an incumbent.

We needed to form a pipeline for new customers based on statistical data from numerical attributes. For the old customers, we found a way to combine several fields from the OBIEE to simulate a reputation metric.

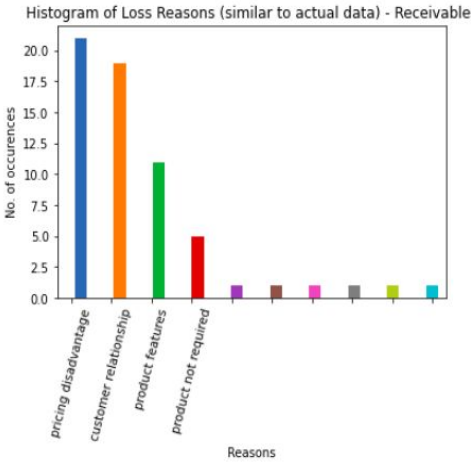
Our approach was easier : Ask simple questions – solve them – ask subsequent questions that arise.So, the first question was “Which companies have made the least and most successful deals?”

So the obvious step was to group the data by the product line and the company names, and sort the grouped data using a win to loss percentage. But then, a problem arose – many of the companies had a 100%, but they had done only 4-5 deals. That was a problem, especially when compared to a company who had done ~2000 deals with a percentage of >90%.

So we put a threshold, grouped it and extracted the names of the companies we wanted.

We set the threshold as a minimum of 10 deals.

Next we wanted to know what were the main reasons for the losses. So we plotted the loss reasons and the product lines grouped by industry, to find the reason for



losing the most deals in each product per industry. Some of the results were expected,say for example, customer relationship issues, while others were surprising – language issues, customer not needing the product anymore, etc. Perhaps, the most surprising aspect of this section of our analysis was that our intuition guessed that pricing and product qualities were probably major issues, and that was definitely not the case.

Secondly, we didn't assume that "customer relationship issues" would be so dominant.

Once, that was figured out, we decided to find out which products had the least deals, which turned out to be – Commercial Cards. But our supervisor explained that some of the products like commercial cards would always have less deals, because of select individuals getting access to these products. So we had to modify our approach.

We also started looking at the popularity of certain products in certain regions, so that we could perhaps:

- recommend similar products in those regions
- redirect push of unpopular products in certain regions.

We were able to pinpoint ~7000 deals which were in the pipeline stage that had been won by the competitor. We also observed that the number of deals won where the competitor lost was pretty less, while the plot showed that ~4500 deals won by the client were also simultaneously won by the competitor. This was probably an error in entry by the sales team, but a waste of valuable resources. Identifying them was the first step in rectifying such mistakes.

The customer review section we had initially planned on doing NLP and sentiment analysis on, turned out to be single sentences with many of them being dashes or dots. However, there were a few that gave us additional information – say, for example, that a significant number of deals were lost to nigerian banks.

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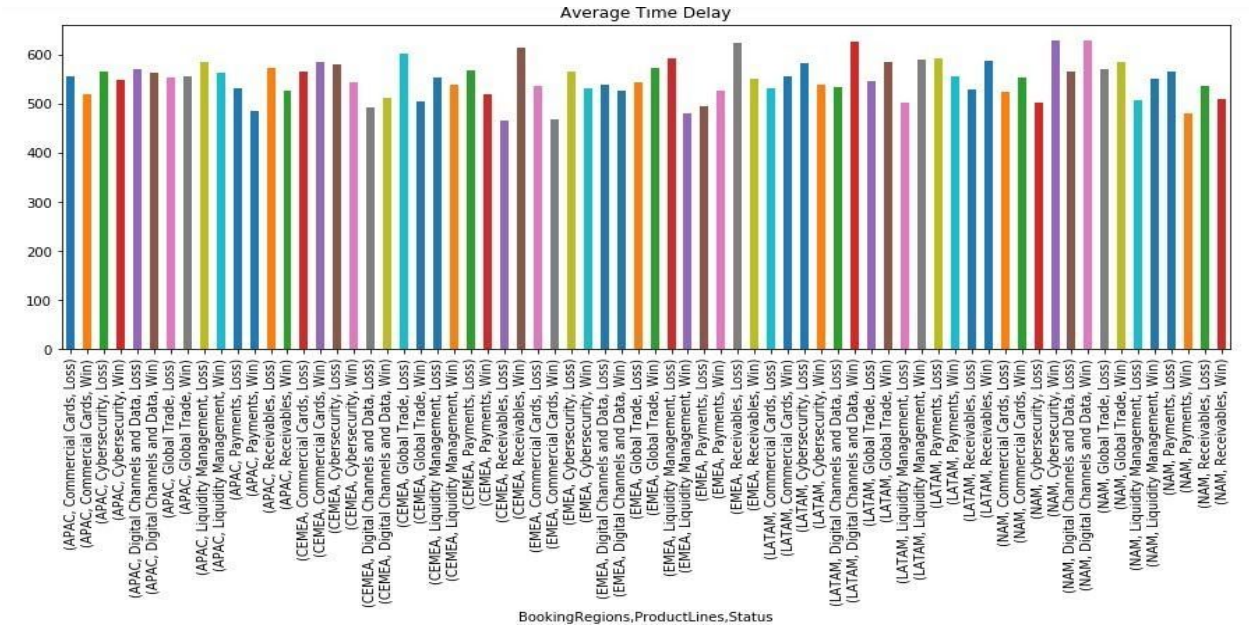
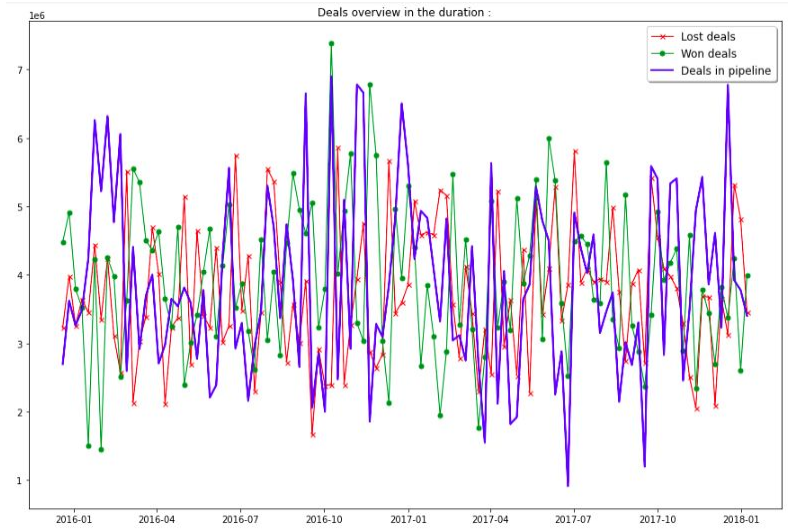


2.3 The Classification Problem:

It was apparent that it was a classification problem at its core. We grouped the data on the ‘start date’ divided into date and month, and used the group aggregation method as sum() , i.e., the total ‘Unfactored Revenue’ per day over the duration of our deals.

We found the time delay between the start day and the day the deal was finally won/lost.



We’ve split the portion of the data with labels ‘Win’ and ‘Loss’ into our train and test datasets with a size of 33 % , converted categorical variables like ‘Win/Loss Reasons’, ‘sales stage', 'BookingRegions' and 'ProductLines'.

Training the data on a pipeline consisting of the popular classification algorithms:–

KneighborsClassifier(),

DecisionTreeClassifier(),

MLPClassifier(),

GradientBoostingClassifier(),

XGBClassifier(),

LGBClassifier(),

CatboostClassifier().

```
Combination of all classifiers report :

 1. knn
2. decision tree
3. mlp
4. gbc
5. xgb
6. lgb
7. cat
value :  0.5200729927007299
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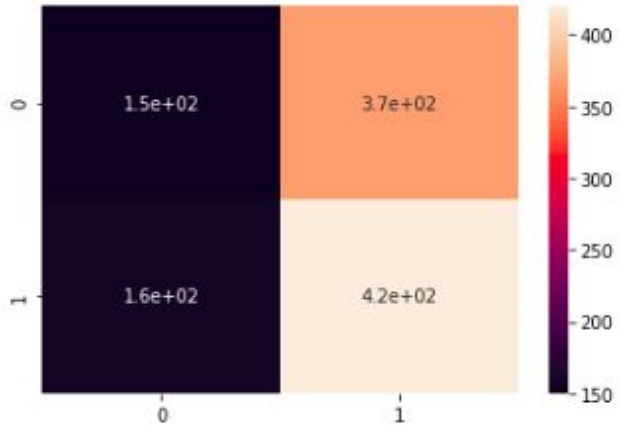


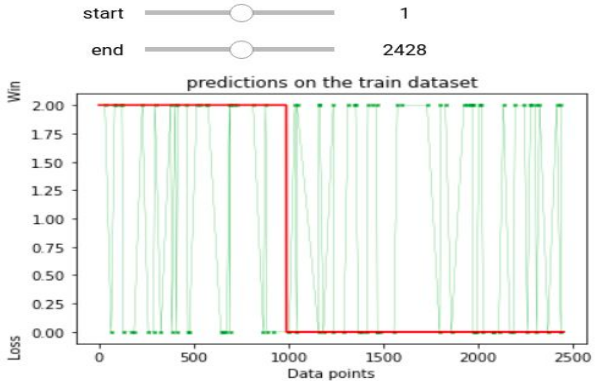
Using majority voting, and each of the classifier's respective accuracies as the weights, we got an accuracy value of 52 %. I would like to remind the reader at this point that the data on which all the above analysis has been performed is entirely fake and created by me. Since there is no order to this fabrication, the above pipeline performs just slightly above randomness.

But using the actual dataset that was provided by the client, it would have a much higher accuracy to predict whether a deal will be won or not.

2.3. Call records - future insights

We then started analysis on the call records data, which had time-stamped call details for each client in the duration of the deals(3 years). We don't have access to that specific data anymore, unfortunately, due to the pandemic. It would have given us good inference on if the amount of interaction with the customer influences their decision, especially in the case of customer relationship issues.

The predictions for the train dataset (the deals already labeled) were quite along the correct direction , as seen in the plot beside.



2.4 Recommender system in the works:

We wanted further to build a recommender system with the region and deal amount as parameters. And since we have the list of deals at each date for each region, it is perfect for association rule mining.

antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	conviction
(CCards)	(Liquidity_mgmt)	0.150252	0.328766	0.049372	0.328595	0.999479	-0.000026	0.999745
(CCards)	(PaymentsFX)	0.150252	0.300328	0.045354	0.301853	1.005077	0.000229	1.002184
(Cybersecurity)	(Liquidity)	0.199922	0.299732	0.059978	0.300007	1.000917	0.000055	1.000393
(Cybersecurity)	(Liquidity_mgmt)	0.199922	0.328766	0.065664	0.328448	0.999033	-0.000064	0.999527
(Cybersecurity)	(PaymentsFX)	0.199922	0.300328	0.060028	0.300257	0.999764	-0.000014	0.999899
(GTrade)	(Liquidity)	0.201446	0.299732	0.060472	0.300190	1.001527	0.000092	1.000654
(Liquidity)	(Liquidity_mgmt)	0.299732	0.328766	0.098302	0.327966	0.997568	-0.000240	0.998810
(AccessFX)	(Liquidity)	0.299654	0.299732	0.090020	0.300413	1.002273	0.000204	1.000974
(Liquidity)	(AccessFX)	0.299732	0.299654	0.090020	0.300335	1.002273	0.000204	1.000973
(Receivables)	(Liquidity_mgmt)	0.200722	0.328766	0.065834	0.327986	0.997627	-0.000157	0.998839
(Receivables)	(PaymentsFX)	0.200722	0.300328	0.060348	0.300655	1.001088	0.000066	1.000467
(Receivables)	(AccessFX)	0.200722	0.299654	0.060500	0.301412	1.005866	0.000353	1.002516
(Digital)	(Payments)	0.199946	0.299546	0.060268	0.301421	1.006261	0.000375	1.002685
(Digital)	(Liquidity_mgmt)	0.199946	0.328766	0.065778	0.328979	1.000647	0.000043	1.000317
(Digital)	(AccessFX)	0.199946	0.299654	0.060076	0.300461	1.002694	0.000161	1.001154
(GTrade)	(Payments)	0.201446	0.299546	0.060510	0.300378	1.002778	0.000168	1.001190
(Liquidity_mgmt)	(Payments)	0.328766	0.299546	0.098630	0.300001	1.001518	0.000149	1.000649
(Payments)	(Liquidity_mgmt)	0.299546	0.328766	0.098630	0.329265	1.001518	0.000149	1.000744
(GTrade)	(Liquidity_mgmt)	0.201446	0.328766	0.066320	0.329220	1.001380	0.000091	1.000676
(GTrade)	(PaymentsFX)	0.201446	0.300328	0.060550	0.300577	1.000829	0.000050	1.000356
(GTrade)	(AccessFX)	0.201446	0.299654	0.060540	0.300527	1.002914	0.000176	1.001248

The products that are popular in a certain region can be used to recommend similar products to clients. Further, we can let an expert check the recommendations, label them and use those labels to retrain our model, making it stronger.

This is important, because there is no room for error when dealing with sensitive data.

Support, confidence and lift measures are used to assess the usefulness of the generated rules, with the following definitions:

$$\text{Support} = P(i_a \cap i_b)$$

$$\text{Confidence} = P(i_b|i_a) = P(i_a \cap i_b)/P(i_a)$$

$$\text{Lift} = P(i_b|i_a)/P(i_b) = P(i_a \cap i_b)/P(i_a)P(i_b)$$

2.5 Conclusion:

The scale of disturbance activated by the COVID-19 emergency – counting diminished physical developments and cash stream weights – have together tossed the errand of treasury into sharp alleviation. From dynamic commerce models to the requirement for an omni-channel nearness, E-commerce presents businesses with unused challenges.

Deals cycles will significantly alter due to a combination of components counting the quick pace of mechanical advancement, large scale shifts affecting commerce models and administrative weights. As the transaction scene proceeds to alter and change there are numerous components that have to be taken into thought from financial, administrative and geopolitical components, to moving trade models and developing advanced opportunity. Hopefully, our approaches will be modified further by our clients to further diminish chance and drive effectiveness.

2.6 References:

[1](https://diceus.com/crm-in-banking-choosing-best-option-for-business/)

[2](https://www.oracle.com/middleware/technologies/bi-enterprise-edition.html)

[3](https://en.wikipedia.org/wiki/List_of_country_groupings#CEEMEA)

[4](https://www.theguardian.com/world/2020/mar/03/banks-issue-emergency-loans-to-firms-hit-by-coronavirus-crisis)

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