**Business Understanding**

**Instructions:**

Please share your answers filled in-line in the word document. Submit code separately wherever applicable.

Please ensure you update all the details:

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_ Batch ID:** \_\_\_\_\_\_\_\_\_\_\_

**Topic: Business Understanding**

**Instructions:** Learn to understand the business objective(s) and constraint(s) based on the business problem statements. You should identify and frame statements using the words “maximize” and/or “minimize” for objective(s) and constraint(s) (for example: “maximize profit” “minimize risk”, etc.)

**Grading Guidelines:**

**1. An assignment submission is considered complete only when correct and executable code(s) are submitted along with the documentation explaining the method and results. Failing to submit either of those will be considered an invalid submission and will not be considered for evaluation.**

**2. Assignments submitted after the deadline will affect your grades.**

**Grading:**

| **Ans** | **Date** |  |  | **Ans** | **Date** |
| --- | --- | --- | --- | --- | --- |
| Correct | On time | A | 100 |  |  |
| 80% & above | On time | B | 85 | Correct | Late |
| 50% & above | On time | C | 75 | 80% & above | Late |
| 50% & below | On time | D | 65 | 50% & above | Late |
|  |  | E | 55 | 50% & below |  |
| Copied/No Submission |  | F | 45 |  |  |

* **Grade A: (>= 90):** When all assignments are submitted on or before the given deadline.
* **Grade B: (>= 80 and < 90):** 
  + When assignments are submitted on time but less than 80% of problems are completed.

(OR)

* + All assignments are submitted after the deadline.
* **Grade C: (>= 70 and < 80):** 
  + When assignments are submitted on time but less than 50% of the problems are completed.

(OR)

* + Less than 80% of problems in the assignments are submitted after the deadline.
* **Grade D: (>= 60 and < 70):**
  + Assignments submitted after the deadline and with 50% or less problems.
* **Grade E: (>= 50 and < 60):** 
  + Less than 30% of problems in the assignments are submitted after the deadline.

(OR)

* + Less than 30% of problems in the assignments are submitted before the deadline.
* **Grade F: (< 50):** No submission (or) malpractice.

Q1. For the below listed business problems, draft the business objectives and constraints.

**Hint:**

* Objective(s) implies the goals to be achieved in terms of maximizing & minimizing.
* Constraint(s) are the challenges/limitations in achieving the objectives.

| **S.no** | **Business Problem** |
| --- | --- |
| **Hint:** | Smart data platforms can bring together customer transactions data and data from real-time communication streams to disclose the insights concerning customers feelings about the services which allows addressing the satisfaction-related issues and churn prevention.  **Sol: Hint**  Business Objective:  Minimize: Churn rate (churning implies customers going to another company for their needs)  (or)  Maximize: Customer satisfaction (satisfaction will make customer more loyal to the brand)  Business Constraints: Lack of data coverage for all customers |
| 1 | Advanced targeting allows predicting needs, preferences, and customers’ reaction to the telecommunication services and products on offer by segmenting their market and targeting the content according to each group.  Business Objective:  Maximize: Customer segmentation (The key to success for the telecommunication companies is to segment their market and target the content according to each group.)  Business Constraints: Cost (Segmentation of market may lead to higher cost.) |
| 2 | Telecommunication companies tend to regard the customers’ engagement process and internal channels as a guarantee of smooth functioning of the operations. Network management and optimization gives an opportunity to identify the root causes.  Business Objective:  Minimize: Strain on network(It minimize costs and increase data flow)  Maximize: Better network experience for users.  Business Constraints:   * Traffic increase (There’s a constant increase in the number of devices attached to the network. There’s more traffic in all directions. Without the right equipment at endpoints and midpoints along the way, it’s impossible to provide the high-speed & reliable communication needed by today’s applications. As networks increase in size, overseeing the network configuration increases in difficulty.) * Security (It involves protecting the network from different cyber attacks, preventing unauthorized users to enter and access systems, and maintaining network integrity. All these security issues increase with increase in network size when network size is large there chance of security issues are more.) * Budget (Available budget almost never meets the need for network services, especially when the network now needs to support not just traditional IT applications but also conventional business services like telephony (in the form of VoIP) and videoconferencing that require new levels of network quality.). |
| 3 | Ensuring the high-quality performance of the product according to the customer’s requirement is not possible without applying smart data solutions.  Business Objective:  Minimize: Cost of development.  Maximize: Customer satisfaction and confidence in the product (which in turn increases the marketshare of the company.).  Business Constraints:   * Budget: Try to make sure the product objectives can be achieved within the cost margins the market will bear. * Validation overhead: Validation is a time-consuming process, or an expensive one. With tight budgets and even tighter deadlines, the time and expense of validating a new system is a big hurdle to overcome. * Bureaucracy: Many companies have complicated rules and processes that stand in the way of improving their development processes. |
| 4 | Collection of positive & negative reactions to the service or product from social media sources, recent trends via customer sentiment analysis may provide an opportunity to utilize mechanisms for direct responding.  Business Objective:  Minimize: Waiting time for customers (sentiment analysis automates the jobs, route customer tickets to the correct teams and deal with them as swiftly as possible.)  Maximize: Profits (customer sentiment analysis can improve your customer satisfaction index, customer loyalty, and customer lifetime value multiple folds, and thus maximize the profits for your business.)  Business Constraints: Analysis may not be able to detect:   * Sarcasm: Sarcasm is when people express their negative sentiments using positive words. This fact allows sarcasm to easily cheat sentiment analysis models * Negation: In linguistics, negation is a way of reversing the polarity of words, phrases, and even sentences. It’s also important to determine the range of the words that are affected by negation words. * Word ambiguity: The problem of word ambiguity is the impossibility to define polarity in advance because the polarity for some words is strongly dependent on the sentence context. * Multipolarity: Sometimes, a text we would like to analyze—will exhibit multipolarity. In these cases, having only the total result of the analysis can be misleading |
| 5 | Acquiring as many subscribers as possible remains a critical goal. In recent years, the number of users has been growing extremely fast and pricing emerged as a tool to limit congestion and increase revenue at the same time.  Business Objective:  Maximize: Price Optimization (Price optimization is the use of mathematical analysis by a company to determine how customers will respond to different prices for its products and services through different channels.). By using this both company as well as users get benefitted.  Minimize: Congestion. (Congestion is a market situation where the demand to buy an asset or trading instrument is matched by the seller's supply. This results in the price not moving significantly, making the price action consolidated or look congested.)  Business Constraints:   * Time and effort: Customer research needed to figure out the right valuations takes time and effort. * Attitude of the business organization: Companies turn to strategies like guessing, relying on discounts, and not relying on Value based pricing. |
| 6 | Customers usually search for better & cheaper services so the telecommunication companies measure, manage, and predict the customer lifetime value (CLV). Smart solutions process real-time insights based on customer purchasing behavior, activity, services utilized, and average customer value.  Business Objective:  Maximize: Retention of customers having high CLV to increase the profitability of the firm.  Business Constraints:   * Calculation of CLV. (If wrongly calculated may result in loss.) * Human behavior. (Retention of a customer also depends on his satisfaction level. A high value customer may leave the services if he gets dissatisfied.) |
| 7 | In telecommunications, companies prevent bypass fraud by using big data to review the source of transactions, the cost of the call, and the destination number, in real-world situations.  Business Objective:  Minimize: Unauthorized traffic in a network.  Maximize: Detection and prevention of fraud calls.  Business Constraints:   * Customer mobility, churn and liability: Being bitten by fraud is a massively negative customer experience, causing disruption and threatening relationships. * Ineffective blacklisting: IP blacklisting. This was never really that effective and when IPv6 comes into full force then not only will existing lists become meaningless, but with the availability of billions more IPs it’ll be even easier for fraudsters to use new IP ranges and avoid being blacklisted. * IoT: It is another dynamic, simply because as more devices connect to a network there are potentially more ways to get in to that network. This provides hackers with more avenues to exploit and greater opportunity, whilst forcing service providers to rely on their partners and end users to maintain good practice in security. |
| 8 | Identify security issues, conduct predictive analysis, and use machine learning-based solutions to analyze any patterns of threats and automated escalations to resolve issues before they cause serious damage.  Business Objective:  Minimize: Entry or proliferation within a network of a wide variety of potential threats.  Maximize: Confidentiality, Integrity, and Availability. These three pillars of Network Security.  Business Constraints:   * Misconfiguration:  Most of firewall breaches are caused by misconfigurations rather than firewall flaws. * Lax control of privileged access:Privileged access abuse is a favored method of hackers because it’s easier for them to exploit existing credentials than to hack into a network. * Lack of visibility: Visibility changes from moment to moment as new devices and endpoints join and leave the network. |
| 9 | Retail industry uses AI systems with built-in machine learning algorithms to collect and analyze data regarding products, transactions, etc. Based on findings from data, systems estimate the best strategies that can be implemented for the profit of the business  Business Objective:  Maximize: Business profits.  Business Constraints:   * Lack of knowledge: Knowledge of the systems is required for smooth functioning of the system. * Cost: Increased cost will be incurred at initial stage for installation and operation of the system. * Bureaucracy: Due to high initial incurred cost many company opt out. |
| 10 | The price determination process depends not only on the costs to produce an item but on the wallet of a typical customer and the competitors' offers. The tools for data analysis bring this issue to a new level of its approach.  Business Objective:  Maximize: Price optimization  Business Constraints:   * Time and effort: Customer research needed to figure out the right valuations takes time and effort. * Attitude of the business organization: Companies turn to strategies like guessing, relying on discounts, and not relying on Value based pricing. |
| 11 | Inventory deals with stocking goods for their future use. Inventory management refers to stocking goods to use in times of crisis. The retailers aim to provide the right product at the right time in the proper condition.  Business Objective:  Minimize: Holding, replacement and shortage costs of inventories  Maximize: Efficiency in production and distribution ofinventory, so that we can fulfill customer demand.  Business Constraints:   * Tracking: Using manual inventory tracking procedures across different software and spreadsheets is time-consuming, redundant and vulnerable to errors * Warehouse efficiency: Inventory management at the warehouse is to be performed on all the tasks like receiving and putaway, picking, packing and shipping in the most efficient way possible. * Inaccurate data: Data updating is needed to be done at regular intervals to keep track of available inventory. * Managing Warehouse Space: Efficiently managing space is a very important task. It increases efficiency. * Lack of expertise and poor communication: Skilled inventory managers who are adept at the latest technology can improve inventory management. Communication is the key. If proper communication is not there then, it makes identifying inventory trends and finding ways to improve much more difficult. |
| 12 | Customer feedback is taken as an important aspect of the retail store. Considering customer feedback and making changes can increase the store profits and customer satisfaction.  Business Objective:  Minimize: Mistakes that causes dissatisfaction.  Maximize: Profits (customer sentiment analysis can improve your customer satisfaction index, customer loyalty, and customer lifetime value multiple folds, and thus maximize the profits for your business.)  Business Constraints:   * Response to grievances: Responding to customer grievances in an efficient and effective manner. * Response time: Retail businesses should have systems in place to quickly track customer complaints. |
| 13 | Businesses have to be extremely cautious about choosing a new store's location. To make such a decision, a great deal of study regarding the location is required which gives us a basis for understanding the potential of the market. Also, special settings concerning the location of other stores are considered.  Business Objective:  Minimize: Customer defections.  Maximize: Profits and customer satisfaction. Choosing a location where the customer will have ease of access and other facilities like parking raise their satisfaction level which in turn increases profits.  Business Constraints:   * Type of store * Budget * Workforce Attributes * Competition nearby * Footfall * Accessibility |
| 14 | Airlines use AI systems with built-in machine learning algorithms to collect and analyze flight data regarding each route distance, altitudes, aircraft type, weight, weather, etc. Based on findings from the data, systems estimate the optimal amount of fuel needed for a flight.  Business Objective:  Minimize: Fuel emission and fuel cost.  Maximize: Fuel efficiency  Business Constraints:   * Cost of fuel: Airlines spend 33 percent of their operating costs on fuel. Any change in fuel prices causes a huge difference in operating costs. * Lift-to-drag ratio: Reducing this makes an aircraft more aerodynamic and hence uses less fuel. * Engine systems: A well maintained engine requires less fuel. Also by new research light weight and electric hybrid engine are being created which also consumes less fuel. |
| 15 | Airlines and flight operators can significantly reduce their operational costs and overhead by optimizing their sales revenue in the longer term with AI-powered systems (dynamic pricing)  Business Objective:  Maximize: Revenue  Business Constraints:   * Data dependent: Dynamic pricing relies heavily on data, and when pricing is being changed on the basis of hours or even minutes, ensuring that the data driving pricing decisions is accurate is highly critical. * Customer behavior: Customer have to book tickets earlier due to dynamic pricing, which causes last minute cancellation and rebooking a bad experience. |
| 16 | As flight delays are dependent on a huge number of factors, an intelligent system can be applied to analyze huge datasets in real time to predict delays and re-book customers’ flights in time.  Business Objective:  Maximize: Customer satisfaction and incomes of airline agencies.  Business Constraints:   * Weather and Natural Disaster * Emergency problems * Acts of terrorism |
| 17 | By analyzing specific customer’s flight and purchase patterns, and coupling it with historic data, algorithms are able to point out suspicious credit card transactions and detect fraudulent cases thereby saving airline and travel companies millions of dollars every year.  Business Objective:  Minimize: Loss due to fraudulent transactions.  Maximize: Detection of fraud transactions.  Business Constraints:   * Fraud patterns: Changing fraud patterns over time makes it difficult to detect. * Time: Feature generation for fraud detection could take a very long time. |
| 18 | What is the optimal way to schedule an airline’s crew to maximize their productive time and balance their working hours to increase employee retention?  Business Objective:  Minimize: Pay-and-credit, the payments made above and beyond the cost of the actual flying time.  Business Constraints:   * government regulations concerning flight time, duty time and required rest, designed to promote aviation safety and limit pilot fatigue, * crew bid requests, vacations * labor agreements * aircraft maintenance schedules * crew member qualification and licensing * other constraints related to training * pairing experienced crew members with more junior crew members * returning crew to their base at the end of their trip (called deadheading) |
| 19 | The image of the enterprise in the community largely influences the recruitment process. A person may not be interested in applying for a job in an enterprise whose goodwill is low.  Business Objective:  Maximize: Profit. (Businesses with a good reputation make greater profits.)  Business Constraints:   * Reputation: Good reputation attracts better people. * Customer reviews. |
| 20 | If the job is boring, hazardous, tension ridden, and lacking in opportunities for advancement, very few people may be available for such jobs.  Business Objective:  Maximize: Good personnel recruitment by providing good working environment and perks. It enhances the productivity of the personnel and in turn it increases the profitability of the business.  Business Constraints:   * Work culture: Figuring out how to be part of a new work culture can at times be frustrating. * Workplace Ethics and Integrity: Poor business and workplace ethics can be hazardous to your job security. Never compromise your integrity. |
| 21 | One of the greatest challenges that an HR leader could face is keeping the staff satisfied.  Business Objective:  Maximize: Customer retention.  Business Constraints:   * Workplace Culture: Research has proven that culture influences organizational performance, whether performance is defined in terms of customer satisfaction, attendance, safety, stock price or productivity. |
| 22 | Organizations face huge costs resulting from employee turnover. Some costs are tangible such as training expenses and the time it takes from when an employee starts to when they become a productive member.  Business Objective:  Minimize: Loss due to employee attrition.  Business Constraints:   * Cost: Attrition causes huge loss to the company. * Salary: one of the major reasons for employee turnover is salary. * Job opportunities: There is a cut-throat competition to attract the best talent in the market. |
| 23 | Attracting the attention of a candidate and driving the traffic towards a company’s hiring page is one place where an AI can see widespread use.  Business Objective:  Maximize: Success of the organization by identifying, recruiting and holding on to people that are responsible for growth.  Business Constraints:   * Good reputation and culture: A place with good culture is sure to increase the productivity. Good reputation brings good talent to the job. * Flexibility in Job: New talent in this age requires flexible working hours and the ability to work from home. |
| 24 | HR departments are responsible for the implementation of training programs. Some of these programs are designed to ensure your staff follows policies and procedures while others are used for job advancement. In some job settings, employees are required to complete certain certification programs.  Business Objective:  Maximize: Productivity by making the employee more knowledgeable about the job.  Business Constraints:   * Information dissemination: Proper information should be provided to the trainee without overloading. * Training methods: Traditional methods of employee training won’t work anymore. Organizational training goals are hard to achieve without effective training methods in place. There is a significant rise in remote work culture and your training problems will get worse if you fail to innovate your training strategies. * Support system: Employee support is an ongoing process where the IT team looks after employee feedback regularly and thoroughly. |
| 25 | Understanding people and why they decide to stay at or leave a job is arguably one of the most important questions for HR to answer. Identifying attrition risk calls for advanced pattern recognition in surveying an array of variables.  Business Objective:  Minimize: Employee attrition.  Business Constraints:   * Salary: Major cause of attrition. * Workplace environment: A good environment is required for employee growth. * Job opportunities: Ample job opportunities mean that employee may defect. |
| 26 | Your HR department likely deals with many requests and queries from employees throughout the day. This could include queries about available time off, vacation time, or HR issues with their paycheck. They may also receive requests for shift swaps and other scheduling problems.  Business Objective:  Minimize: Loss due to improper scheduling.  Business Constraints:   * Time management: Poor planning will cause improper time management. * Customer satisfaction: Poor planning of a project will not meet the expectations of the customers. |
| 27 | In modern manufacturing, production can often depend on a few critical machines or cells. The same data that provides a manufacturer real-time monitoring can be analyzed through data science to improve asset management and prevent machine failure.  Business Objective:  Minimize: Loss caused due to machine breakdown.  Business Constraints:   * Monitoring: Proper monitoring is needed for fault prediction * Complex processes: Many processes are very complex and require further knowledge. * Resources: It requires expenditure of resources for finding out solutions. |
| 28 | Plan to help manufacturers analyze if their product and services are meeting all objectives for initial processes such as the DMAIC framework. They need a strategy to be used to determine which product has the highest impact. Helping in minimizing errors and losses and eliminating unnecessary human effort can increase the overall quality of products and services.  Business Objective:  Maximize: Quality assurance and profits.  Business Constraints:   * Communication: Proper communication should be there about product requirements. * Automation: Automated tools and their knowledge is required to provide quality assurance. |
| 29 | Some flaws in products are too small to be noticed by the naked eye even if the inspector is very experienced. The time taken for inspection also slows down the production.  Business Objective:  Minimize: Errors due to visual inspection  Maximize: Product quality.  Business Constraints:   * Dependability: One cannot entirely depend on human vision for inspection. * Imprecision: Human eyes are imprecise when it comes to measurements. * Cost: Manual inspection is a bit costly as trained individuals are needed. |
| 30 | A business wants to make design enhancements/upgrades to the current version of the product to increase consumption of the product and thereby the brand image. They need to identify the features which most of the customers use and they need to understand customer behavior towards the product, brand, and their interests.  Business Objective:  Maximize: Consumption of upgraded product to increase brand image.  Business Constraints:   * Price sensitivity: Whenever the choice of a product depends on its price * Consumer: A consumer’s personality, his behavioral attitudes, beliefs and values may change from time to time so consumer behavior analysis also needs updating. |
| 31 | For many contract manufacturers, product development is part of the service they provide so having data to validate their choices to their customer is crucial. To validate the choices, they need to depend on a wide range of factors such as value for money, quality, reliability, and service. It is crucial to gather such data.  Business Objective:  Maximize: Quality of product to be developed.  Business Constraints:   * Quality: Sometimes contractors cannot adhere to quality standard. So, choosing a contractor is a very important task. * Design: Contractors don’t have any control over the manufacturing design as the goods are produced as per guidelines of contract. |
| 32 | Manufacturers are able to detect all kinds of issues on their routine methods of production, from bottlenecks to unprofitable production lines. Companies are taking a deeper look into their logistics, inventory, assets, and supply chain management. The insights will bring high-value insights that uncover potential opportunities not just in the manufacturing process but also in the packaging and distribution.  Business Objective:  Maximize: Process efficiency  Business Constraints:   * Bureaucracy: Lack of Support and Leadership by Upper Management * Training:Lack of Professional Development or Training * Prioritization: Include your employees on prioritization processes, so that they feel connected to change and improvements. |
| 33 | The Department of Employment, Skills and Small Business carries out research to identify skill shortages in the labor market. Factors for skilled labor shortage analysis are adequate availability of vacancy, job postings and recruitments, applicants’ qualifications for the job, factors affecting the position to be filled, such as required licensing requirements, qualification and experience requirements are few of those constraints that should be considered.  Business Objective:  Maximize: Availability of job opportunities according to skill level to fulfill skill shortages.  Business Constraints:   * Credentials: Fake credentials may cause dissatisfaction among the recruiting company. * Adaptability: It's important to keep an open mind when looking at your available skill sets, paying close attention to skills that could be transferable. * Contigent workers: freelancers, consultants, contractors and more, you can fill massive gaps in your operation quickly and in a cost-effective manner. |
| 34 | The world is constantly changing. Thus, the sports industry is faced with the challenge of trying to predict the next trend, the next big idea that will capture their audience. Coupling this challenge with that of technology, it’s clear that some sports teams and venues will always be at odds.  Business Objective:  Maximize: Good predictions of the future based on historical data and present data.  Business Constraints:   * Volume: Working with low volume data doesn’t produce accurate results * Statistics: Use proper assumptions and statistics to calculate outcomes. * Model: Use of linear models on non linear interaction. |
| 35 | A team can find out the strengths and weaknesses of key players in the opposite team by analyzing past data and device their own tactics accordingly.    Business Objective:  Maximize: Performance of a team by anticipating opponents plans and use appropriate plan.  Business Constraints:   * Plan Change: If opponent changes its plan to suit according to present team plan. * Statistics: Proper statistical calculations are needed to be done. |
| 36 | Using machine learning algorithms to find out the profile of players who are best to be bought/sold.  Business Objective:  Minimize: The cost of acquiring the best team possible.  Business Constraints:   * Budget: Budget plays an important role in this. * Team building: Building an all round team is also a necessity |
| 37 | Betting companies analyze the massive amounts of data generated by sporting events all around the world to come up with probabilities for future outcomes. Goes without saying that predictive modelling using machine learning techniques plays an important role in this.  Business Objective:  Maximize: Good predictions of the future based on historical data and present data.  Business Constraints:   * Volume: Working with low volume data doesn’t produce accurate results * Statistics: Use proper assumptions and statistics to calculate outcomes. * Model: Use of linear models on non linear interaction. |
| 38 | Stadium management and sponsors have studied the average profile of their audience carefully and have made targeted advertisements that appeal to their audiences. The broadcasters and stadium management have placed those ads carefully after conducting a careful analysis of its own resources for maximum impact.  Business Objective:  Maximize: Sale based on customer’s interests by targeted ads which informs, persuades and reminds potential customers.  Business Constraints:   * Privacy concerns: Targeted advertising is performed by analyzing consumers' activities through online services without their consent which can be seen as detrimental to consumers' privacy. * Time, Effort and Money: It takes time and effort to analyze the behavior of consumers. This results in more expenses than the traditional advertising processes. |