Loan Approval Desk: Computational Thinking Approach

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Computational Thinking End-Term Report

ABSTRACT

For the Computational Thinking End-Term Report, I have developed a Loan Approval Desk Platform Named "Vidyashilp-Your Financial Partner" using CT concepts. Based on the Customers' requirement for the loan, this desk will tell whether their loan can be approved/rejected and which bank to approach for their required loan also the customer can directly apply for a loan by selecting a bank and loan type from the approval desk. I have tried showing the working of an Online Loan Desk and have covered the basic functionality of the Bank Loan Management System. People require loans for various purposes be it for Education, Business, Agriculture & Homes, so to make it easier for them to get loans, this desk would play an important and helpful role. Even software can also be developed which can provide all the facilities to the customer. The system is then designed in accordance with specifications to satisfy the requirements of customers. This system would help people to avoid crowding and loan rejection and directly apply for the loan through this desk. And this would

INTRODUCTION

Problem Statement- One of the most important factors that cause problems while taking a loan is the requirement & criteria of the bank that don't meet the customers' expectations. Also, they don't know their **Credit** Information Bureau (India) Limited (CIBIL) Score and its importance & usage. We know that people require money in almost all aspects of life be it for business, shopping, farming, Homes, Education, etc. Many times, they lack money to fulfill their requirements. So, they opt for loans from various sources. Issuing loans directly from banks requires lots of time, effort, and patience, even then some people's loans are rejected and some people end up taking loans at a higher interest rate. Many people lack proper knowledge of the bank loan management system, this often creates problems during loan issuance and repayments.

Why does it need to be solved?

Every customer & Bank has a different requirement and many times the requirements for both customer and bank are not met, resulting in loan rejection and a waste of time & effort. Many of these people are not familiar with the types of loans and the necessities that are required to take the loan such as required documents, eligibility, and the method of repayment. This issue creates a lot of problems in the Bank Management System It also becomes very difficult for the bank to have physical verification of documents and manage the records of the customers. At times it becomes very difficult for customers to match the size of the loan with repayment abilities. So to eliminate all these problems, an efficient and smooth system is required.

Using CT concepts (*Decomposition, Abstraction, Pattern Matching & Algorithm, Evaluation*) we can easily solve this problem and make the loan approval system, even more, user-friendly and efficient. Using *Decomposition,* we can break down the problem into smaller sub-problems, and then each can be dealt with separately.

The second stage, *Pattern Recognition*, asks for the problem solver to search for patterns in the data in the problem that can be used to effectively develop a solution. After that, *Abstraction* is done. Patterns are abstracted in the problem so we can filter out unnecessary data and focus on the relevant information. The fourth step is *Algorithm Design*, where the problem solver develops the solution to the issue in a systematic way. The final step in the problem-solving process is to assess the algorithm to make sure that it has all the necessary steps for a complete solution. If these procedures are properly followed, this will result in an efficient solution that can solve the problem.

LITERATURE SURVEY

Computational thinking is forming a new way of thinking where we can formulate a problem and propose several solutions to come up with the best one. There are some steps involved in solving any problem. These are as follows: -

- Defining the problem
- Brainstorming solutions
- Picking up a solution
- Implementing the solution
- Reviewing the result

We can't find the best solution on the very first attempt. If needed, we would also have to go back to the previous steps to make it work or improve. There are many misconceptions about computational thinking that is the same as coding. But the truth is that coding is a way to teach CT. It's something more than programming, CT is about understanding the problem and formulating a solution before coding. The main goal of CT is to make us apply common elements to solve problems and discover new questions that can be explored within and across all areas, including Math, Science, Economics, Psychology, Design, and Management. **Steps of Computational Thinking-**

- Decomposition – To simplify the problem, the problem solver needs to identify sub-problems that can be handled more efficiently. Then each sub-problem can be solved individually. Hence, breaking the complexity of the problem.
- Pattern matching – Looking for the patterns of information throughout the sub-problems. It’s basically the information that is common or repeats itself in sub-problems and then Analyzing the repeating element.

- Abstraction - Removing unnecessary information or filtering out the details of the pattern so that a generalized representation of the pattern can be used to solve the problem. We need to focus on the relevant and required data to efficiently solve the problem

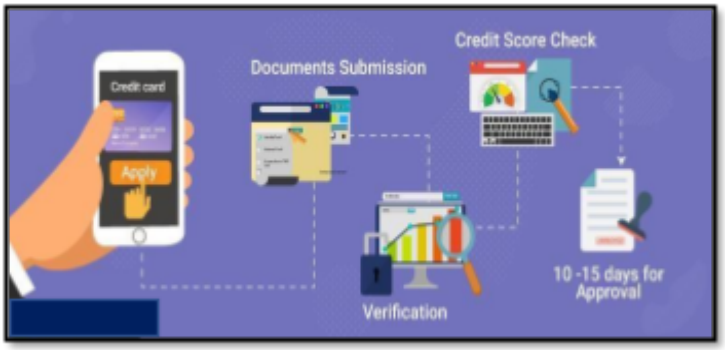
- Algorithm - Creating step-by-step instructions to solve the problem. Here we design an algorithm to create an iterative solution to the problem. It should have a defined start point and end point. It should be:
    - ○ Finite/Formal ○ Definite/Unambiguous ○ Predictable ○ Repeatable

- Evaluation (Generalization) - Once the algorithm is designed, we check the correctness of the algorithm and ensure that it has all the necessary steps that are required to solve the problem and it meets all the requirements. Further, we can also extend the solution for the other similar problems

Computational Thinking

Computational thinking is an approach in which you break down problems into distinct parts, look for similarities, identify the relevant information and opportunities for simplification, and create a plan for a solution. We can present these solutions in a way that both computers and people can understand. Wing (2006) defined CT as a way to solve problems, design systems, and explain behavior by exploiting concepts from computer science. Concepts from CT have also influenced how we explain reality using information processing. CT is a set of skills essential to every modern profession in which the use of large amounts of data (information) is important. Typical activities associated with this concept in the literature include simulation, data mining, networking, automated data collection, gaming, algorithmic reasoning, robotics, programming, problem-solving, modelling, data analysis, and interpretation, as well as statistics and probability.

APPLYING COMPUTATIONAL THINKING TO MANAGE THE LOAN APPROVAL DESK



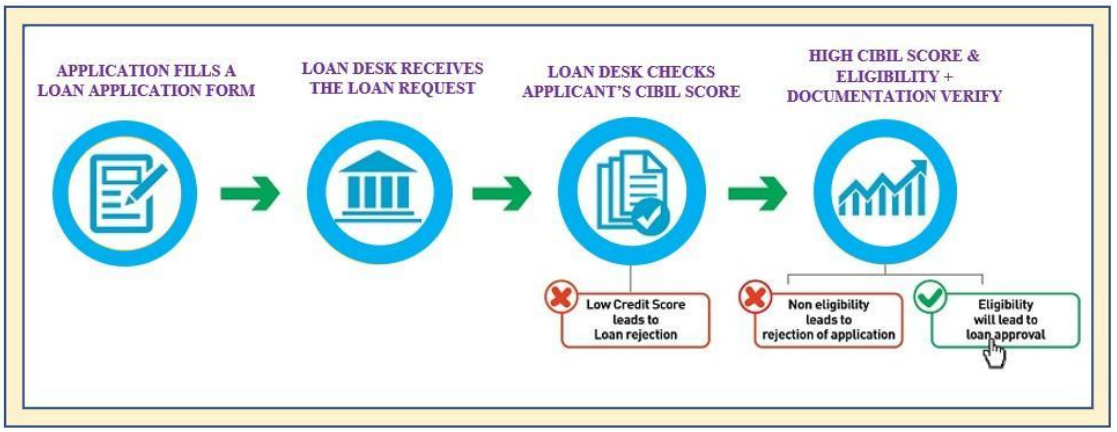
Problem Statement-

The requirements and criteria of the bank that don't strictly adhere to the customers' expectations are one of the most significant elements that cause issues when applying for a loan. Additionally, they are unaware of the importance and applications of their Credit Information Bureau (India) Limited (CIBIL) Score. We are aware that individuals need money for practically every element of life, including homes, businesses, shopping, agriculture, and education. They often don't have enough money to cover their needs. They choose loans from numerous sources. Direct bank loans take a lot of time, effort, and patience; even then, some customers have their loans rejected, and others end up taking out a loan with higher interest rates. Many consumers are not properly informed about the bank loan management system.

Requirement Specification-

1: Categories & Types of loan
2: Criteria of loan
3: Interest rate
4: Collateral Information
5: Repayment methods/duration
6: CIBIL Score
7: Financial Statements
8. Credit History
9. Information on outstanding loans/debt(payroll)

Concept Mapping-



Hypothesis-

This Loan Approval desk will eliminate all the shortcomings while opting for loans, it would help customers to get loans very easily and efficiently. It will help automate the entire loan lifecycle. Further, its software can be remotely accessed by anyone, and using this platform, they can solve their financial problems. **Data Required-**

APPLICANT ID	CUST. NAME	LOAN CATEGORY	CIBIL SCORE	INCOME(PER YEAR)	CREDIT HISTORY	LOAN AMOUNT
VU0001	AKASH SHUKLA	Personal	550	₹ 2,00,000.00	NO	₹ 3,00,000.00
VU0002	ANKITA SHUKLA	Vehicle	575	₹ 4,50,000.00	YES	₹ 1,50,000.00
VU0003	NAMRITA BAJPAI	Business	625	₹ 12,00,000.00	YES	₹ 6,00,000.00
VU0004	SNEHA SINGH	Personal	675	₹ 6,00,000.00	NO	₹ 2,50,000.00
VU0005	TRIPTI MISHRA	Home	825	₹ 8,50,000.00	YES	₹ 4,50,000.00
VU0006	KOMAL GUPTA	Business	690	₹ 7,00,000.00	NO	₹ 5,00,000.00
VU0007	PRAKASHITA SINGH	Personal	700	₹ 5,50,000.00	NO	₹ 6,25,000.00

CIBIL Score	Creditworthiness	Approval Probability
<600	Urgent Action Needed	Low
600-649	Murky and doubtful	Difficult
650-699	Satisfactory or fair	Possible
700-749	Good	Good
750-900	Excellent	Very High

DECOMPOSITION:

This problem looks complex and to solve it efficiently, we need to break down this complex problem into several sub-problems. And each sub-problem can be handled individually and managed easily. Similarly, this problem can also be divided into several sub-problems based on different criteria such as:

- LOAN CATEGORY [Personal, Vehicle, Business, Home]
- CIBIL SCORE [<600, 600-649, 650-699, 700-749, 750-900]
- INCOME [<Rs.6,00,000 >=Rs.6,00,000]
- CREDIT HISTORY [YES/NO]

The above sub-problems can then be examined and solved or designed individually as it becomes easy to do so after decomposing.

PATTERN RECOGNITION:

Searching for relevant patterns among the sub-problems Basically, it is information that is repetitive or common across sub-problems. Using this technique, we can categorize data based on similarities and regularities In this context, Pattern Recognition is:

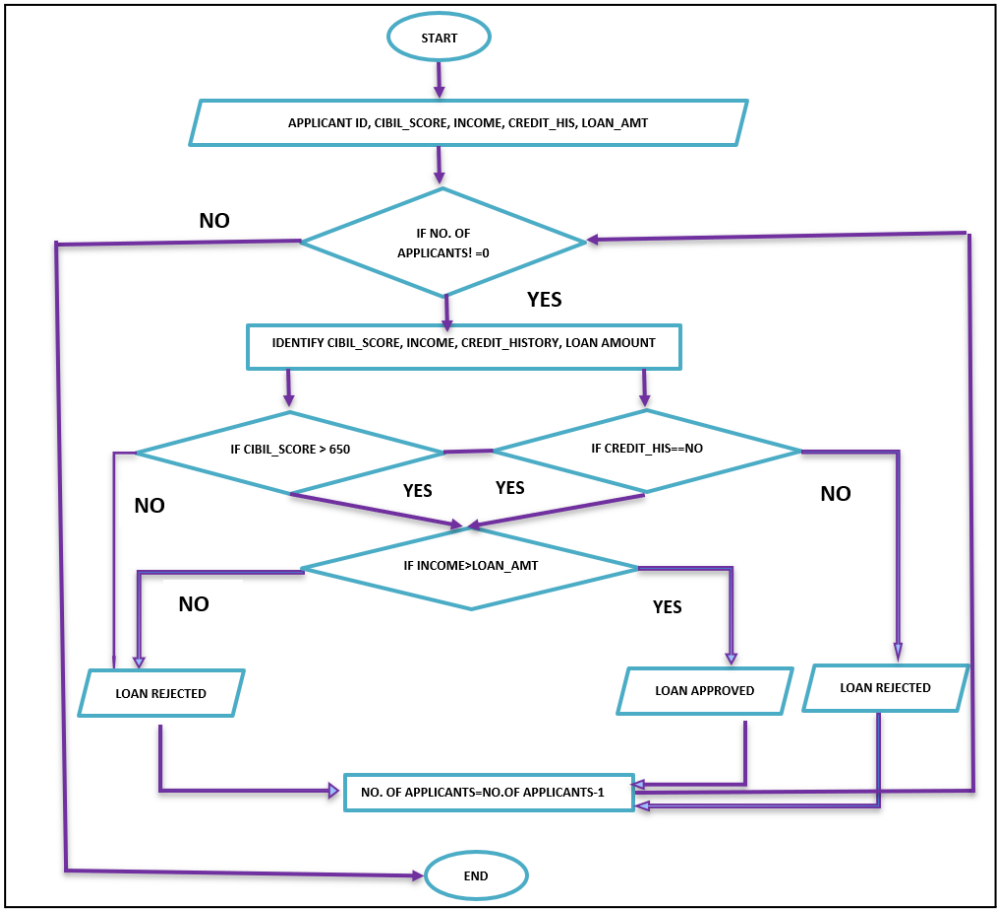
- LOAN CATEGORY [Many people have opted for different loan categories, based on this people whose loan categories are the same can be grouped together (Personal Loan- 3 Applicants, Business Loan- 2 Applicants]
- CREDIT HISTORY [Based on Credit History (YES/NO), the applicants can be grouped together. The applicants who have a loan history can be kept in one group and the applicants who have no loan history can be kept in another group

ABSTRACTION:

As we know, Loan Approval is a complex problem and there would be many unnecessary data/information in this so it needs to be filtered out and focused on the required information. Similarly, in this context, we need to follow the Abstraction approach. Here, we need to require the Applicant's name or address or their Marital Status or Education Status. Rather we need to focus on the Loan category, the amount of loan that the customer wants, and also the income & Credit history.

ALGORITHM:

Algorithms are very much necessary to solve problems and create error-free and efficient solutions to the problem in an iterative manner. There can be many algorithms for the same problem and we can make the algorithm even better using the above CT Techniques. For the above problem, the flow chart of the algorithm is below and it fulfills all the requirements



EVALUATION:

Correctness-

- The algorithm has Start point
- The formula used to compute No. of Applicants is correct · Operators to Check for different conditions/criteria are available.
- Calculate no. of applicants who has a Credit History or not.
- Categorize/calculate applicants on basis of the CIBIL Score
- Various conditions can be checked
- Pre-Condition- Total no. of applicants greater than zero
- Post Condition- Total No. of applicants equal to zero
- Flow Sequence- [1,2,3,10], [1,2,3,4,5,7,9], [1,2,3,4,5,6,7,9], [1,2,3,4,5,6,8,9]
- Loop Invariant- While iterating there would be applicants who have either a Yes/No Credit History, & CIBIL SCORE >650, CREDIT_HIS=NO
- Loop Terminates so Algorithm also terminates.

Generalization:

The Decomposition, Abstraction, Pattern Matching, and Algorithm used in Loan Approval Desk can be used for better efficient & effective bank loan management. It can also be used to design user-friendly software/applications where customers with ease can apply for loans from their homes themselves. This principle can be used in almost all domains be it business, Health, Education, and management.

Be it small or bigger management, this technique can be implemented to save time & energy. It's not just specific to one domain or subject. It can be also used in shop management and financial firm Management. This would solve a lot of problems or real life.

CONCLUSION:

To fulfill all of our wishes, money is a crucial component. Not everybody has the funds to accomplish them. People look for alternatives, so they borrow money from banks. I've described the steps of computational thinking here, along with an illustration of how this approach for problem-solving may be incorporated into the Loan Management System. The designed Desk will be efficient, user friendly, and would meet the expectations of the users/customers. It would be an easy job for customers to get the loan at their convenience. The generalization can also be implemented for the Bank Loan Management system or for any other management projects. Even, user-friendly software can also be designed to make it more accessible and efficient. Those who are not familiar with the Loan Approval system will benefit greatly if we can make it more effective and simpler to use. There are various needs for all different types of people. And many loan types apply to these demands. As a result, understanding this domain is necessary. I have examined many approaches in an attempt to identify some effective answers to this issue.

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