ISSN No.2349-7165

The Role of Credit Scoring in Modern Banking–An Overview of Methodology & Implementation

Meeta Sharma Moghe
Research Scholar, Barkatullah University, Bhopal

Shiva Johri
Professor, Oriental College of Management,
Oriental Group of Institutes, Bhopal,

ABSTRACT

The article begins by providing an overview of the importance of credit scoring in modern banking and its impact on lending decisions, risk management, and financial stability. It discusses the purpose of credit scoring for banks, which have paved the way for the development of more advanced and sophisticated methods. It also gave insights regarding CIBIL score in India which includes how CIBIL score is calculated, criteria for getting the score, ideal CIBIL score. The methodology section probes into the various statistical, algorithmic techniques employed in the process of credit scoring. It discusses the use of logistic regression, Discriminant analysis, and neural networks etc for Credit Scoring. Additionally, it explores the application of decision trees, random forests, and gradient boosting, providing insight into their formulation and usage. Furthermore, the research paper highlights the implementation of credit scoring models in real-world banking scenarios. It examines the data requirements, data pre-processing techniques, feature selection, and model validation methodologies involved in developing robust credit scoring systems. The integration of credit scoring models into banking operations and decision-making processes is explored, emphasizing the importance of model monitoring and updates. Emerging technologies, such as AI & big data analytics & alternative data sources, which have the potential to revolutionize credit scoring methodologies, are discussed. Incorporation of non-traditional data, such as social media profiles, transactional data, and behavioural patterns, and their impact on credit assessment is brought to a fresh focus. Looking towards the future, the paper outlines potential advancements and future aspects in credit scoring.

Additionally, the paper examines the influence of regulatory frameworks and evolving consumer trends on credit scoring practices. It discusses the need for transparency, fairness, and ethical considerations in credit scoring algorithms to

mitigate biases and ensure responsible lending practices. In conclusion, this research paper sheds light on the role of credit scoring in modern banking, providing insights into the methodology, implementation, and future aspects. By understanding the evolving landscape of credit scoring, banks can enhance their risk assessment capabilities, improve lending decisions, and adapt to the changing dynamics of the financial industry.

Key words: CIBIL score, Logistic Regression, Big data & Artificial intelligence.

INTRODUCTION

Assessing the creditworthiness of debtors has become increasingly dependent on credit scoring in modern banking. As the banking industry continues to adapt to shifting market dynamics, credit scoring has emerged as a crucial instrument for financial institutions to effectively manage credit risk. This research paper intends to investigate the methodology and implementation of credit scoring in contemporary banking, casting light on its significance and the difficulties encountered in its practical application.

Credit scoring is the process of determining a borrower's creditworthiness by analysing their financial history, payment patterns, and other relevant factors. This method allows banks to evaluate the probability of default and make informed lending decisions. With the advancements in data analytics and technology, credit scoring models have significantly evolved, employing a vast array of variables and statistical techniques to increase accuracy and efficiency.

The implementation of credit scoring in contemporary finance requires the development and application of robust models that predict credit risk accurately. This paper will explore the various methodologies used by banks, including conventional statistical models, machine learning algorithms, and hybrid approaches. It will evaluate the advantages and disadvantages of these methodologies, taking into account model transparency, interpretability, and predictive potential. Credit scoring offers numerous advantages to banks, but its implementation presents obstacles. Research paper will examine the limitations &potential fallacies of credit scoring models, including issues of fairness, model over fitting, &the effect of a fluctuating economy.

In addition, it will investigate the regulatory landscape surrounding credit scoring, taking into account the need for compliance with consumer protection laws & data privacy regulations. Understanding the methodology &

implementation of credit scoring in contemporary banking is ultimately essential for both financial institutions & borrowers.

This research paper seeks to contribute to the existing body of knowledge by providing insights into the changing landscape of credit scoring, emphasising its importance in risk management, &providing recommendations for its effective and ethical implementation. This research seeks to promote a deeper comprehension of credit scoring & its implications for banking industry by examining the methodologies &addressing the associated challenges.

REVIEW OF LITERATURE

Goel, A., & Rastogi, S. (2023), in their study identified certain behavioural and psychological traits of the borrowers which can be used to predict the credit risk of the borrowers. They also delved on the conceptual model that reveals the impact of those traits on credit default. The study adopted a systematic Literature Review approach to identify those behavioural & psychological traits of borrowers that reflect on the tendency to predict the credit default of borrowers. The proposed model can help banks and financial institutions to evaluate those borrowers who lack substantial financial information. Further, a subjective credit scoring model would help to evaluate the credit worthiness of such borrowers who do not have any credit history. The model would also reduce the biasness of subjective scoring and would reduce the financial constraints of borrowers.

RabihahMd.Sum, Waidah Ismail & ZulHilmi Abdullah (2022), in their research proceeded to simplify the credit assessment procedure. They proposed a five-step model for credit scoring which includes data manipulation, factor analysis, data mining modelling, credit scoring, and post-modelling. To ensure accuracy, the model incorporates factors that are significant in determining the creditworthiness of applicants, including the type of instalment, age, monthly expenses, employment industry, payment method, and income-to-finance ratio. In addition, this study contributed to the research on credit scoring by presenting a systematic and structured phase review for developing a credit scoring model. On the basis of the findings of this study, banks may use this model to develop their own credit scoring model to evaluate the creditworthiness of applicants for personal loans. By using this model to manage risks, banks can construct a long-term solution for credit system management and improve their decision-making.

Djeundje, V. B., Crook, J., Calabrese, R., & Hamid, M. (2021) in their study illustrated two main points regarding credit debt behaviour i.e. firstly good payers can be separated from bad payers by using data on alternative traits

(psychometric variables), such as how people use email. Secondly the significance of these traits as compared to things like age and income in a credit scoring model. It is found that when each of predictor is used on its own, it makes a model with only moderate predictive accuracy. However, when both types of non-traditional variables i.e. are used together in an ensemble, they improve the predictive accuracy of demographic variables. We also find that the level of predictive accuracy is at a commercially acceptable level when demographic and psychometric variables are combined in an ensemble model. This means that the model could, in theory, be used for credit applicants who don't have a credit history.

Bhatore, S., Mohan, L., & Reddy, Y. R. (2020) provide emphasis on the fact that while credit rating agencies and credit scoring companies provide analysis to banks for a fee, researchers are actively exploring machine learning techniques to enhance the accuracy of credit risk evaluation. The paper presents a systematic literature review of 136 research papers published between 1993 and March 2019, focusing on methods & techniques of machine learning employed in evaluation of credit risk. It examines the impact of important parameters on models of machine learning used for credit risk assessment & identifies existing limitations & research trends. Findings reveal that Ensemble & Hybrid models incorporating neural networks & SVM are increasingly utilized for NPA Prediction, fraud detection & Credit scoring. The review also highlights the ongoing challenge of limited comprehensive public datasets, which remains a concern for researchers in this field.

OBJECTIVES OF STUDY

The objective of this research paper is to provide an overview of the importance of credit scoring in modern banking and its impact on lending decisions, risk management, and financial stability. It aims to explore the purpose of credit scoring for banks, including the development of advanced methods. The paper also seeks to provide insights into the CIBIL score in India, including its calculation, criteria for obtaining the score, and the ideal CIBIL score. Furthermore, the objective is to investigate various algorithmic & statistical techniques employed in credit scoring, such as logistic regression, Discriminant analysis. Use of neural networks, decision trees, random forests & gradient boosting is explored.

The paper aims to examine the implementation of credit scoring models in real-world banking scenarios, including data requirements, data pre-processing

techniques, feature selection, and model validation methodologies. Additionally, the objective is to explore the integration of credit scoring models into banking operations & decision-making processes, emphasizing the importance of model monitoring and updates.

CONTEMPORARY DISCUSSION & SALIENT POINTS

(A) PURPOSE OF CREDIT SCORING FOR BANKS

Efficient Loan Evaluation: Credit scoring enables banks to efficiently evaluate loan applicants' creditworthiness. By utilising credit scoring models, banks can swiftly evaluate the credit histories, financial profiles, &other relevant factors of prospective borrowers. This expedites the loan evaluation procedure, sparing banks time and resources.

Enhanced Risk Management: Credit scoring is essential for institutions' risk management. By analysing the credit scores of debtors, banks can determine the likelihood of default and overall credit risk associated with lending to particular individuals or businesses. This enables banks to manage their loan portfolios effectively, allocate resources appropriately, and mitigate prospective losses.

Improved Loan Decision-Making: Credit assessment provides objective and reliable information for loan decisions. Instead of relying exclusively on subjective evaluations, banks can base lending decisions on the borrower's credit score, thereby reducing bias &ensuring consistent decision-making.

Efficient Loan Pricing: Credit scoring aids banks in determining adequate loan interest rates based on borrowers' creditworthiness. The interest rates &terms offered to borrowers with higher scores of credit, indicating a lesser risk, can be more favourable. Credit scoring enables banks to accurately price loans in accordance with the levels of risk associated with each borrower, ensuring fair and risk-based pricing.

Fraud Detection & Prevention: Models of credit scoring help institutions detect and prevent fraudulent activities. By incorporating fraud detection mechanisms into credit scoring models, institutions are able to identify unusual credit behaviour, deviations from historical patterns, and suspicious activities that may be indicative of fraud. This enables banks to safeguard themselves and their clients against financial losses.

Portfolio Optimization: Credit scoring enables institutions to effectively manage their portfolios. By consistently monitoring the credit scores of borrowers, banks can identify potential risks and loan portfolio concentrations. This enables banks

to proactively diversify their portfolios, manage their exposure to high-risk debtors, and maintain a balanced risk-return profile.

Compliance with Regulatory Requirements: Credit assessment helps banks comply with regulatory lending and risk management requirements. To ensure equitable and responsible lending practises, many regulators mandate the use of credit scoring models. By utilising credit scoring, banks are able to demonstrate compliance with regulatory guidelines and demonstrate their dedication to sound risk management practises.

Improved Efficiency & Productivity: Credit scoring streamlines the loan evaluation and decision-making processes, enabling banks to efficiently process a greater number of loan applications. This enhances the operational efficacy and productivity of banks, allowing them to serve a greater number of customers efficiently.

Customer Relationship Management: Credit scoring enables banks to evaluate the creditworthiness of existing consumers more accurately. This aids in customer relationship management, identification of cross-selling opportunities & provision of specifically customised financial products & services based on individual credit profiles.

(B) CIBIL SCORE IN INDIA

A CIBIL score is a numeric summary of three digits that determines your creditworthiness. A score between 300 and 900 is an indicator of creditworthiness with a higher score indicating a better credit profile and reduced credit risk. Credit Information Bureau (India) Limited, or CIBIL, is a leading credit information corporation in India that provides credit scores & credit reports to individuals and businesses. The CIBIL score is a numerical representation of a person's creditworthiness, as determined by their credit history and repayment behaviour.

It is extensively utilised by banks, financial institutions, and lenders as a significant determinant of creditworthiness and lending decisions. The score is determined by a variety of factors, including the individual's payment history, credit utilisation, credit history duration, credit mix, and recent credit inquiries. These criteria are derived from a person's credit report, which contains information about their credit accounts, loans, credit cards, and repayment history.

The CIBIL score is an integral component of the credit evaluation procedure. This score is used by lenders to determine the interest rates, loan quantities, and

terms offered to borrowers based on the likelihood of repayment. A high CIBIL score indicates a positive credit history and responsible repayment conduct, thereby increasing the likelihood of securing favourable loan terms and reduced interest rates. In contrast, a low CIBIL score indicates a greater credit risk and may result in difficulties obtaining loans or terms that are less favourable.

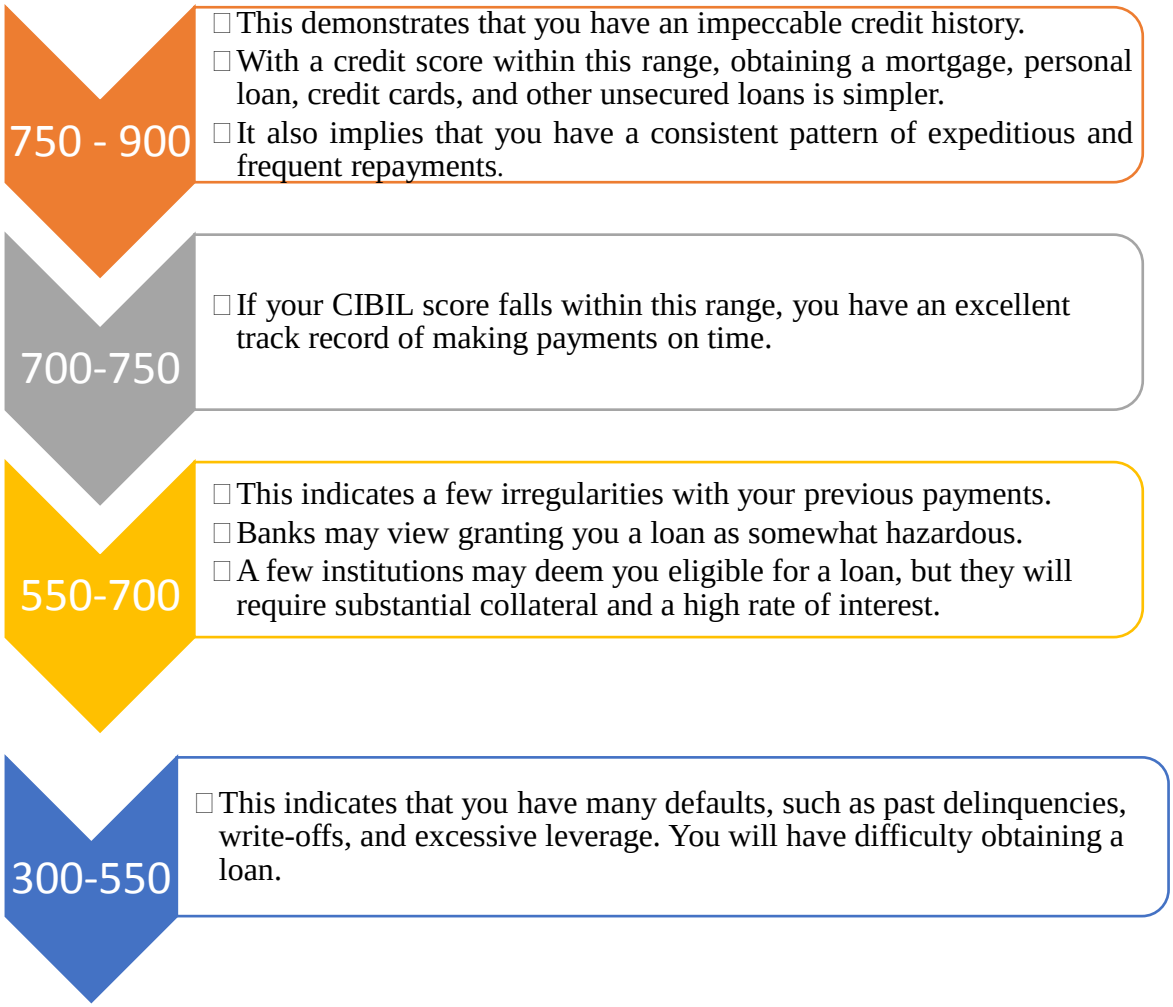
How is CIBIL Score Calculated?

A CIBIL Score is calculated based on the following factors:

Track Record of Past Payments	• A log of all previous payments • Regular on-time payments result in higher score • Delinquent payments result in a lesser score • More damage has been done due to recent payment delays.
Previous Settlements, Defaults, Write-offs	• The effects of recent write-offs are more severe than those of earlier ones. • Credit scores tend to drop after multiple write-offs. • A lower credit score is a direct result of documented debt write-offs by a lender in the past. • The consequences of being late or defaulting on a secured loan are more severe than those of an unsecured loan.
Income Share of Loans	• A high loan balance is indicative of poor financial management, so keeping your balances low is one way to maintain a high credit score.
Compare secured loans to credit cards & unsecured loans.	• Relying heavily on unsecured loans (credit cards) as opposed to secured loans can have a negative impact on your credit score. • A higher credit score is achieved by having a smaller number of these accounts and by paying them on time consistently.
Loan Enquiries	• Numerous loan application inquiries indicative of "credit hungry" behaviour negatively influences credit score.

Table 1: CIBIL Score Components

What is the Ideal CIBIL Score you should have?



To maintain a good CIBIL score, individuals should focus on the following factors:

Payment History: It is essential for maintaining a high credit score to pay credit card bills and loan instalments on time. Any payment delays or defaults can negatively affect the CIBIL score.

Credit Utilization: Customers must keep their credit card utilisation below 30% of available limit. High utilisation rate may be indicative of greater credit risk & can reduce CIBIL score.

Length of Credit History: A lengthy credit history is indicative of stability &prudent credit management. Maintaining elder credit accounts &not frequently opening or closing credit lines is advantageous.

Credit Mix: A healthy credit mix, consisting of both secured and unsecured credit, can have a positive effect on the CIBIL score. Maintaining a diverse credit portfolio is essential.

Recent Credit Inquiries: Multiple credit inquiries in a brief amount of time can have a negative effect on the CIBIL score. It is prudent to limit credit inquiry requests and only apply for credit when necessary.

(C) PROCESS FOR OBTAINING A CIBIL SCORE IN INDIA

The procedure for obtaining a CIBIL score in India involves the following steps:

Check Eligibility: To receive a CIBIL score, you must have access to your credit report. In general, individuals with a credit history who have previously obtained loans or credit cards are eligible. If you have questions about your eligibility, you can contact CIBIL or visit their official website.

Visit the CIBIL Website: Navigate to the section on the official CIBIL website (www.cibil.com) for obtaining a credit score. CIBIL charges a nominal fee for access to credit scores and reports.

Provide Personal Information: Fill out the online form with your correct name, address, contact information, and identification evidence. Verify that the details supplied correspond to those on your identification documents.

Authenticate Identity: CIBIL may require you to provide identity verification. This can be accomplished by submitting identification documents such as a PAN card, Aadhar card, passport, or driver's licence. Follow the website's instructions to complete the authentication procedure.

Make Payment: Pay the required fee to access your credit report and score. On the CIBIL website, multiple online payment options are available for making the payment.

Verify Information: Following a successful payment, you may be required to verify additional information to confirm your identity. This may involve answering security queries based on your credit history or, if requested, providing additional documentation.

Access Credit Score and Report: After confirming your identity and receiving payment, you will receive your CIBIL score and credit report. This report will contain information regarding your credit history, including loans, credit cards, repayment behaviour, defaults, and any other pertinent credit information.

(D) ADVANTAGES OF CIBIL SCORE

Standardized Credit Assessment: CIBIL score gives a standardised widely accepted indicator of a person's creditworthiness. It is based on a thorough evaluation of a person's credit history, repayment habits, and credit utilisation patterns. This enables lending institutions to evaluate loan applications with consistency and knowledge.

Faster Loan Approvals: A high CIBIL score can accelerate the loan approval procedure. High CIBIL scores indicate a lower credit risk, so lenders frequently favour applicants with high scores. With a high credit score, borrowers are more likely to receive speedier loan approvals and funds disbursement.

Negotiating Power: A high CIBIL score increases a person's bargaining power with lenders. It provides them with leverage to negotiate more favourable interest rates, loan terms, and credit limits. Individuals with a track record of responsible credit behaviour are more likely to receive favourable loan terms from lenders.

Access to Competitive Credit Products: Individuals with higher CIBIL scores have access to a broader selection of credit products and services. Strong credit profiles make lenders especially banks & financing institutions more willing to offer retail loans, mortgages & varied financial services at nominal interest rates.

Lower Interest Rates: A high CIBIL score typically results in reduced interest rates for loans and credit cards. Lenders are more likely to offer individuals with excellent credit scores lower interest rates because they perceive them to be lower-risk borrowers. This results in substantial cost savings over the life of the loan.

Increased Borrowing Capacity: A high CIBIL score increases an individual's ability to borrow. Individuals with a demonstrated history of responsible credit behaviour are more likely to receive larger credit limits and loan amounts from lenders. This can be especially advantageous when making large purchases or financing large undertakings.

Rental and Utility Applications: A high CIBIL score can also be advantageous in non-lending circumstances. Landlords &utility service providers frequently examine a person's credit score to determine their dependability &ability to make timely payments. High CIBIL score can increase a person's likelihood of procuring rental agreements &utility connections.

Financial Discipline and Awareness: Maintaining a high CIBIL score encourages financial responsibility and discipline. Individuals are more likely to make payments on time, keep credit utilisation in control, and effectively manage their finances. Regular monitoring of the CIBIL score enables individuals to remain cognizant of their creditworthiness and to take the necessary measures to enhance it.

(E) METHODOLOGIES AND IMPLEMENTATION OF CREDIT SCORING

Data Collection: The first step in credit scoring is to collect pertinent information about prospective consumers. This includes their personal data, credit history, financial statements, employment details, and any other pertinent information. The information can be gathered from credit bureaus, financial institutions, application forms, and other trustworthy sources.

Variable Selection: The next stage, following the collection of data, is to identify the variables that best predict creditworthiness. These variables may include credit utilisation, payment history, credit history length, outstanding obligations, and income level. Statistics and expert opinion are frequently used to identify the most influential variables.

Model Development: After determining the variables, a model for credit assessment is developed. This requires the application of statistical and mathematical techniques to analyse the relationships between the variables and credit outcomes. Neural model Networks, Ensemble Methods, Logistic Regression & Decision trees are some techniques which are commonly applied. Using historical data with known credit outcomes, the model is trained to establish the relationship between variables and creditworthiness.

Model Validation: Once the model has been created, it must be validated to ensure its precision and dependability. This entails evaluating the performance of the model using a separate dataset or a holdout sample. Various Parameters which include Area under Receiver Operating Characteristic (ROC) Curve, Precision & Accuracy & credit Recall provide basis of creditworthiness for evaluating Model's reliability.

Score Generation: After the model has been validated, a scoring algorithm is employed to generate individual borrowers' credit scores. Credit scores are numeric assessment of creditors creditworthiness as per the calculations of the credit assessment model's. For easier interpretation, the total is typically scaled to a predetermined range, such as 300 to 850.

Scorecard Development: In addition to the credit score, a scorecard may be created to provide additional information regarding the factors that influence the credit decision. The scorecard assigns weights or points to each variable in proportion to their relevance in predicting creditworthiness. This assists lenders in understanding the specific factors that contribute to a borrower's credit score.

Implementation and Monitoring: Once the credit scoring model and scorecard have been developed, they are implemented in the lending operations of the bank. The model is incorporated into the bank's credit evaluation procedure, and credit scores are used to evaluate loan applicants' creditworthiness. Regular monitoring and revisions are required to assure the model's continued accuracy and relevance.

(F) STATISTICAL METHODS USED FOR CREDIT SCORING

Logistic Regression: One of the most commonly used statistical method for credit assessment. It models the association between an individual's creditworthiness (the dependent variable) and a set of independent variables, such as income, credit history, and debt-to-income ratio. Based on the independent variables, logistic regression estimates the probability of a borrower belonging to a particular credit category.

Discriminant Analysis: Credit scoring also employs Discriminant analysis, a statistical technique. Linearly related combination of independent variable is identified which seeks to provide clear emphasis on differentiation between poor & worthy credit risks. It assists in identifying the variables that contribute most to differentiating between creditworthy and un-creditworthy consumers.

Neural Networks: Neural networks are an algorithm for machine learning that can be used for credit assessment. They discover patterns and relationships in data without being explicitly programmed. Neural networks can capture intricate nonlinear relationships between variables and are especially advantageous when dealing with large and diverse datasets.

Percentage Correctly Classified (PCC): A prevalent performance metric used to evaluate the performance of a classification model, known for its accuracy. It provides quantitative proportion of instances which are classified as correct & credit trustworthy from the dataset of total number of instances. The Formula for PCC:

PCC = (Number of correctly classified instances / Total number of instances) * 100

Decision Trees: Due to their interpretability and usability, decision trees are a well-liked credit scoring instrument. Each node represents a decision based on a specific variable, leading to subsequent nodes until a final decision is reached. Credit scoring can benefit from the use of decision trees to identify essential variables and their relationships.

Random Forests: Random forests are an ensemble learning technique that predicts credit scoring by combining multiple decision trees. By integrating the predictions of individual decision trees, they enhance the accuracy and robustness of credit scoring models. Random forests are efficient at managing high-dimensional datasets &capturing complex interactions among variables.

Gradient Boosting: This happens to be one of the most analytical & ensemble predictive learning technique which integrates weak predictive models like decision trees etc. in order to rationalize even more efficient credit risk assessment & provide credit score. Series of models are created iteratively, & errors are successively in each model. This technique has capacity to deal with complex numbers, large databases & is popular among researchers for its efficient predictions.

Support Vector Machines: They are statistical learning techniques found to be highly effective for credit risk assessment. In a high-dimensional feature space, SVM seeks a hyper plane that maximally separates creditworthy and non-creditworthy borrowers. Using kernel functions, SVM can manage both linear and nonlinear relationships between variables.

(G) CHANGES NEEDED OR NECESSITATED DUE TO TECHNOLOGY &REGULATION

Credit scoring has undergone modifications and advancements as a result of technological and regulatory developments. The following modifications have been implemented or are being considered:

Alternative Data & Machine Learning: With technological advancements, credit scoring algorithms now incorporate alternative data sources in addition to traditional credit information. This includes social media, utility, and digital financial transaction data. Large volumes of data are analysed using machine learning algorithms to identify predictive patterns, allowing for more precise credit assessments.

Open Banking &Account Aggregation: With customer permission, open banking initiatives and use of account aggregation services enables lenders to access a broader range of financial data. Comprehensive assessment of creditworthiness & financial behaviour of people is provided by the Credit scoring models which integrate and analyze data from various financial institutions in a secure manner.

Explainable AI & Transparency: Credit Assessment is invariably enormously supported by emerging technologies like AI (artificial intelligence) & machine

learning since they provide benefits of Explainability and transparency. Regulatory authorities and industry stakeholders are encouraging development of artificial intelligence (AI) models that can provide straightforward explanations for credit decisions, ensuring that individuals comprehend the factor(s) that influences their creditworthiness.

Privacy & Data Protection: Varied concerns regarding data privacy have been voiced and continue; as a consequence of which regulations such as GDPR (General Data Protection Regulations) have been developed in Europe. Similarly other measures globally are influencing practices & models of credit scoring. Credit scoring models must adhere to stringent data protection standards &guarantee the proper management, storage, and use of personal information based on consent.

Fair Lending & Non-Discrimination: Emphasis on ensuring equitable lending practises and preventing discriminatory credit scoring outcomes has increased. The regulatory authorities are monitoring the use of certain bias-inducing factors, such as race, gender, &ethnicity, in credit decisions. Development of equitable and inclusive credit scoring models that mitigate bias and promote equal access to credit opportunities is currently underway.

Consumer Access & Control: Various members of EU have enacted laws like PSD2 (Revised Payment Services Directive) which are providing greater autonomy & control to consumers over their financial data. Same is the case with USA where acts such as CCPA (California Consumer Privacy Act) have been enacted. These enable controlled access & sharing of financial information by people for credit scoring to alternative models & or other service providers, thus allowing far comprehensive & accurate credit evaluation.

Cyber security & Fraud Prevention: To protect sensitive credit information from breaches and unauthorised access, technological advancements necessitate robust cyber security measures. Models of credit scoring must incorporate robust security protocols to protect customer information and prevent deception.

Continuous Monitoring and Dynamic Scoring: Technology enables real-time monitoring & dynamic scoring rather than periodic samples of credit history. Credit scoring models can take into account current financial data and changes in credit behaviour, allowing lenders to make more informed and timely credit decisions.

FUTURE SCOPE

As technology continues to advance and new data sources become available, the future of credit scoring contains numerous exciting prospects. Here are some possible future trends and developments in credit scoring:

Expanded Use of Alternative Data: In addition to traditional financial information, credit scoring models may integrate a broader array of alternative data sources. This may include information from social media, online purchasing habits, educational background, and other sources. Data integration from varied sources can provide a comprehensive & accurate frame regarding creditworthiness of individual & thus help in perfecting credit scoring models.

Incorporation of Big Data and Artificial Intelligence: Big Data analytics & Artificial intelligence (AI) Applications will lead through the evolution of credit Assessment. Machine learning algorithms can rapidly analyse enormous amounts of data & recognise complex patterns that human analysts may overlook. Credit scoring models enabled by AI can adapt &learn from new data inputs, enhancing their predictive capabilities over time.

Personalized Credit Scoring: Credit scoring may become more personalized, considering individual circumstances and goals. Models could take into account factors such as life events, income trajectory, education, &career prospects to provide tailored credit assessments. This could result in more customized loan offers &interest rates based on an individual's specific financial situation.

Integration of Behavioural Analytics: Behavioural analytics can play a significant role in credit scoring. By analyzing patterns of financial behaviour, such as spending habits, bill payment patterns, and savings behaviour, credit scoring models can gain insights into an individual's financial discipline and repayment capacity. This can help lenders make more accurate credit decisions.

Block chain Technology for Credit History: Credit scoring has been revolutionized on account of Block Chain Technology which provides a continuous immutable secure ledger of individuals' credit histories. This could enable seamless sharing of credit data between lenders while maintaining privacy and data security. Block chain-based credit scoring systems may enhance transparency, reduce fraud, and simplify credit assessments.

Real-time Credit Scoring: Instant Credit risk assessment can be done with the help of advanced analytics & availability of read time dynamic financial data on varied credit scoring models. Banks & Lenders could evaluate creditworthiness in real-time, allowing for immediate loan approvals or credit decisions. This can

improve the customer experience, especially in situations requiring quick access to credit.

Social Credit Scoring: Social credit scoring, which is already being explored in some countries, involves evaluating an individual's creditworthiness based on their social connections, community involvement, and reputation. This approach aims to assess an individual's trustworthiness and could provide access to credit for individuals with limited traditional credit histories.

Enhanced Fraud Detection & Risk Management: Credit scoring models will likely continue to advance in fraud detection &risk management. Large data sets can be analyzed actively by algorithms of Machine learning techniques which allow the identification of patterns of fraud detection and credit risk. This can help lenders proactively manage risk &reduce likelihood of defaults.

CONCLUSION

In conclusion, credit scoring, including CIBIL score, plays a vital role for banks in assessing creditworthiness and managing lending risks. It provides several advantages, such as objective evaluation, efficient loan processing, risk mitigation, enhanced portfolio management, fraud detection, regulatory compliance, and cost reduction. By utilizing credit scoring models, banks can make informed lending decisions, set appropriate interest rates, and optimize their loan portfolios. Looking ahead, the future of credit scoring holds significant potential. Advancements in technology, such as alternative data integration, AI and machine learning, personalized scoring, behavioural analytics, block chain, and real-time assessments, offer exciting opportunities for further enhancing credit scoring models. These developments could lead to more accurate, personalized, and efficient credit assessments, enabling lenders to make faster and more informed credit decisions.

REFERENCES:

- Bhatore, S., Mohan, L., & Reddy, Y. R. (2020). Machine learning techniques for credit risk evaluation: a systematic literature review. *Journal of Banking and Financial Technology, 4*, 111-138.
- Chhabra, D., Patil, A., &Sikhakolli, S. S. (2023). Corporate Loans Credit Risk Analysis-A Study of an NBFC Strategy. *Phronimos*, *3*(1), 32-42.
- Dastile, X., Celik, T., &Potsane, M. (2020). Statistical and machine learning models in credit scoring: A systematic literature survey. *Applied Soft Computing*, *91*,Volume 91,106263; ISSN 1568-4946; https://doi.org/10.1016/j.asoc.2020.106263

- Djeundje, V. B., Crook, J., Calabrese, R., & Hamid, M. (2021). Enhancing credit scoring with alternative data. *Expert Systems with Applications, 163*, 113766.https://doi.org/10.1016/j.eswa.2020.113766
- Faisal, M. F., Saqlain, M. N. U., Bhuiyan, M. A. S., Miraz, M. H., & Patwary, M. J. (2021). Credit Approval System Using Machine Learning: Challenges and Future Directions. *International Conference on Computing, Networking, Telecommunications & Engineering Sciences Applications (CoNTESA)*. 76-82. https://doi.org/10.1109/CoNTESA52813.2021.9657153
- Goel, A., & Rastogi, S. (2023). Understanding the Impact of Borrowers' Behavioural &Psychological Traits on Credit Default: Review &Conceptual Model. *Review of Behavioral Finance, 15(2),* 205-223.
- Gowtham, A., &Revathy, N. (2019). A Comprehensive Review on CIBIL Registry.*International Journal of Computer Science and Mobile Computing, 8*(10), 64-71.
- Gupta, S. L., Kansra, P., &Kukreja, G. (Eds.). (2022). *Applications, Challenges, and Opportunities of Blockchain Technology in Banking and Insurance*.https://doi.org/10.4018/978-1-6684-4133-6
- Husain, A. R. A. M., Hamdan, A., &Fadhul, S. M. (2022). The Impact of Artificial Intelligence on the Banking Industry Performance. *Future of Organizations &Work after the 4th Industrial Revolution: The Role of Artificial Intelligence, Big Data, Automation, and Robotics*, 145-156.
- Kumar, C. N., Keerthana, D., Kavitha, M., & Kalyani, M. (2022). Customer Loan Eligibility Prediction using Machine Learning Algorithms in Banking Sector. *7th International Conference on Communication and Electronics Systems (ICCES)*, 1007-1012.
- Lohokare, J., Dani, R., &Sontakke, S. (2017). Automated data collection for credit score calculation based on financial transactions and social media. *International Conference on Emerging Trends & Innovation in ICT (ICEI)*, 134-138.https://doi.org/10.1109/ETIICT.2017.7977024
- Markov, A., Seleznyova, Z., &Lapshin, V. (2022). Credit Scoring Methods: Latest Trends & Points To Consider.*The Journal of Finance and Data Science, 8,*180-20.
- Marques, A. I., García, V., & Sánchez, J. S. (2013). A literature review on the application of evolutionary computing to credit scoring. *Journal of the Operational Research Society, 64*, 1384-1399.

- R. Corrales-Barquero, G. Marín-Raventós and E. G. Barrantes. (2021). A Review of Gender Bias Mitigation in Credit Scoring Models. *Ethics and Explainability for Responsible Data Science (EE-RDS)*, Johannesburg, South Africa. 1-10, https://doi.org/10.1109/EE-RDS53766.2021.9708589
- Szepannek, G. (2020). An overview on the landscape of R packages for credit scoring. arXiv preprint arXiv:2006.11835.https://doi.org/ 10.48550/arXiv.2006.11835