Explainable AI in Credit Scoring

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XAI: A New Frontier

Explainable AI (XAI), also known as Interpretable Machine Learning (IML), is a rapidly evolving field.

1

Model as a Function

A model is a function that takes inputs (features) and produces outputs (predictions).

2

Explainable vs. Interpretable

Explainable models require additional techniques for human understanding.

3

Black Box Models

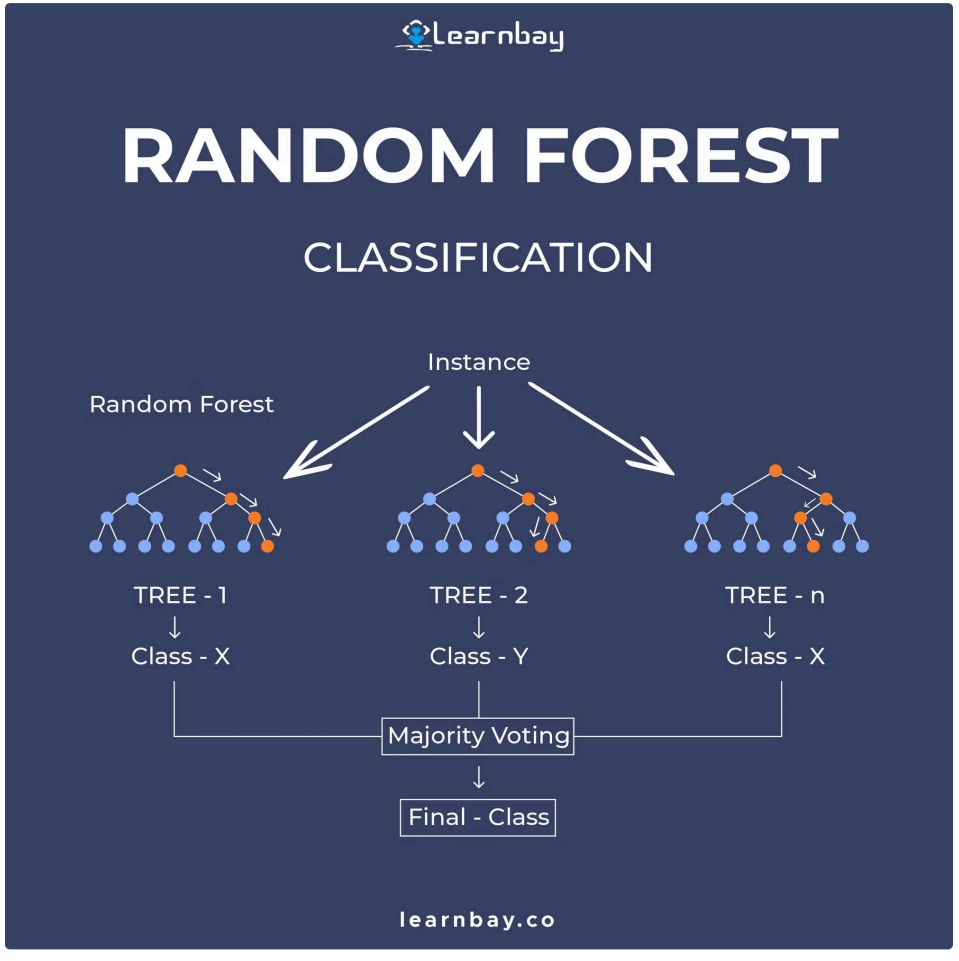
Complex models like Random Forests and Neural Networks are considered "black boxes".

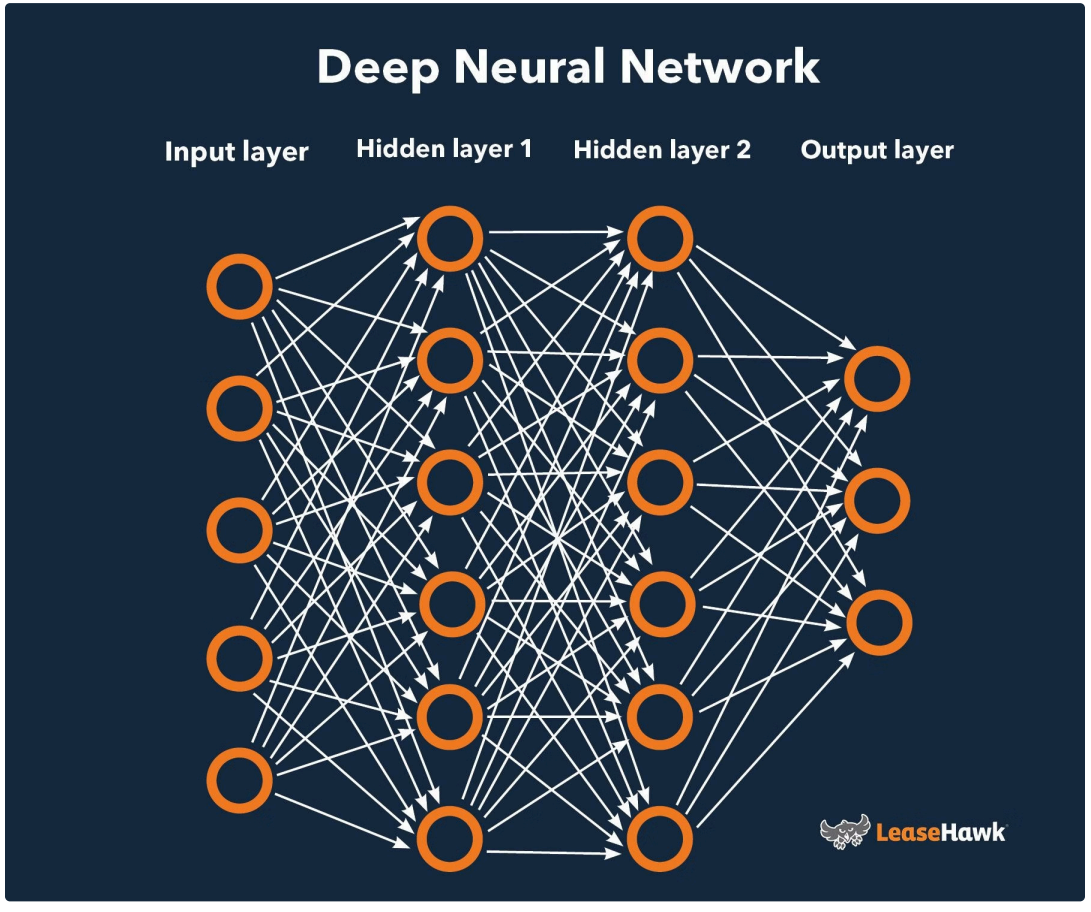
4

Importance of Explainability

Explainability is crucial for ethical and regulatory compliance in financial decision-making.

"Black Box" Models





Research Question & Objectives

Research Question 1

What XAI techniques are used in credit scoring models?

Research Question 2

How do XAI techniques compare in their ability to explain AI-driven decisions?

Objective 1

Identify & compare different XAI techniques in credit scoring

Objective 2

Highlight any gaps in research, especially in the practical application of XAI

Literature Review: Key Papers

Four papers were reviewed to explore the application of XAI in credit scoring.

Paper	Focus	Key Findings
Paper 1 (Trivedi, 2020)	Feature Selection	Random forests with Chi-Square feature selection achieved best results.
Paper 2 (Misheva et al., 2021)	LIME & SHAP	Both techniques are effective, but SHAP faces computational challenges.
Paper 3 (Demajo et al., 2020)	Integrated XAI	Highly practical model with intuitive explanations, but high computational costs.
Paper 4 (Sadok et al., 2022)	AI in Credit Risk	AI models outperform traditional methods, but explainability remains a challenge.

Gaps in the Literature

1

Accuracy vs. Interpretability

Lack of comparative analysis between shallow and complex classifiers.

2

Bias Mitigation

Limited focus on how XAI techniques can actively mitigate bias.

3

Real-World Case Studies

Need for more real-world case studies on the viability of XAI in commercial settings.

4

Scalable XAI

Further research is needed on scalable XAI solutions.

Trivedi (2020) - A study on credit scoring modeling with different feature selection and machine learning approaches

Table 4
F-Measure and Accuracy of all classifiers (10-Fold).

Accuracy, F-Measure (in %)	Chi-square	Gain-Ratio	Info-Gain
Bayesian	71.01, 71.00	71.01, 71.00	70.91, 70.90
NB	70.12, 70.10	70.43, 70.40	70.51, 70.50
SVM	77.02, 77.00	77.40, 77.40	77.70, 77.70
C5.0	92.21, 92.20	89.71, 89.70	89.21, 89.20
RF	93.12, 93.10	91.20, 91.20	90.90, 90.90

Table 8
Training Time of all classifiers.

Time taken (Sec)	Chi-square	Gain-Ratio	Info-Gain
Bayesian	03.04	00.01	00.01
NB	03.18	00.02	00.01
SVM	04.66	00.29	00.33
C5.0	08.22	00.01	00.01
RF	16.20	18.00	17.00

Emerging Trends

1 Real-Time Data

Increasing use of real-time and evolving datasets from credit lending institutions.

2 Complementary XAI Techniques

Use of feature selection methods, interpretable models, and post-hoc XAI methods in combination.

3 User-Centric Evaluations

Ensure explanations are practical and user-friendly.

4 Alternative Data Sources

Incorporation of alternative data sources, such as educational background.

1. Misheva et al. (2021) & Demajo et al. (2020)
2. Misheva et al. (2021) & Demajo et al. (2020)
3. Demajo et al. (2020)
4. Langenbucher & Corcoran (2022)

Future Research Directions

1

Real-World Implementation

Conducting real-world case studies in banks and financial institutions.

2

User-Centric XAI Designs

Developing explanations that cater to different stakeholders, including loan officers, regulators, and consumers.

Conclusion

1

Key Takeaways

XAI techniques like SHAP and LIME are crucial for explainability.

2

Future Outlook

Continued research and development of XAI will be essential for the responsible adoption of AI in finance.

XAI is essential to ensure the credit scoring models remain interpretable and compliant.