

# **Developing a Data-Driven Home Loan Origination Scorecard: Enhancing Risk Management and Decision-Making in the Australian Mortgage Industry**

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# Project Goals



Explore the Australian mortgage market landscape



Examine home origination models and delinquency prediction



Evaluate market trends and analyse loan products



Develop a model to predict loan defaults

# Project Relevance



## Bank's Point of View:

Reduced Risk

Improved Profitability

Efficient Resource Allocation

Regulatory Compliance



## Customer's Point of View

Access to Credit

Financial Stability

Peace of Mind

Targeted Support

# Problem Statement

For

Clients(Borrowers)

- Severe damage to credit history

- Risk of Foreclosure

- Emotional and Mental Strain

For

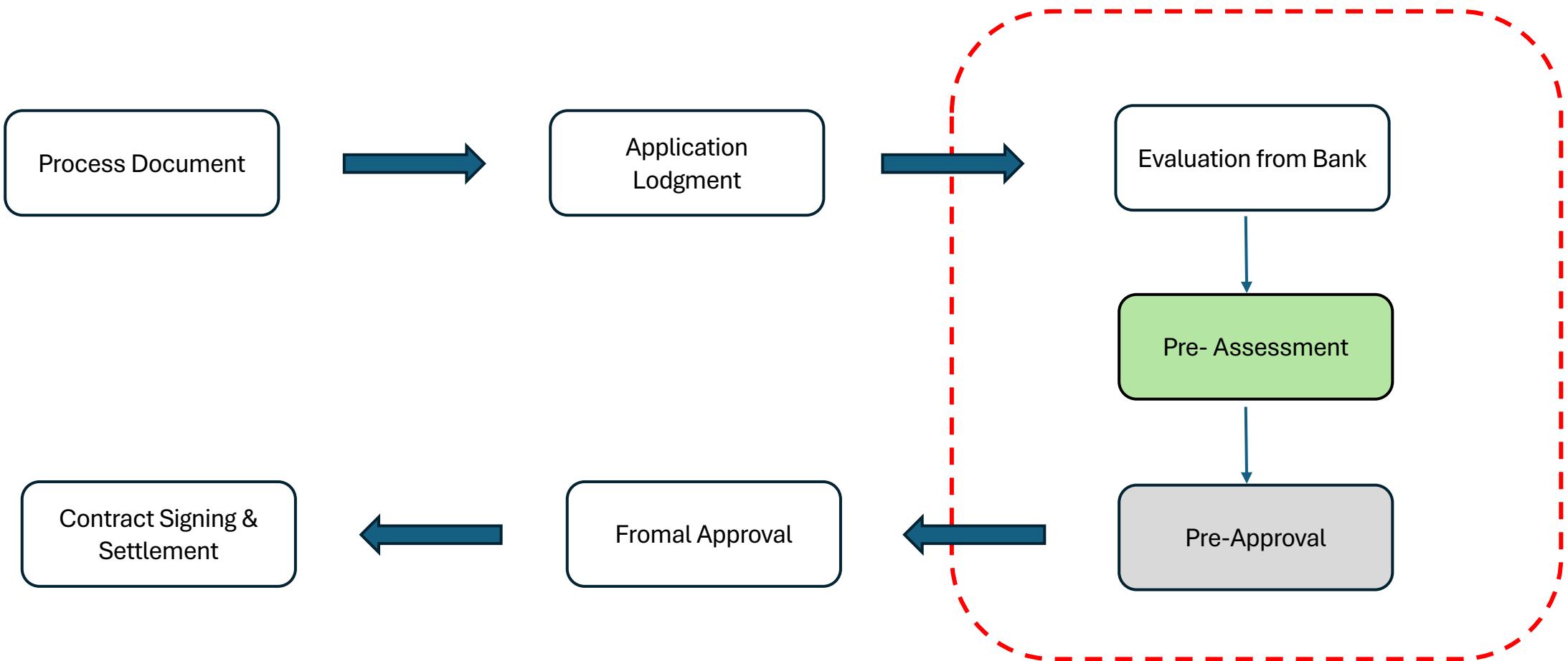
Businesses(Lender s)

- Significant financial loss

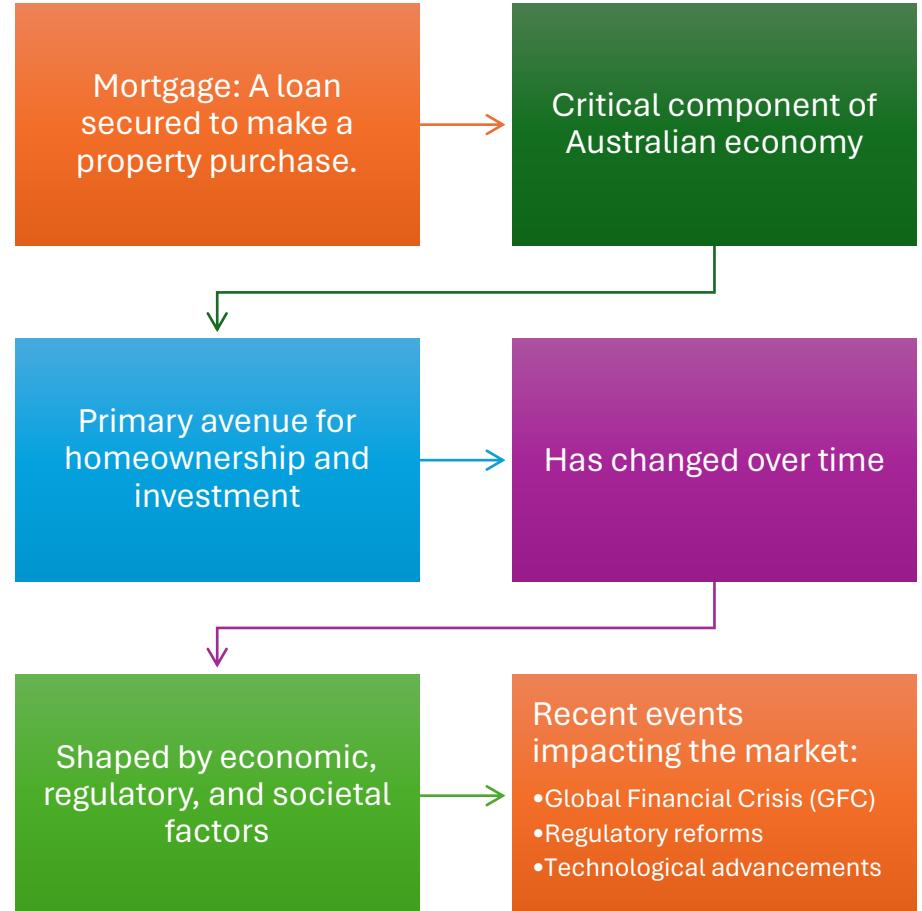
- Market uncertainty

- Increased Operational Cost

# Home Loan Process

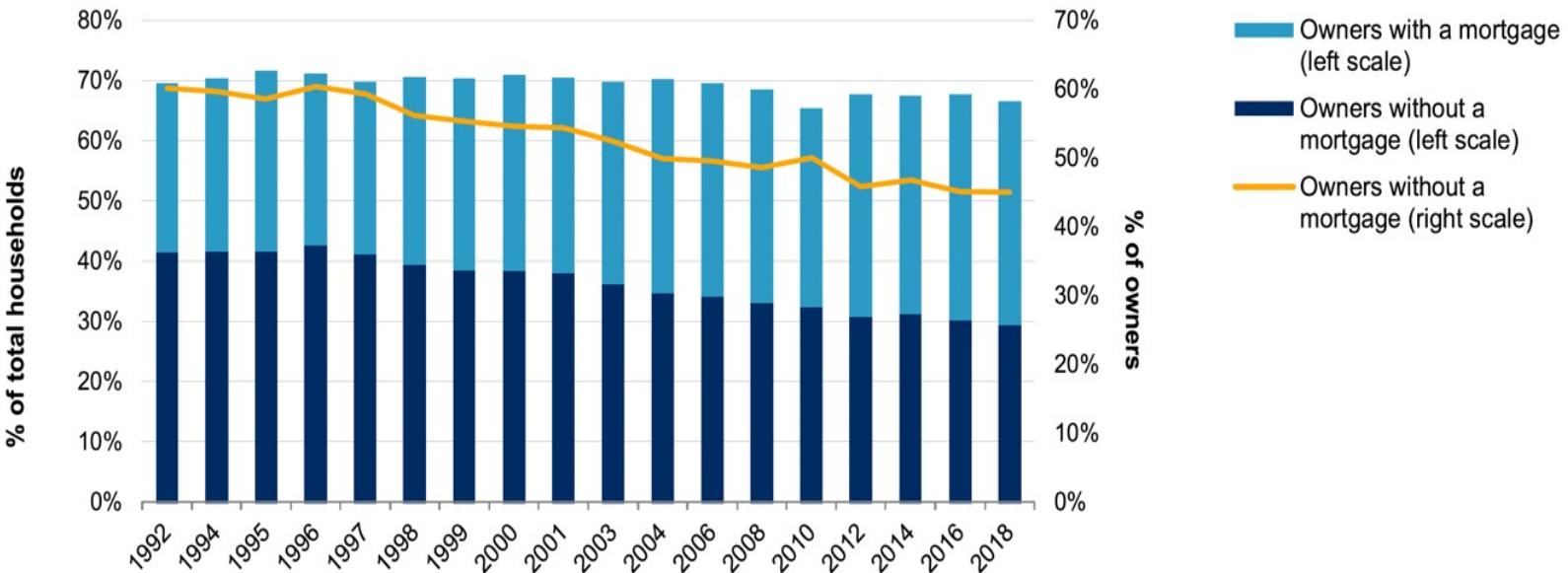


# Australian Mortgage Market



# Market Overview

Australian Home Ownership And Mortgage Trends

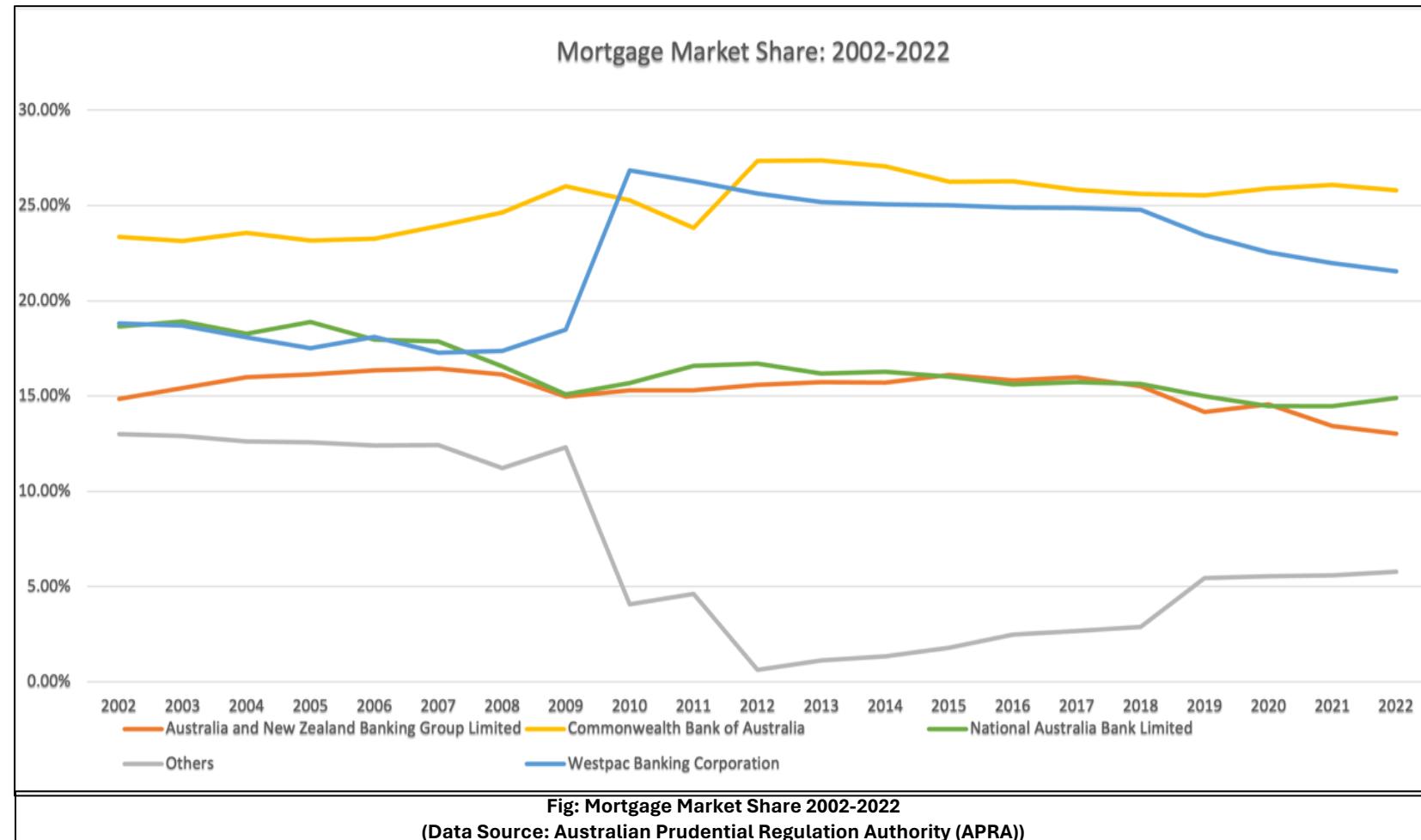


Source: Australian Bureau of Statistics.

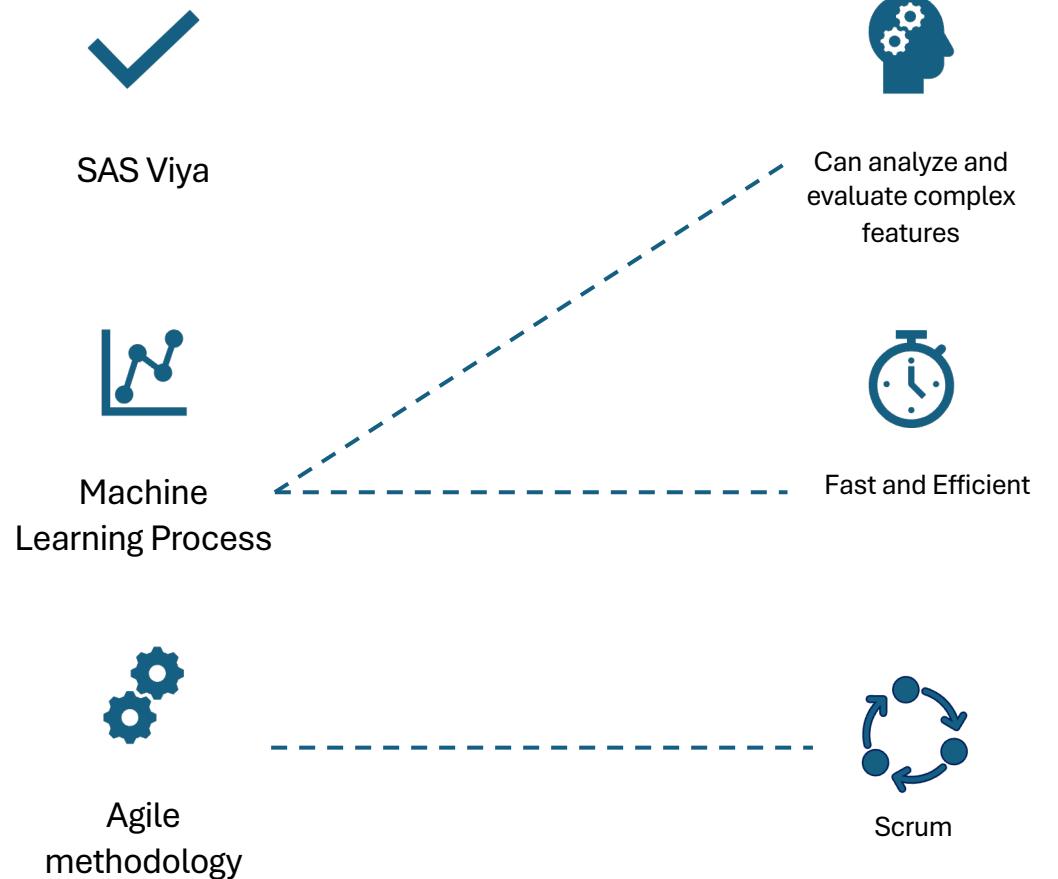
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Fig: Australian Home ownership and Mortgage Trends

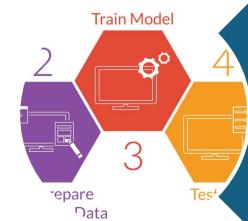
# Market Overview



# Approach



# Models



## Model 1

- Train using all the features



## Model 2

- Focuses more on credit history and similar behaviours



## Model 3

- Emphasizes financial status and property valuation

Share and  
Collaborate

Develop SAS  
Code

Manage Data

Build Decision

Prepare Data

Explore and  
Visualize

Build Model

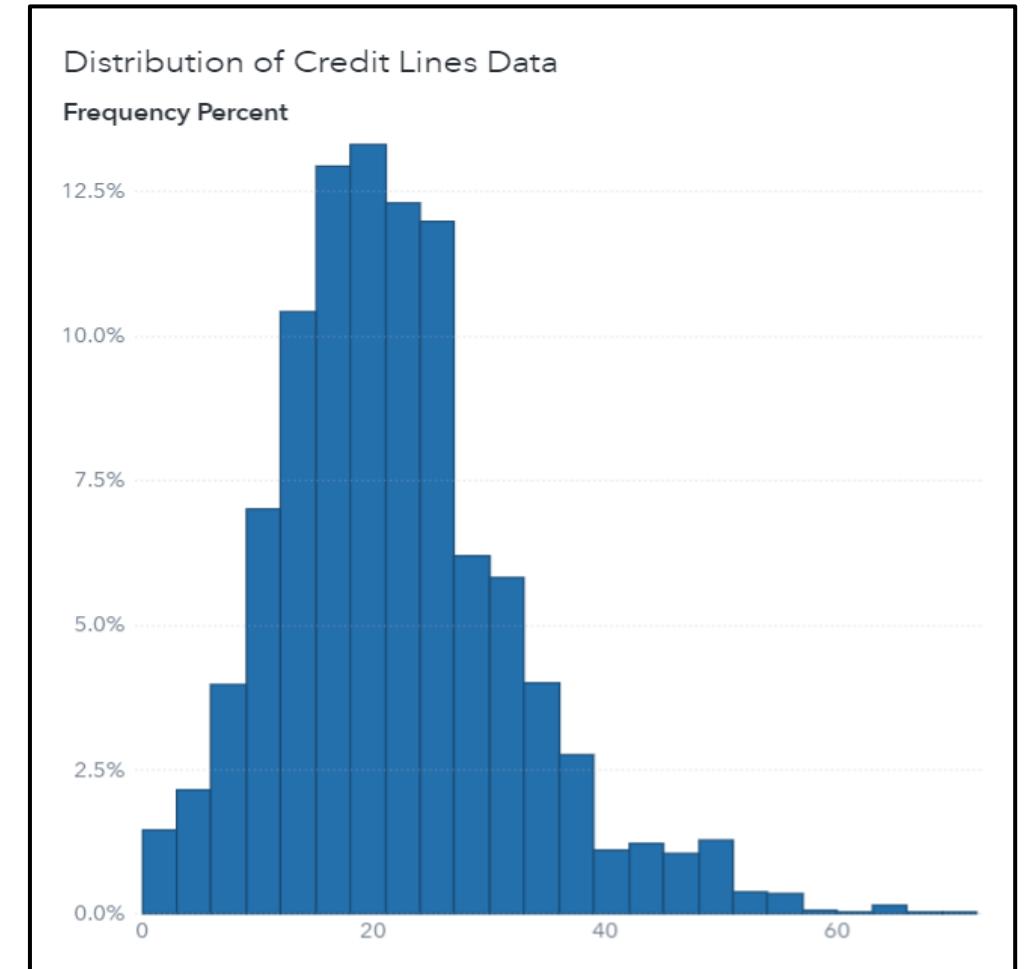
Manage  
Model



# Dabbling into Data



*Fig: Percentage of Ongoing and Default cases*



*Fig: Data distribution of Number of Credit Lines*

# Model Training and Data Treatment

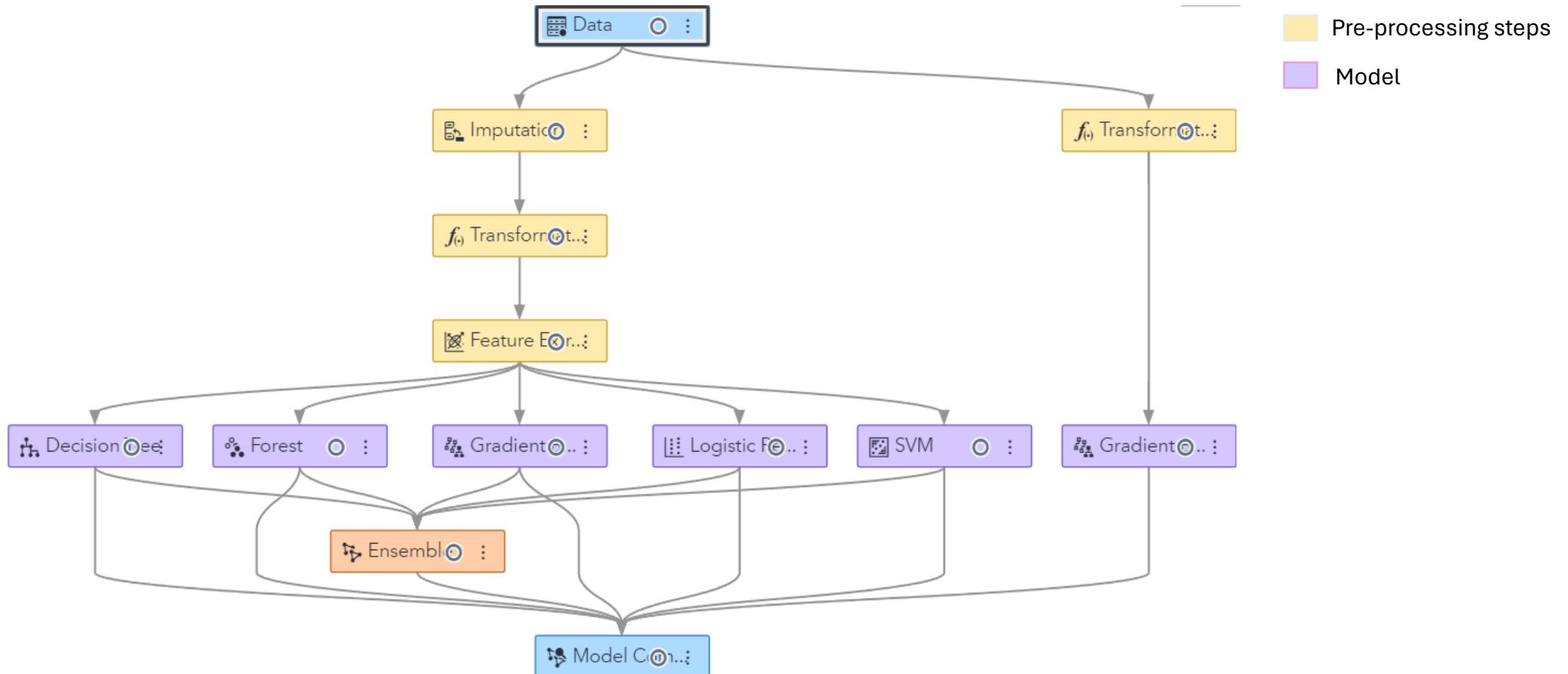


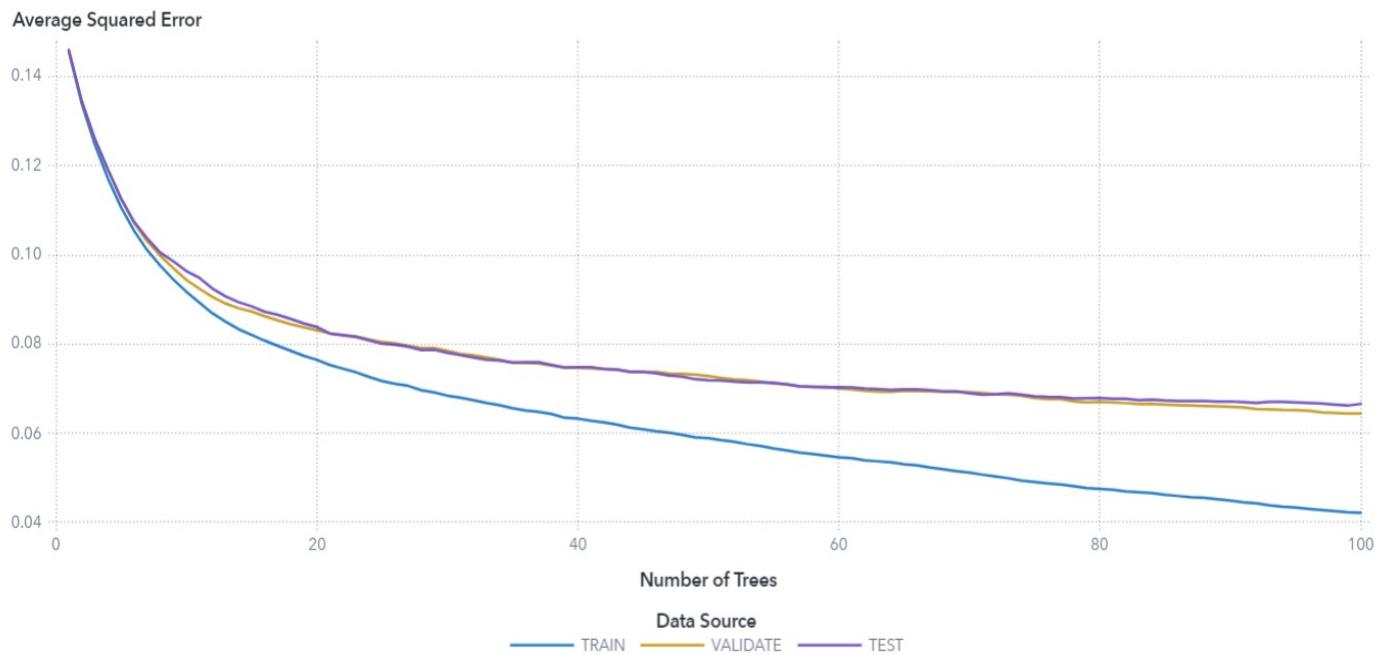
Fig: Pipeline for optimal model creation

# Evaluation in SAS Viya

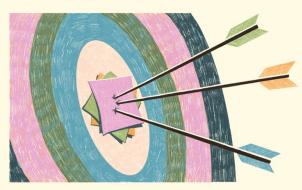
Pre-Processing  
Node

Input Variable	Variable Level	Number of Missing Values	Percent Missing
CLAGE	INTERVAL	174	4.8658
CLNO	INTERVAL	133	3.7192
DEBTINC	INTERVAL	754	21.0850
DELINQ	NOMINAL	354	9.8993
DEROG	NOMINAL	438	12.2483
LOAN	INTERVAL	0	0
MORTDUE	INTERVAL	325	9.0884
NINQ	NOMINAL	311	8.6969
VALUE	INTERVAL	75	2.0973
YOJ	INTERVAL	318	8.8926

Machine Learning  
Node



# Evaluating Machine Learning Model



## Accuracy

Measures how well the model has been able to correctly predict the cases



## Misclassification

Evaluation of the errors the model has made while trying to predict

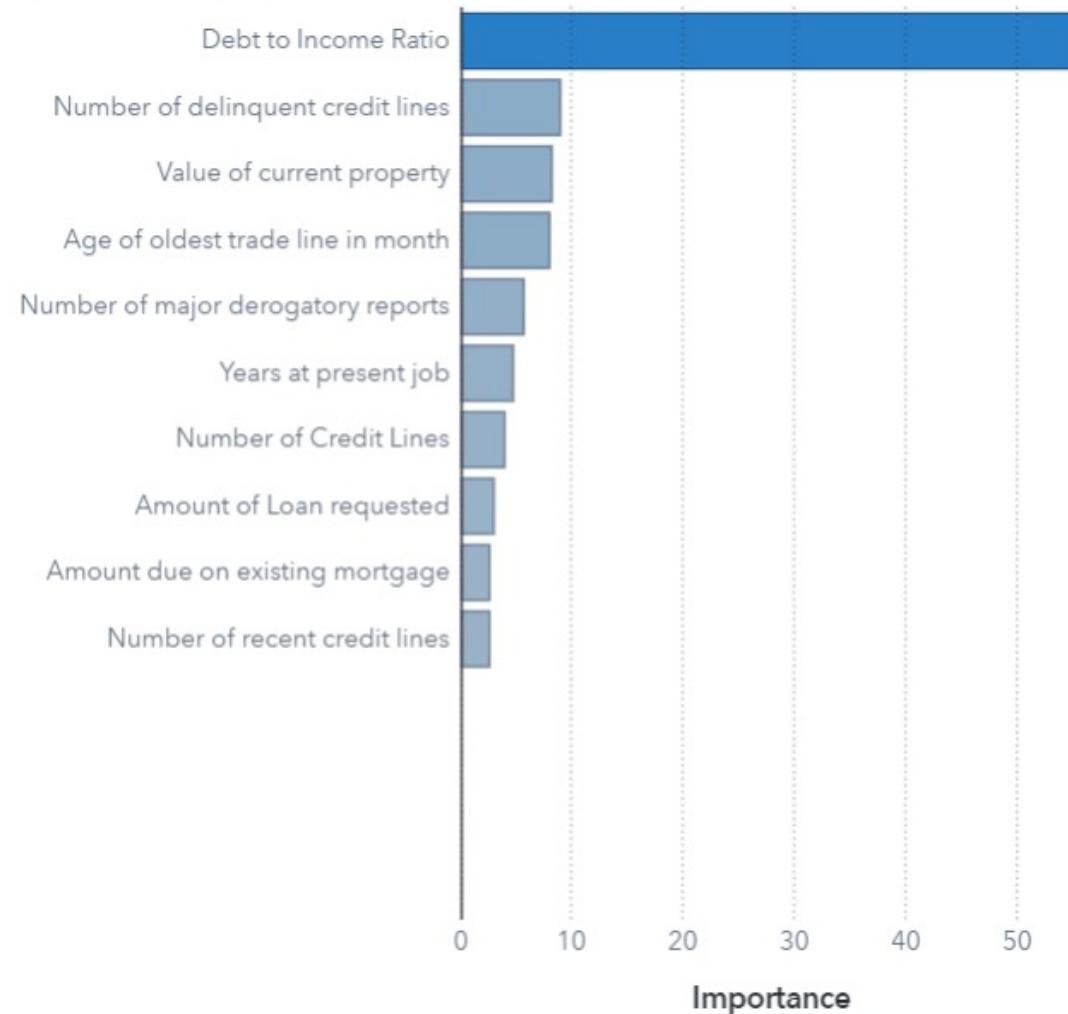


## Graphs

Visual representation of the information

# Model Insight

## Variable Importance



Model	Algorithm	KS (Yoden)	Accuracy	Misclassification Rate
Main Model	Gradient Boosting	0.77	0.91	0.08
Model Credit line	Gradient Boosting	0.49	0.86	0.14
Model Income ratio	Gradient Boosting	0.65	0.86	0.16
Model	Training		Testing	Validation
Main Model	0.85		0.77	0.76
Credit line	0.59		0.49	0.51
Income ratio	0.67		0.65	0.68

# Test Case

## Model Credit Line

Number of Credit Line	5
No of Delinquent Credit Line	0
Number of Major Derogatory Report	5



Loan Repaid



Loan Defaulted

Number of Credit Line	5
No of Delinquent Credit Line	2
Number of Major Derogatory Report	7



# Outcome Achieved

## Deliverables

A home loan origination model  
Final Project report  
Presentation  
Poster Presentation

## Challenges:

Integrating the model for wider use  
Focused on predicting delinquency based on a single data point

## Achievements:

Home loan origination Model Development  
Literature Review  
Case Study  
Market Knowledge  
Project management Skills  
Networking  
Person and Professional growth

# Key Findings

1

Deep Learning Algorithms results were not as good as anticipated

- Reason: Less volume of data

2

Statistical Learning Algorithms are found to be effective.

3

Gradient Boosting the best suited for the dataset

No imputation is required

# Key Takeaway



PROJECT  
MANAGEMENT  
TECHNIQUES



AUSTRALIAN HOME  
LOAN AND  
MORTGAGE MARKET



ADAPTABILITY AND  
TIME MANAGEMENT



ETHICAL  
CONSIDERATION



# Conclusion



Learned about SAS Viya and its toolchain



Built a home loan origination model using various machine learning algorithms



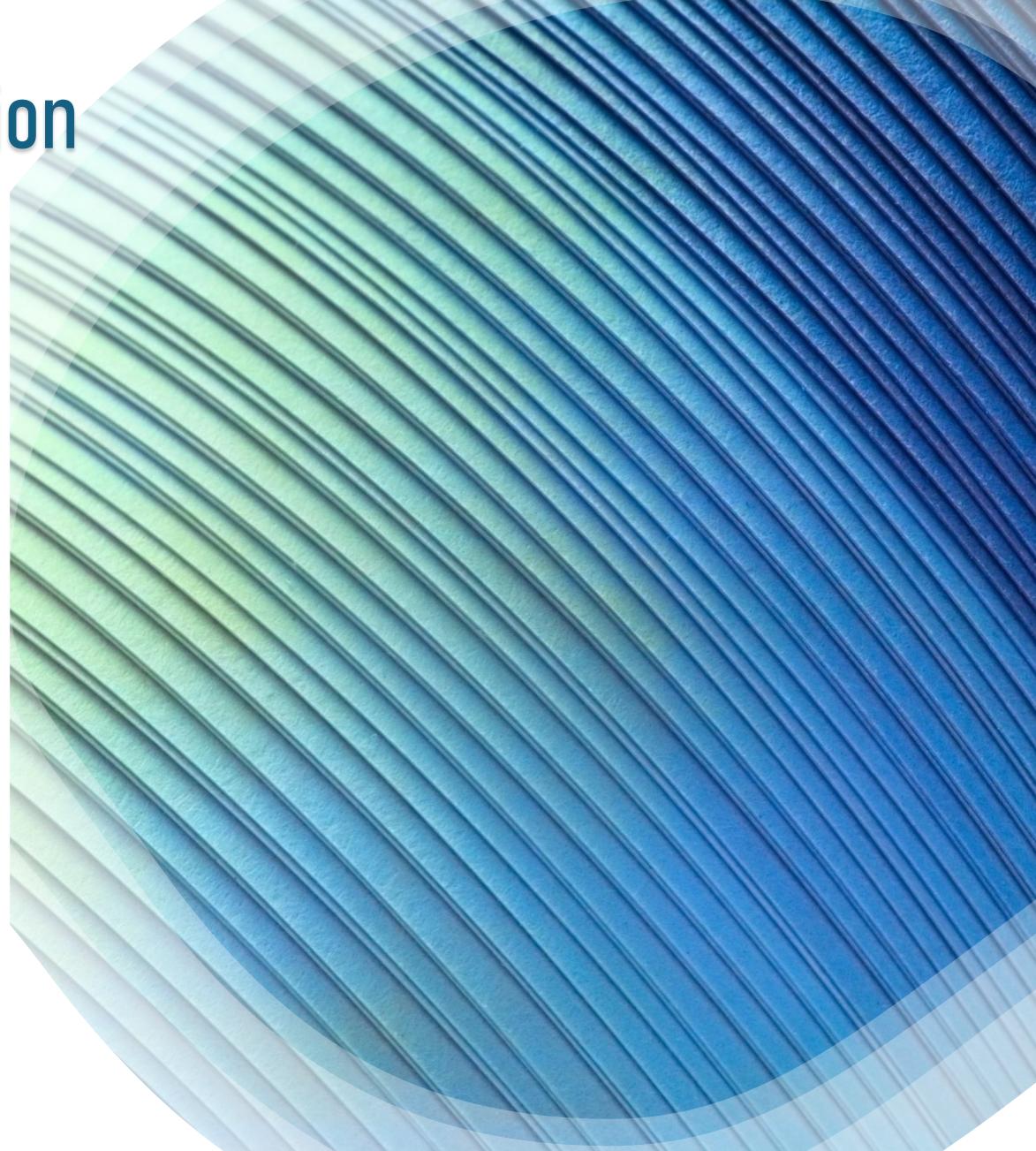
Implemented SCRUM methodology for project management

# Recommendation

Consider other influential Factors like change in home loan interest

Increase the volume of dataset

Human In the loop



## References



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## Q & A Session

