Modernizing credit risk modelling:

Using machine learning to challenge industry norms:

Loss Given Default (LGD) Models

Executive presentation

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Outline

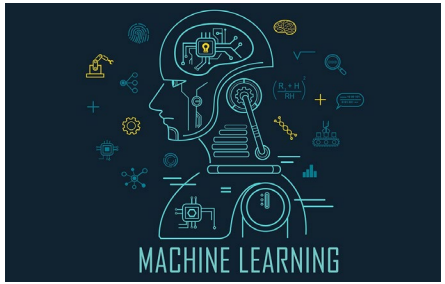
1. Problem Statement
2. Introduction & Background
3. Solution overview
4. Data, Modelling, & Analysis
5. Outcomes – conclusions & impacts
6. Next steps

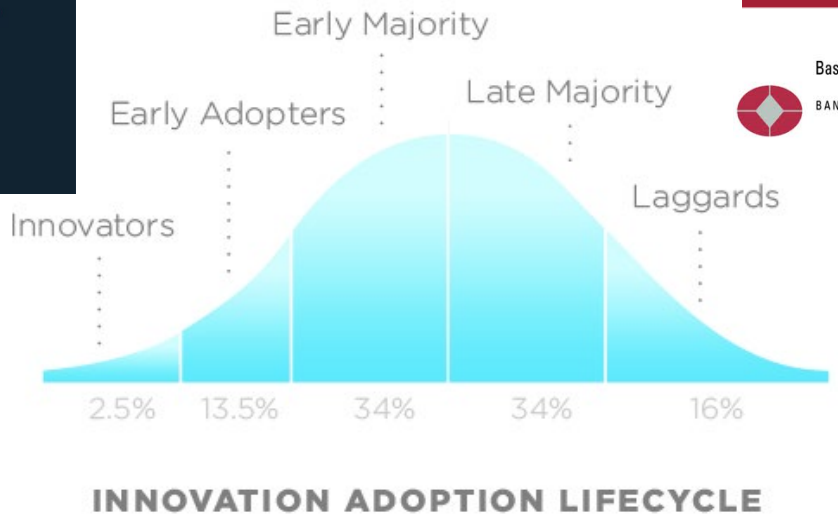
1. Problem Statement

Use **modern data science** and **machine learning** techniques to benchmark, **challenge**, refine, and enhance the more **traditional statistical modelling** methods employed currently at my organization for processes related to certain **accounting standards** and **banking regulations**.

2. Introduction & Background

Resulting in slower adoption:





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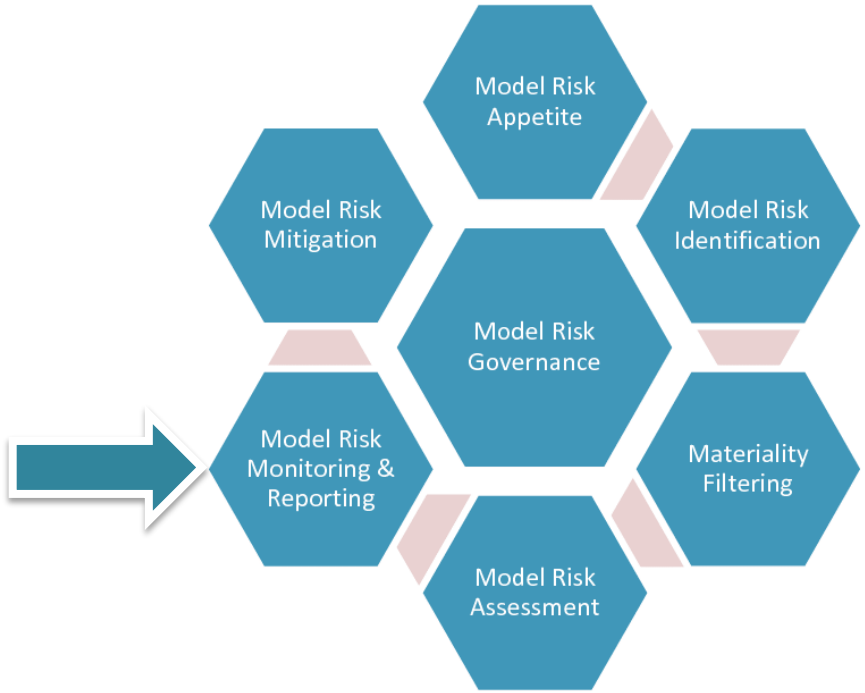
2. Introduction & Background

Initial opportunity:

- Model Performance
- Model benchmarking
- “Challenger” models
- Alternative models



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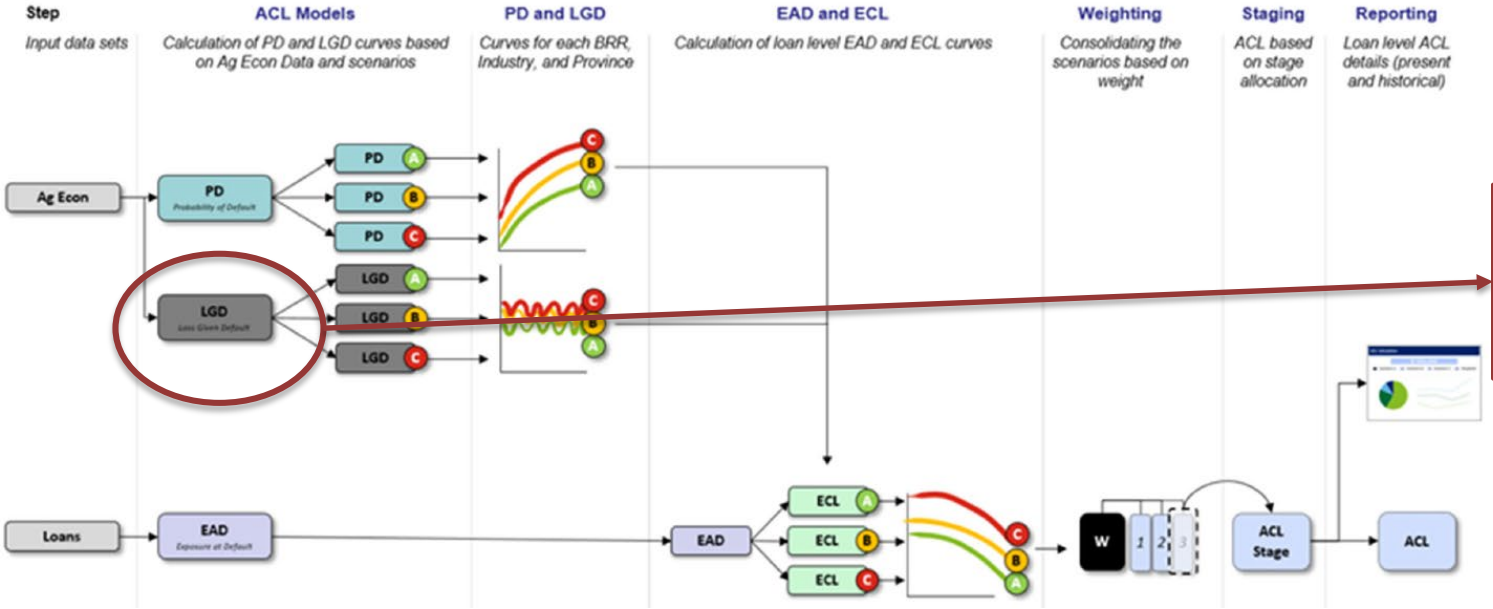
3. Solution Overview

Scope:

3. Solution Overview

$$ACL = \sum \left[\frac{PD_i \times LGD_i \times EAD_i}{(1+r)^n} \right]$$

Allowance for Credit Loss Calculation | Model



Loss Given Default (LGD) Model

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4. Solution Overview

Current Approach

- Two-stage micro-structure
- Likelihood X Severity
- Assumes independence

$$E(LGD) = E(PWOD \times ELWO) = E(PWOD) \times E(ELWO)$$

- Scorecard approaches based on logistic regression

Proposed Approaches

1. Two-step models
   a) RF class with RF regress
   b) RF class with k-NN regress

2. Two-step models
   a) RF regression
   b) k-NN regression
   c) Multi-layer neural network

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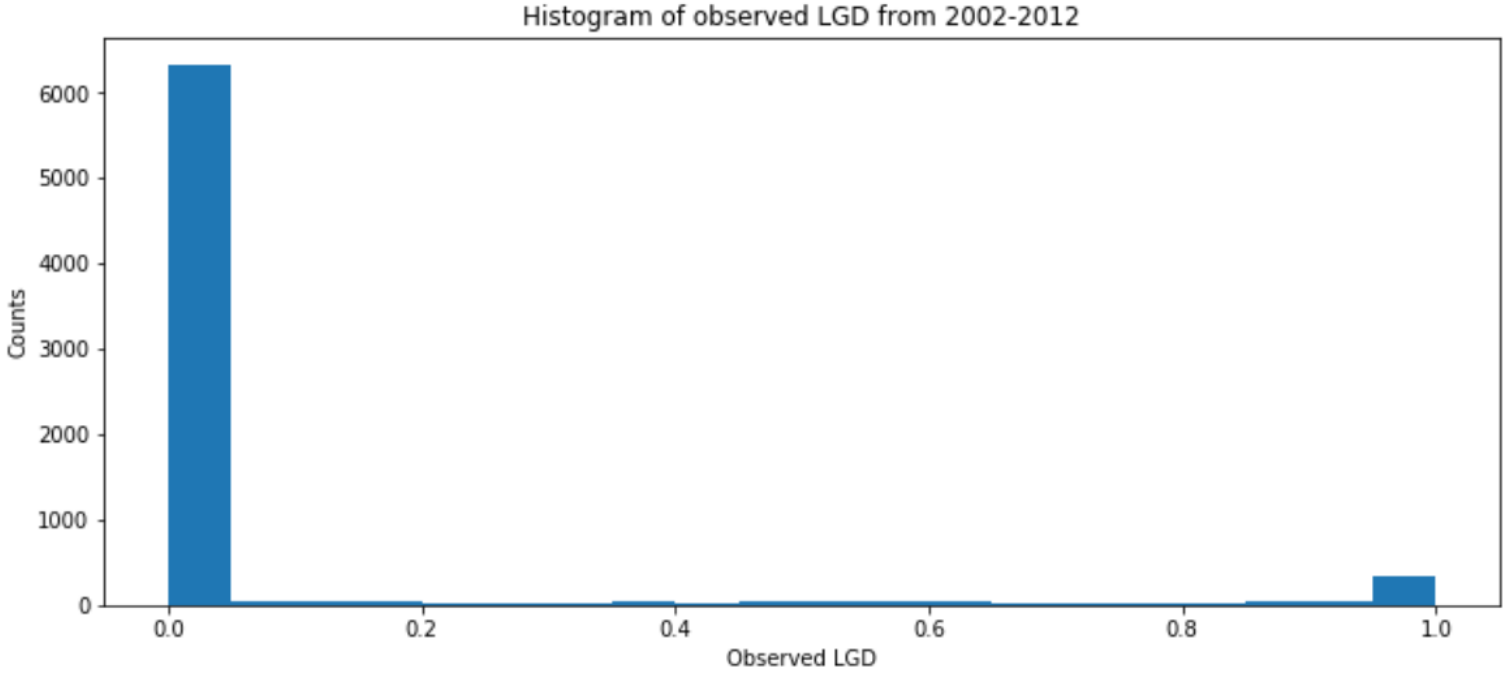
5. Data, Modelling, & Analysis

LGD Data:



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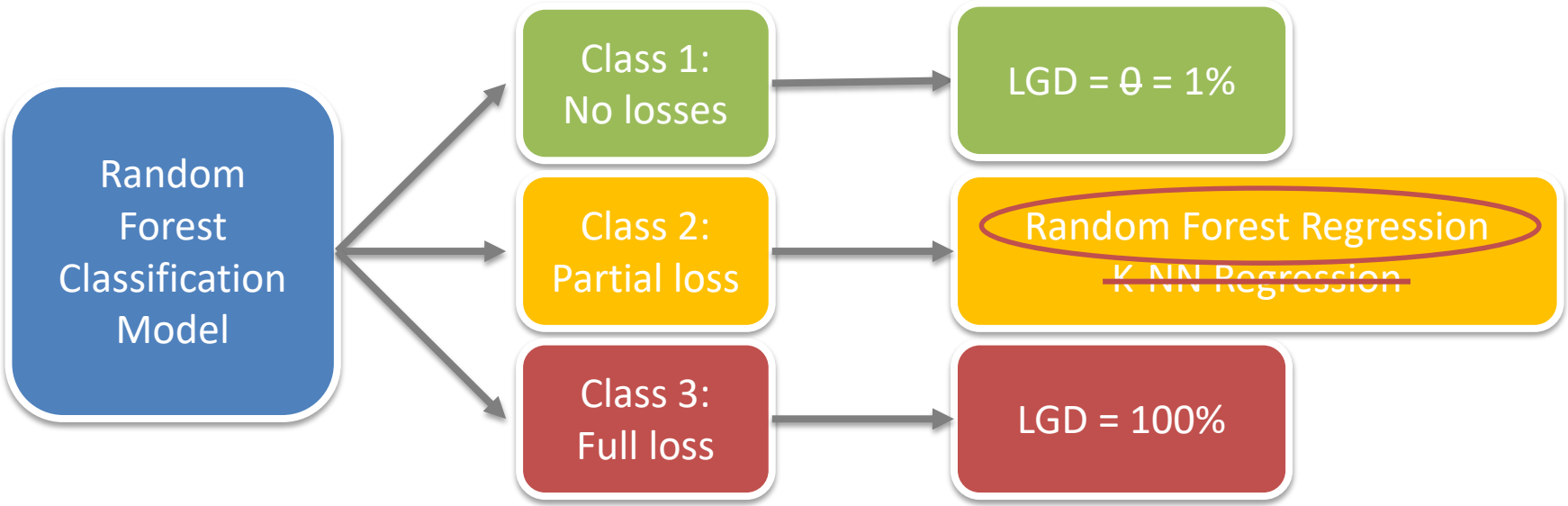
5. Data, Modelling, & Analysis

Two-step models:



Classification then severity

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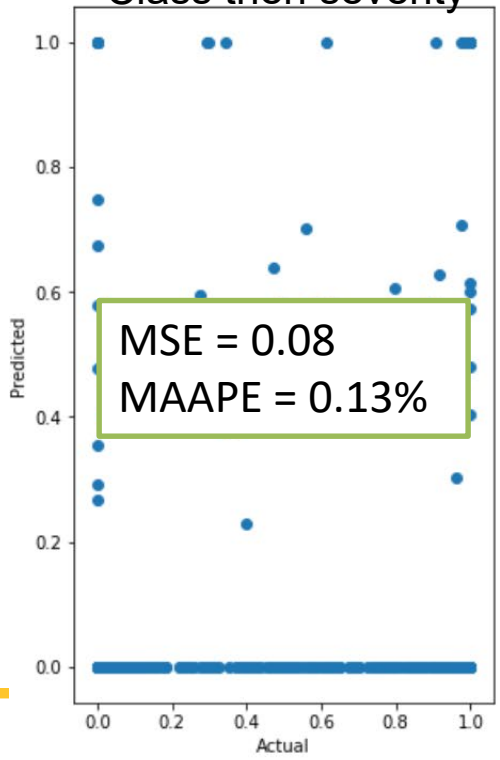
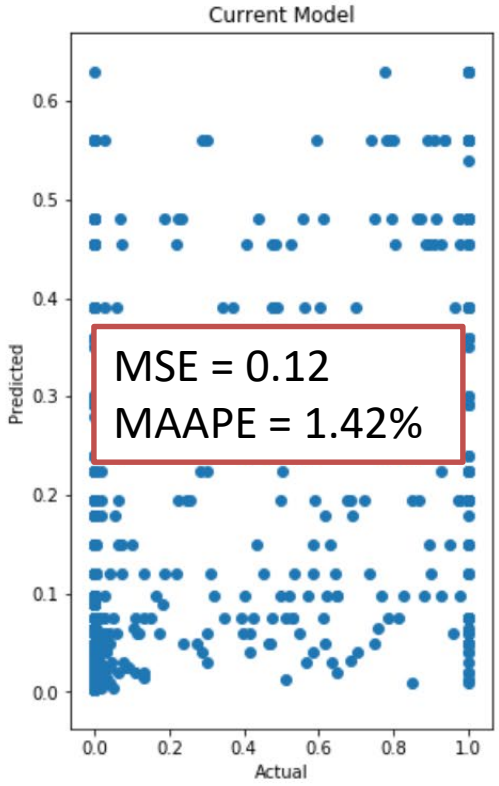
5. Data, Modelling, & Analysis

Two-step models:

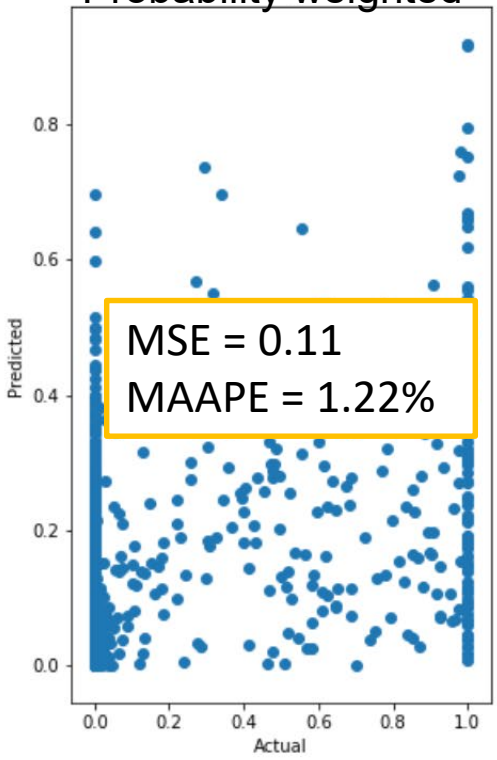
Class then severity



Current Model



Probability weighted



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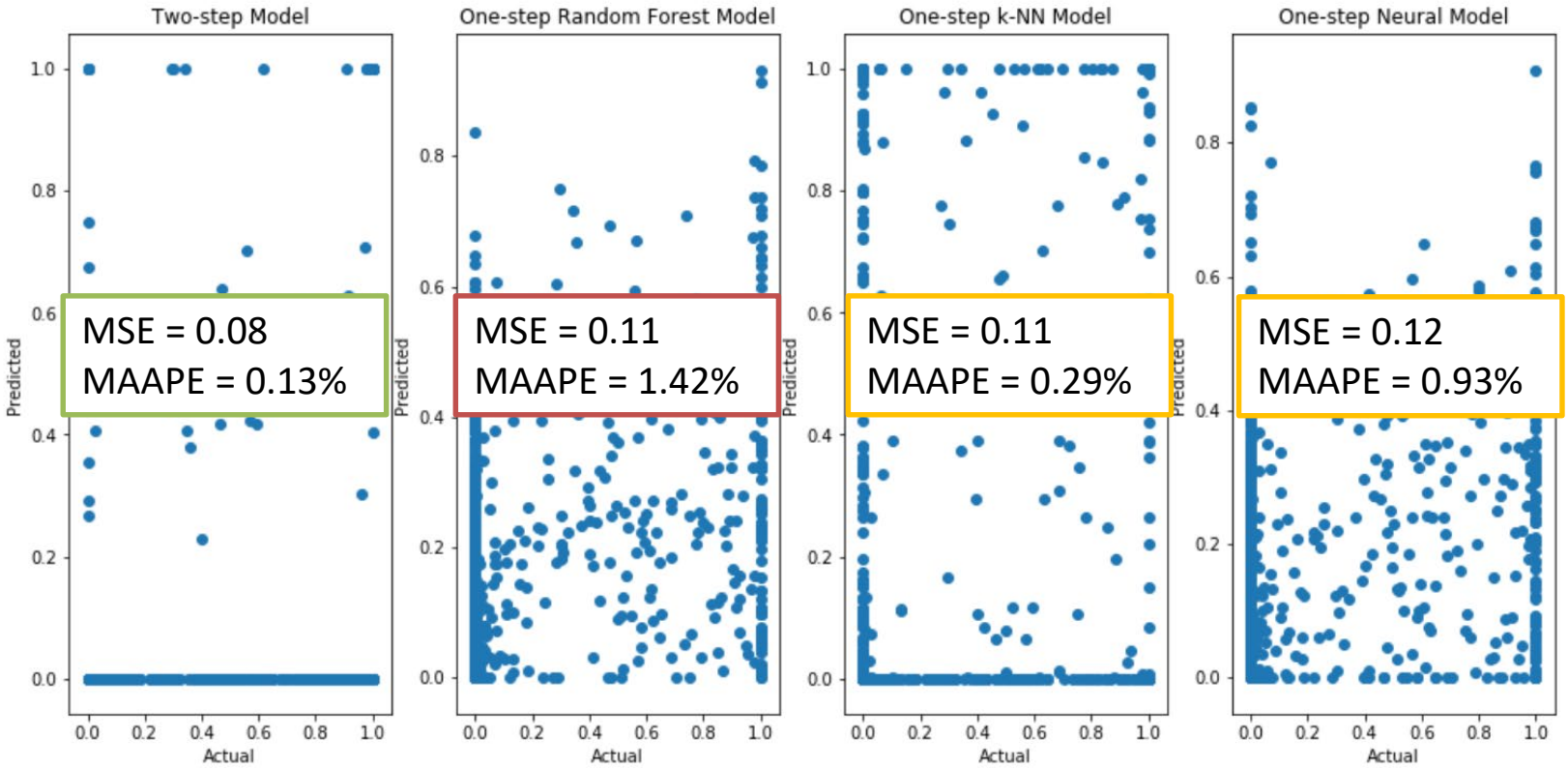
5. Data, Modelling, & Analysis

One-step models:



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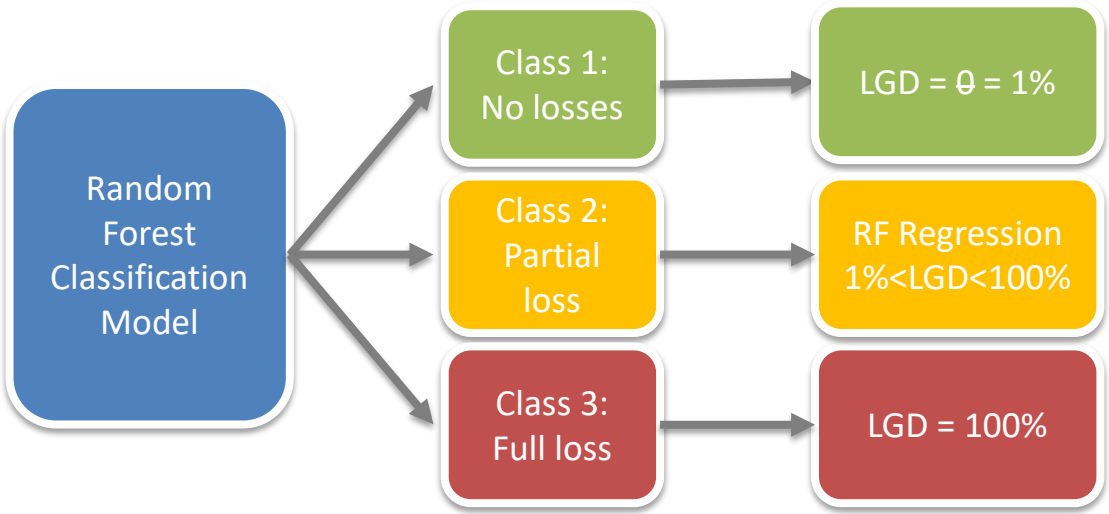
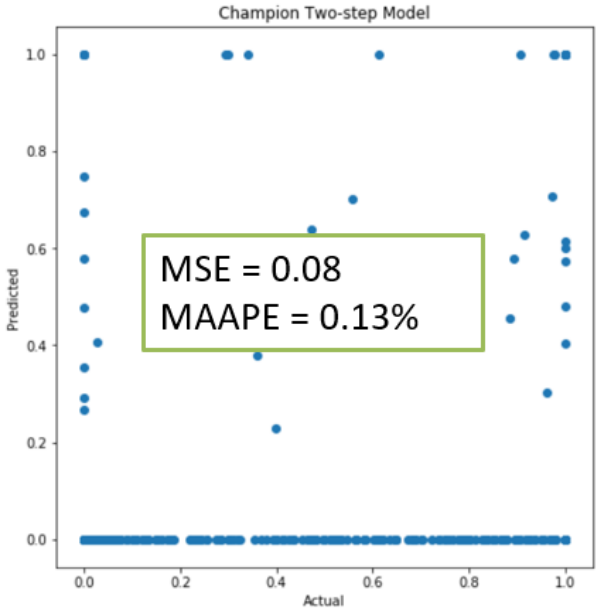
6. Outcomes – conclusions

Champion Model: RF Classification, then RF Severity





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6. Outcomes – impacts

- Enables more accurate Financial Statements
- Enables more refined pricing
- Improved Model Performance Monitoring
- Facilitate change management and adoption of new techniques
- Inform next round of model development (this upcoming year)
- Simulation engine will be used in credit economic capital (ECAP) model

7. Next Steps

1. Partner with Model Development on LGD simulation (for credit ECAP)
2. Work with IT and Finance to get 2013 – 2019 data, then re-run analysis
3. Incorporate “Challenger” model into Model Performance Monitoring
4. Explore enhancements by bringing in macro-economic variables (forward-looking)
5. “Familiarize” stakeholders with new approaches (to help move Challenger to Production)
6. Work with IT and Finance to determine best practices for deployment

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