LUMINARY
ANALYTICS

BERMUDA

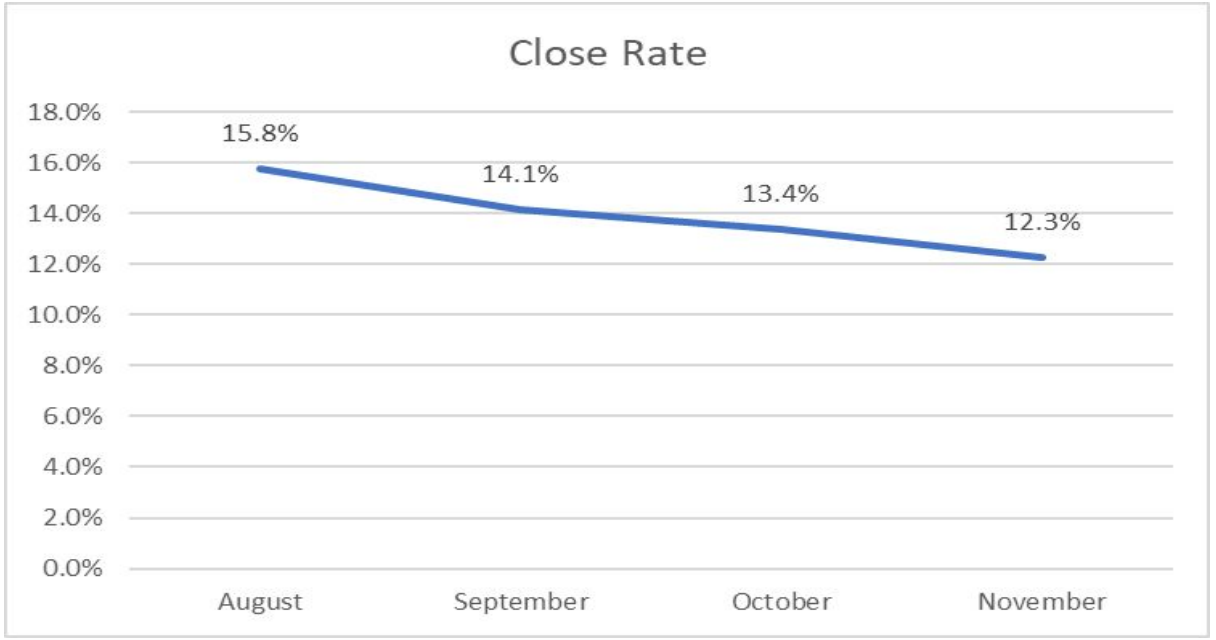
Lead Scoring System

12.10.25

Summary

- Business Situation
- The Profit Equation
- BERMUDA System - Version 1
- BERMUDA System - Version 2
- BERMUDA System - Version 3 and Beyond
- Evaluating Impacts
- Q&A

Business Situation



Close rates have declined for months.
We need a solution to optimize our call center operations.

The Profit Equation

$ = REVENUE - COSTS

$$\Pi_{\text{day}} = \sum_{i=1}^{N} \left[\underbrace{(\lambda_i \cdot \alpha_i \cdot \beta_i \cdot \kappa_i \cdot \pi_i)}_{\text{Net Realized Revenue}} - \underbrace{\left(\begin{cases} \sigma_T & \text{if Tenured}_i \\ \sigma_R & \text{if Training}_i \end{cases} + \left[(\lambda_i \cdot \alpha_i \cdot \beta_i \cdot \kappa_i) \cdot \begin{cases} 0.20 & \text{if Tenured}_i \\ 0.05 & \text{if Training}_i \end{cases} \right] + \sum_{n=1}^{\lambda_i} \omega_{i,n} + \frac{\Omega}{N} \right)}_{\text{Total Cost Allocation}} \right]$$

number of leads

close rate

annual premium

commission factor

$$\kappa_i = \begin{cases} 1.525 & \text{if Class}_i \in \{\text{Preferred, Standard}\} \\ 1.200 & \text{if Class}_i = \text{Graded} \\ 0.975 & \text{if Class}_i = \text{GI} \end{cases}$$

$$\pi_i = \frac{1}{T} \sum_{t=1}^{T} P(\text{pay}_{i,t})$$

placement & retention

salary

agent commissions

marketing cost & cost per call

overhead

focus for today (Lead Scoring System)

Version 1 - Clustering, Routing and Lessons Learned

ALL SEGMENTS USE SAME FEATURES:

Segment: Male_High_Under70
Number of features: 21

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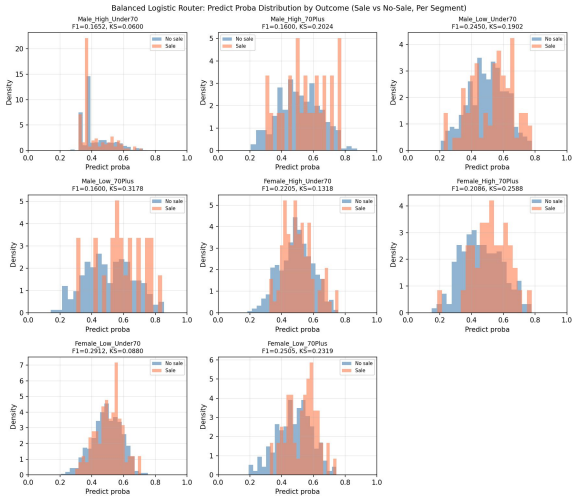
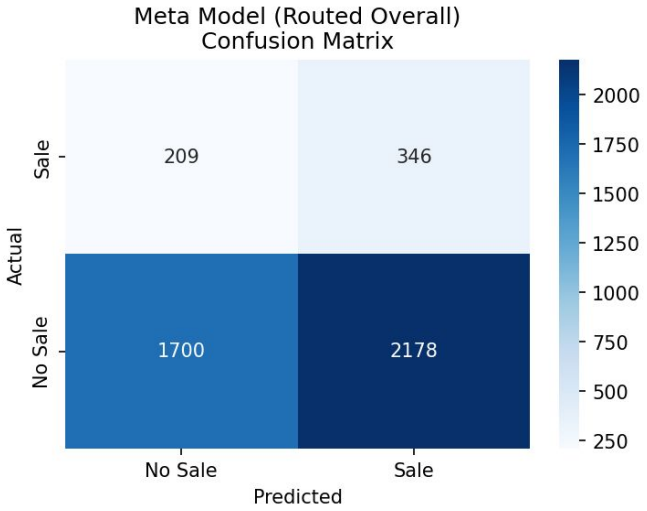
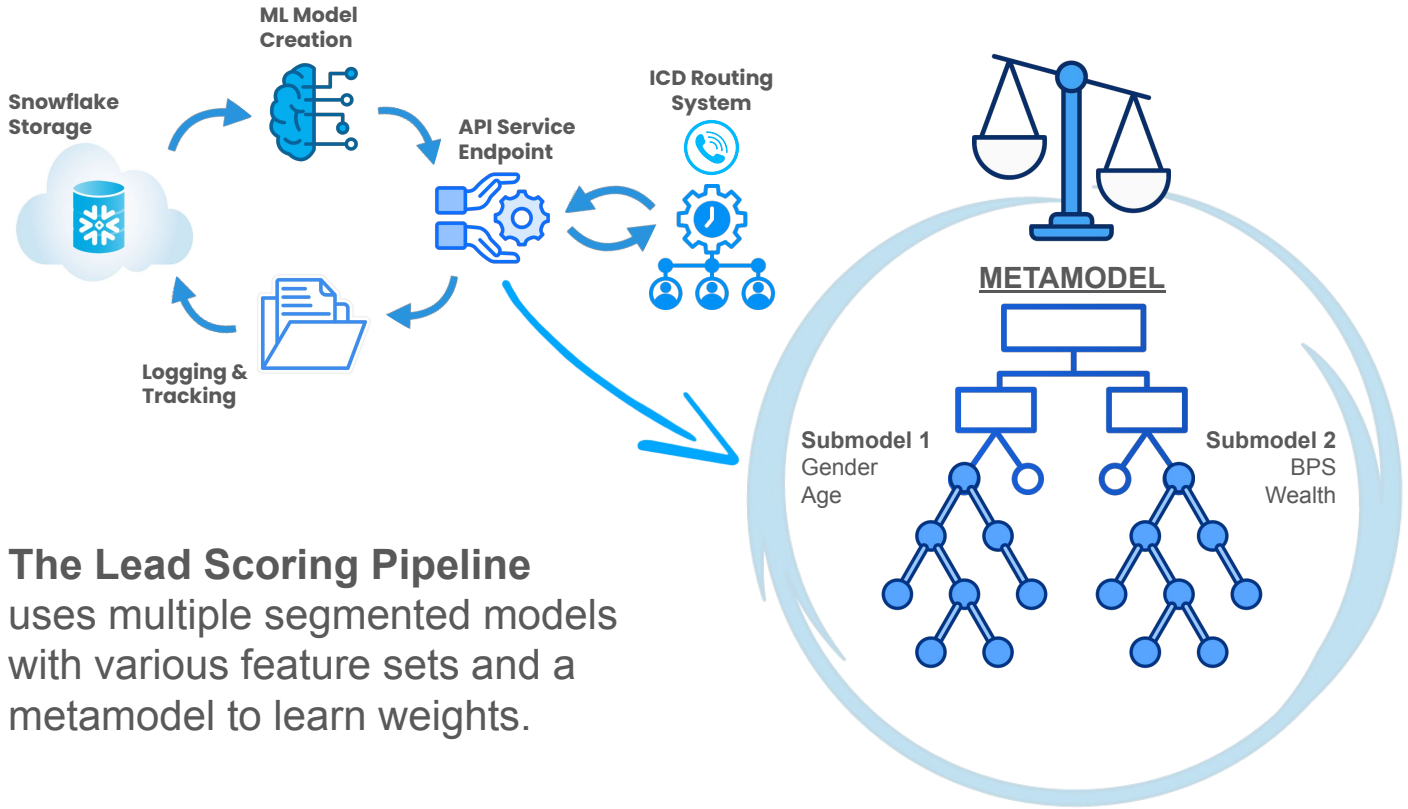
1. URBANICITY
2. LANGUAGE
3. RELIGION
4. RACE_V2
5. MARITAL_STATUS
6. VETERAN_IN_HOUSEHOLD
7. HOMEOWNER_RENTER
8. LIFE_INS_LOYALTY_HIGH_PROPENSITY
9. LIFE_INS_LOYALTY_LOW_PROPENSITY
10. NUMBER_OF_CHILDREN_V2
11. OCCUPATION_GROUP
12. EDUCATION
13. PERSON_TYPE
14. OPEN_PERSONAL_LOAN
15. OPEN_STUDENT_LOAN
16. MORTGAGE_OPEN_LIEN
17. CREDIT_BEHAVIOR_ESTABLISHED
18. CREDIT_BEHAVIOR_UP_AND_COMING
19. CREDIT_BEHAVIOR_THRIVING
20. TV
21. WEB





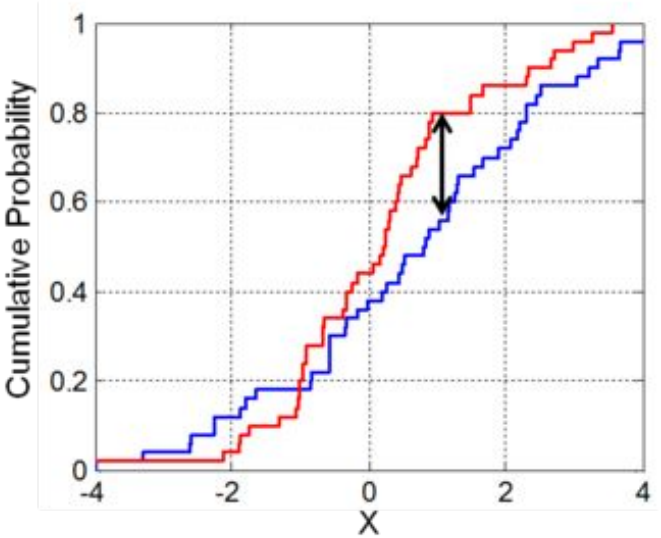
F1 is the wrong metric for this problem!

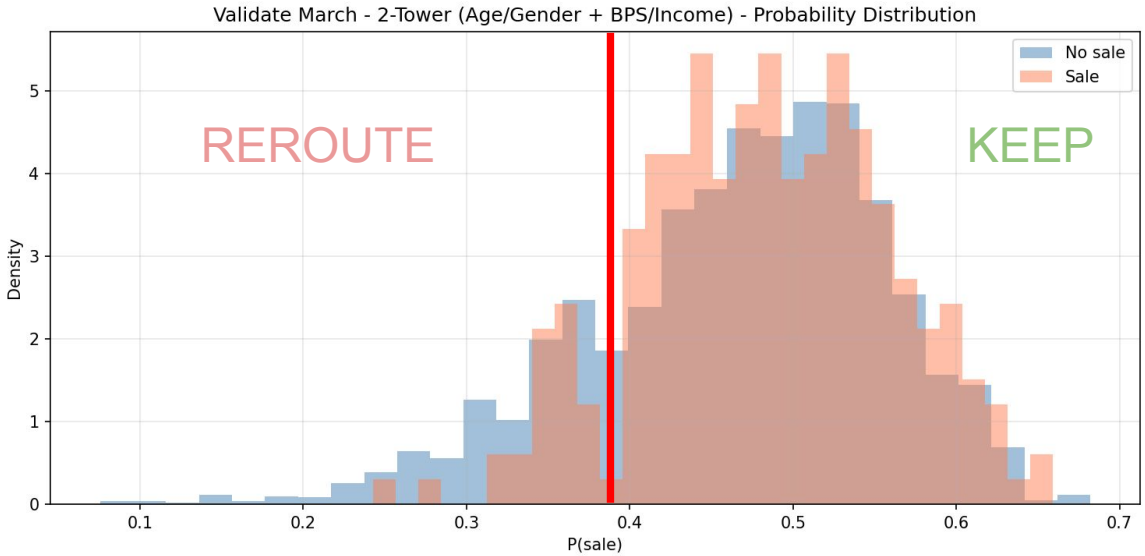
Version 2 - Metamodeling and MLOps



The Lead Scoring Pipeline uses multiple segmented models with various feature sets and a metamodel to learn weights.

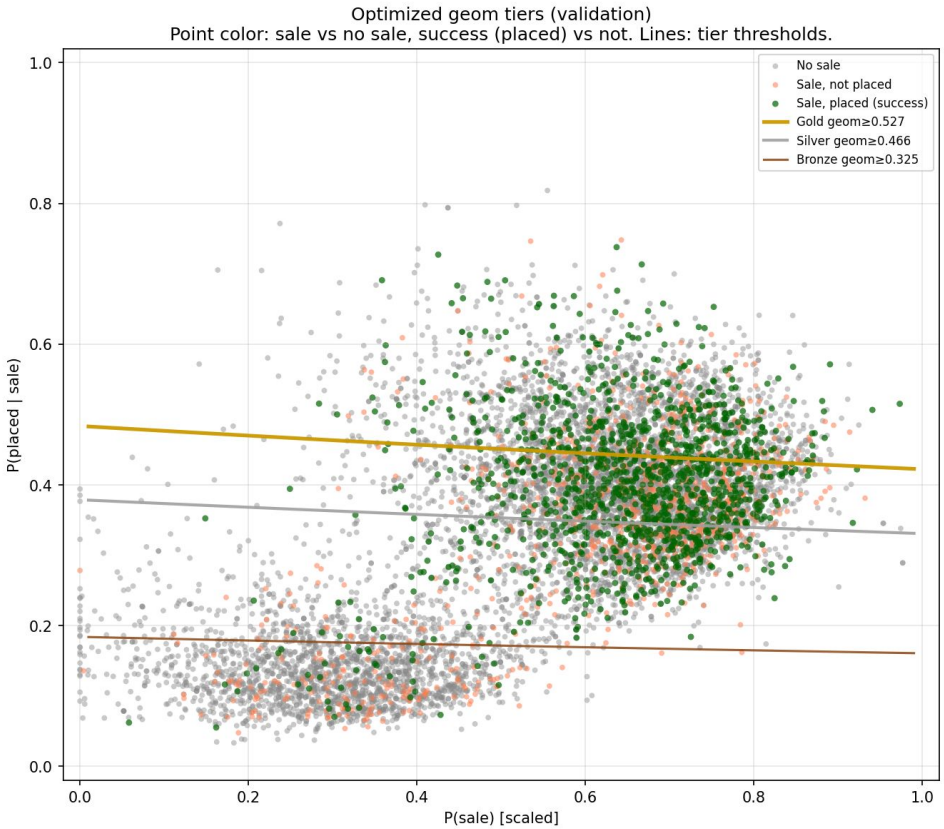
Version 2 - Maximizing KS on Validation for Selecting Out ‘TIN’





Maximizing stratification between the ‘sales’ and ‘non-sales’ reveals a population of likely non-buyers to discriminate out of the leads pool via our meta-model’s predict_probas .

Future Versions - Geometric Mean Tiering of Multiple Condition Successes



Features correlated with one condition of success (sales) are often inversely correlated with other conditions of success (placement).

Final expense insurance is most appealing to low earners, often on fixed incomes.

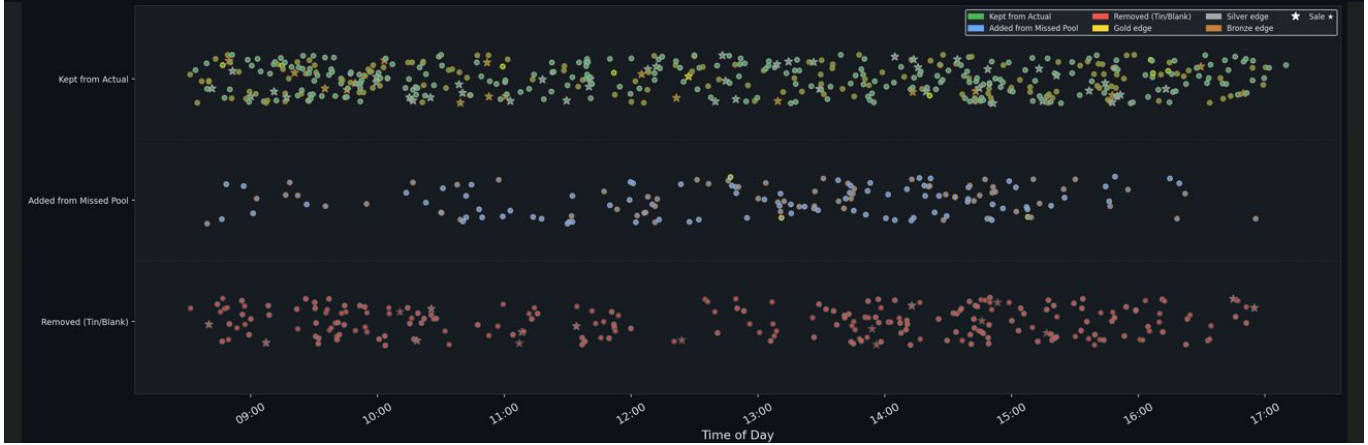
Paradoxically, customers most inclined to buy are least equipped to pay.

Bayesian methods let us model the probability of success as the joint probabilities of multiple conditions of success (i.e. buying and ‘sticking’)

Tiering becomes a multidimensional optimization problem.

Impact Analysis - Modeling Flow and Close Rate Deltas

Metric	Actual	Scenario 2	Δ
Total Calls	709	663	-46
Expected Sales	80.0	88.3	+8.3
Close Rate	11.3%	13.3%	+2.0%
Tin/Blank removed	238	0	-238
Gold/Silver/Bronze added	0	192	+192
→ Gold added	0	3	
→ Silver added	0	112	
→ Bronze added	0	77	



Lead Scoring removes low probability sales from the mix.
8 additional sales per day is worth over $3mil in gross revenue annually.

PARENTAL
ADVISORY
EXPLICIT CONTENT