



A New Credit Card Offering? An Assessment via Machine Learning

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Introduction & Objective



- OBC Credit Card Services operational for over six months

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- Objective

***Leverage power of Machine Learning to evaluate
viability of a new credit card offering***

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- Features: 23
 - *Demographics: gender, age, education & marital status*
 - *Credit limit*
 - *Billing records for past 6 months*



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- Target: 0 – No Default, 1 – Default
 - *Over 20% defaulted*



Methodology & Toolset

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- Analysis exclusively with Python
- Machine Learning to predict defaults
 - *K-NN, SVC, Logistic Reg, GB, Random Forest, etc*
- Best one so far is Gradient Boost (GB)
 - *AUC = 0.78*
- How does it inform us moving forward?



Confusion Matrix: Cost Benefit/Loss

OBC

Actual	No Default		Default	
	Default			
		No Default	Default	
		Predicted		

Confusion Matrix: Cost Benefit/Loss

OBC

Actual	No Default	
	Default	True Positive (TP) <i>Predict:</i> Default <i>Actual:</i> Default <i>Action:</i> <u>No offer</u> to customer <i>Cost:</i> \$0
	No Default	Default
	Predicted	

Confusion Matrix: Cost-Benefit-Loss



Actual	No Default	True Negative (TN) <i>Predict:</i> No Default <i>Actual:</i> No Default <i>Action:</i> <u>Offer</u> to customer <i>Revenue:</i> \$28,000 from interest	
	Default		True Positive (TP) <i>Predict:</i> Default <i>Actual:</i> Default <i>Action:</i> <u>No offer</u> to customer <i>Cost:</i> \$0
		No Default	Default
		Predicted	

Confusion Matrix: Cost Benefit/Loss



Actual	No Default	True Negative (TN) <i>Predict:</i> No Default <i>Actual:</i> No Default <i>Action:</i> <u>Offer</u> to customer <i>Revenue:</i> \$28,000 from interest	False Positive (FP) <i>Predict:</i> Default <i>Actual:</i> No Default <i>Action:</i> <u>No offer</u> to customer Loss: \$0
	Default		True Positive (TP) <i>Predict:</i> Default <i>Actual:</i> Default <i>Action:</i> <u>No offer</u> to customer Cost: \$0
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Confusion Matrix: Cost Benefit/Loss

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No Default	True Negative (TN) <i>Predict:</i> No Default <i>Actual:</i> No Default <i>Action:</i> <u>Offer</u> to customer <i>Revenue:</i> \$28,000 from interest	False Positive (FP) <i>Predict:</i> Default <i>Actual:</i> No Default <i>Action:</i> <u>No offer</u> to customer Loss: \$0
	False Negative (FN) <i>Predict:</i> No Default <i>Actual:</i> Default <i>Action:</i> <u>Offer</u> to customer Loss: -\$48,500 from defaults	True Positive (TP) <i>Predict:</i> Default <i>Actual:</i> Default <i>Action:</i> <u>No offer</u> to customer Cost: \$0
No Default		Default
Predicted		

Estimated Return Next 6 Months



$$\text{Net Return} = [\#TN \times \$28,000] + [\#FP \times (\$0)] + [\#FN \times (-\$48,500)] + [\#TP \times \$0]$$

- Estimated return of USD 87 Million

TN \$28,000 4,476	FP \$0 211
FN -\$48,500 861	TP \$0 452

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- Estimated return of USD 87 Million
- Recommendation
 - *Go ahead with program*

TN \$28,000 4,476	FP \$0 211
FN -\$48,500 861	TP \$0 452

Summary & Next Steps



- Go ahead with the program
- Future work
 - *Improving models further*
 - En-sembling or Stacking
 - Neural Networks
 - *Internal web portal for finance & marketing to use this application*

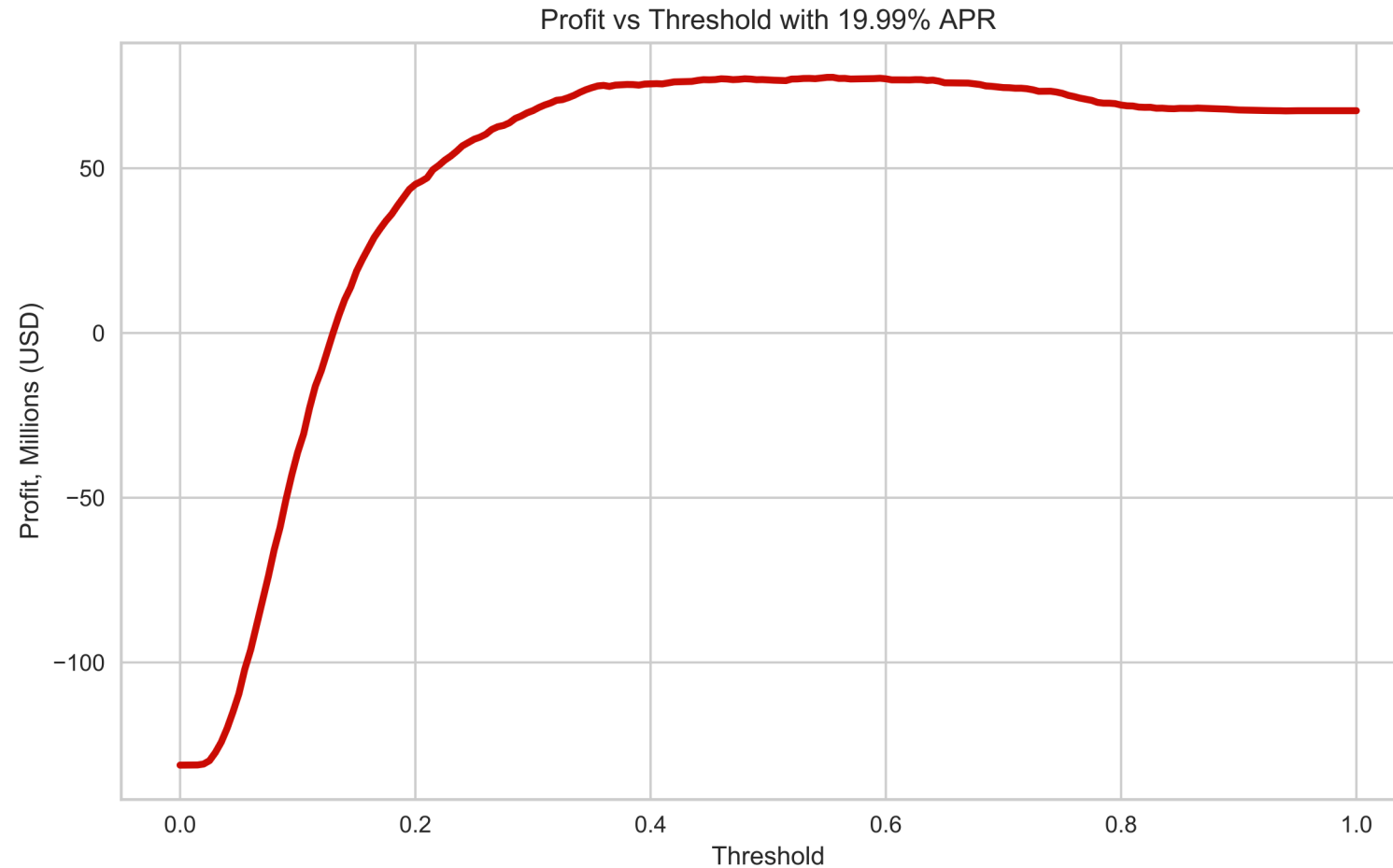
- **Disclaimer:** Obsidian Banking Corporation (OBC) and its logo are fictitious. Any resemblance to reality is purely coincidental.
- Dataset obtained from UCI – Machine Learning Database (<https://archive.ics.uci.edu/ml/datasets/default+of+credit+card+clients>)

Appendix

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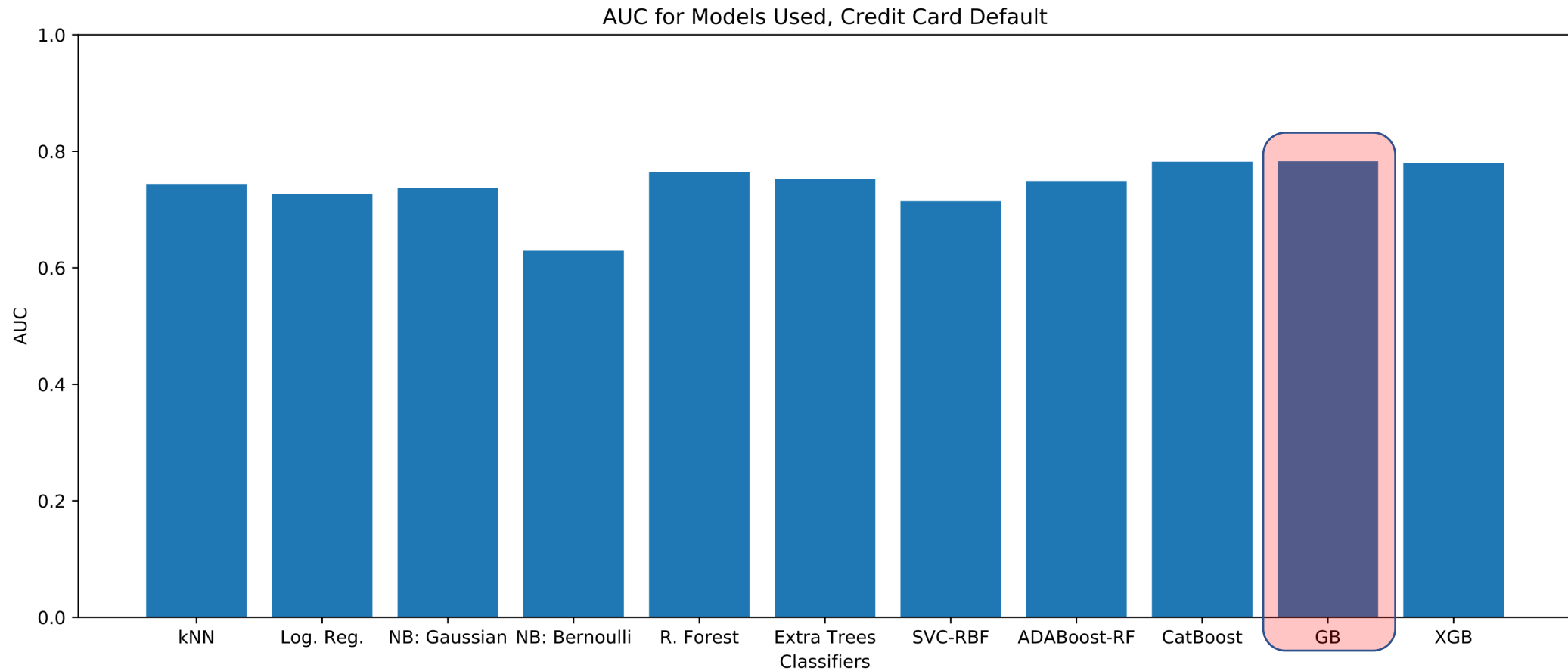
Loss Curve from Confusion Matrix

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AUC Scores of Multiple Classification Models

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Correlation Matrix

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Gradient Boost confusion matrix, credit card default

