A New Credit Card Offering? An Assessment via Machine Learning

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Introduction & Objective

OBC

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- Request by customers & corporate to offer another type of credit card especially with perks

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- Objective

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

Dataset

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- Observations: 30,000

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

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- Features: 23
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- Target: 0 – No Default, 1 – Default
  - *Over 20% defaulted*

Methodology & Toolset

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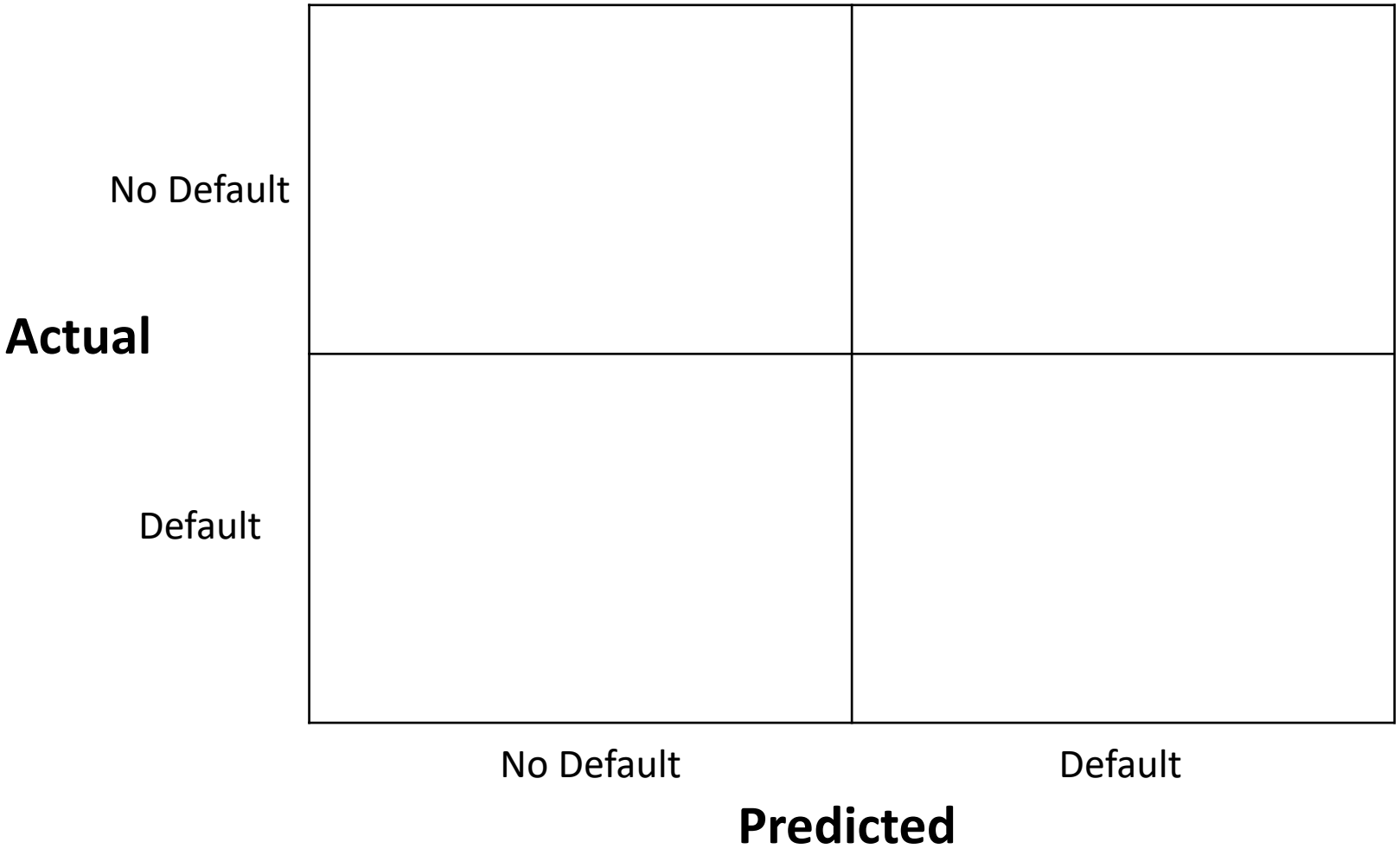
- Analysis exclusively with Python
- Machine Learning to predict defaults
  - *K-NN, SVC, Logistic Reg, GB, Random Forest, etc*
- Best one so far is Gradient Boost (GB)
  - *AUC = 0.78*
- How does it inform us moving forward?

Confusion Matrix: Cost Benefit/Loss

OBC



Confusion Matrix: Cost Benefit/Loss

OBC

Actual \ Predicted	No Default	Default
No Default		
Default		**True Positive (TP)** *Predict*: Default *Actual*: Default *Action*: No offer to customer *Cost*: $0

Confusion Matrix: Cost-Benefit-Loss

OBC

Actual \ Predicted	No Default	Default
No Default	**True Negative (TN)** *Predict*: No Default *Actual*: No Default *Action*: Offer to customer *Revenue*: $28,000 from interest	
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Confusion Matrix: Cost Benefit/Loss

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Default	**False Negative (FN)** *Predict*: No Default *Actual*: Default *Action*: Offer to customer Loss: -$48,500 from defaults	**True Positive (TP)** *Predict*: Default *Actual*: Default *Action*: No offer to customer *Cost*: $0

Estimated Return Next 6 Months

OBC

Net Return = [#TN x $28,000] + [#FP x (-$28,000)] + [#FN x (-$48,500)] + [#TP x $0]

- Estimated max profit of USD 78 Million

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

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Net Return = [#TN x $28,000] + [#FP x (-$28,000)] + [#FN x (-$48,500)] + [#TP x $0]

- Estimated return of <u>USD 78 Million</u>
- Recommendation
  - *Hold-off new credit card roll-out for another six months*
  - *Re-assess with added data & maturity of program*

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

Summary & Next Steps

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- Hold-off on new program for another six months
- Future work
  - *Improving models further*
    - En-sembling or Stacking
    - Neural Networks
  - *Internal web portal for finance & marketing to use this application*

Disclaimer & Source

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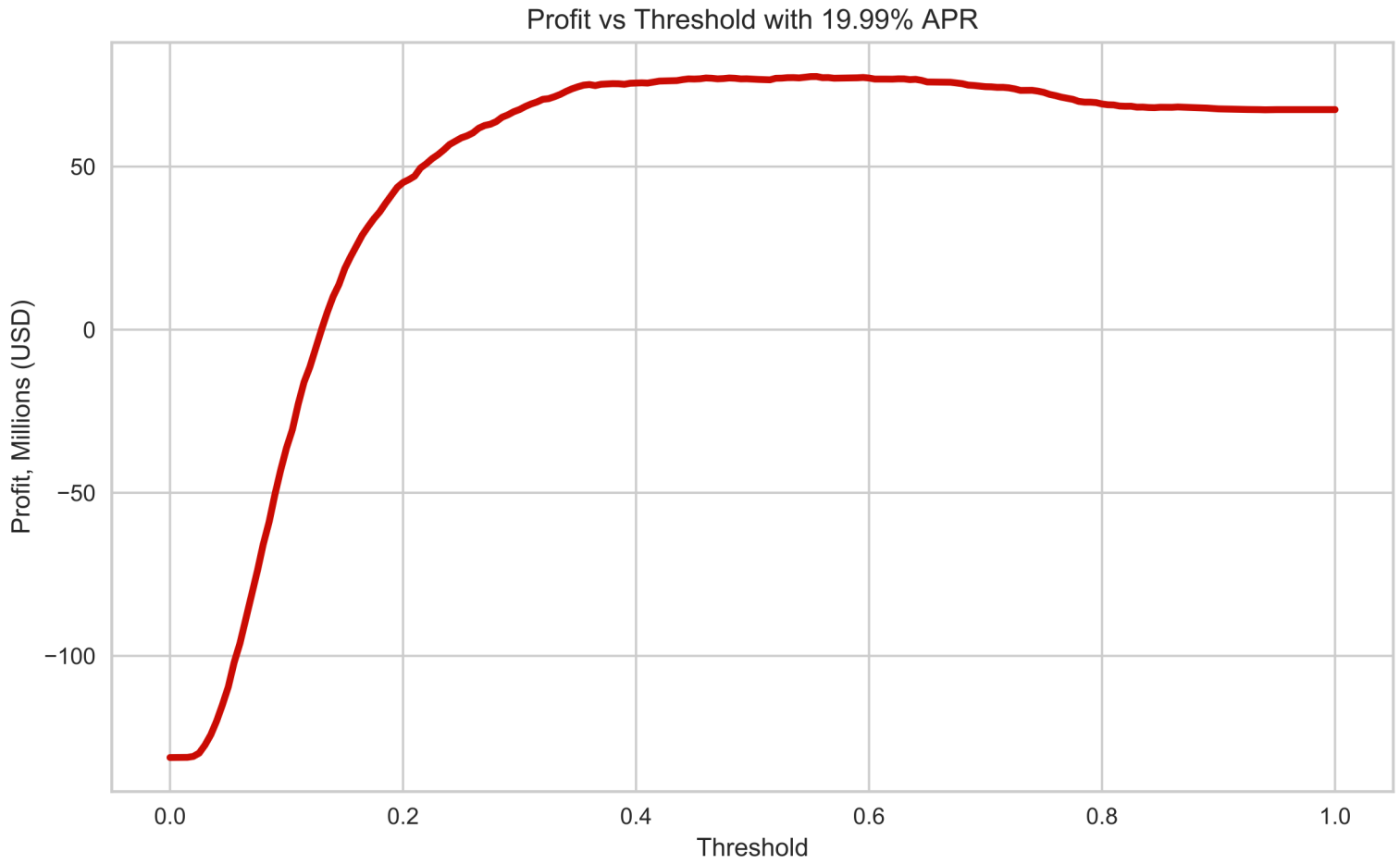
- **Disclaimer:** Obsidian Banking Corporation (OBC) and its logo are fictitious. Any resemblance to reality is purely coincidental.

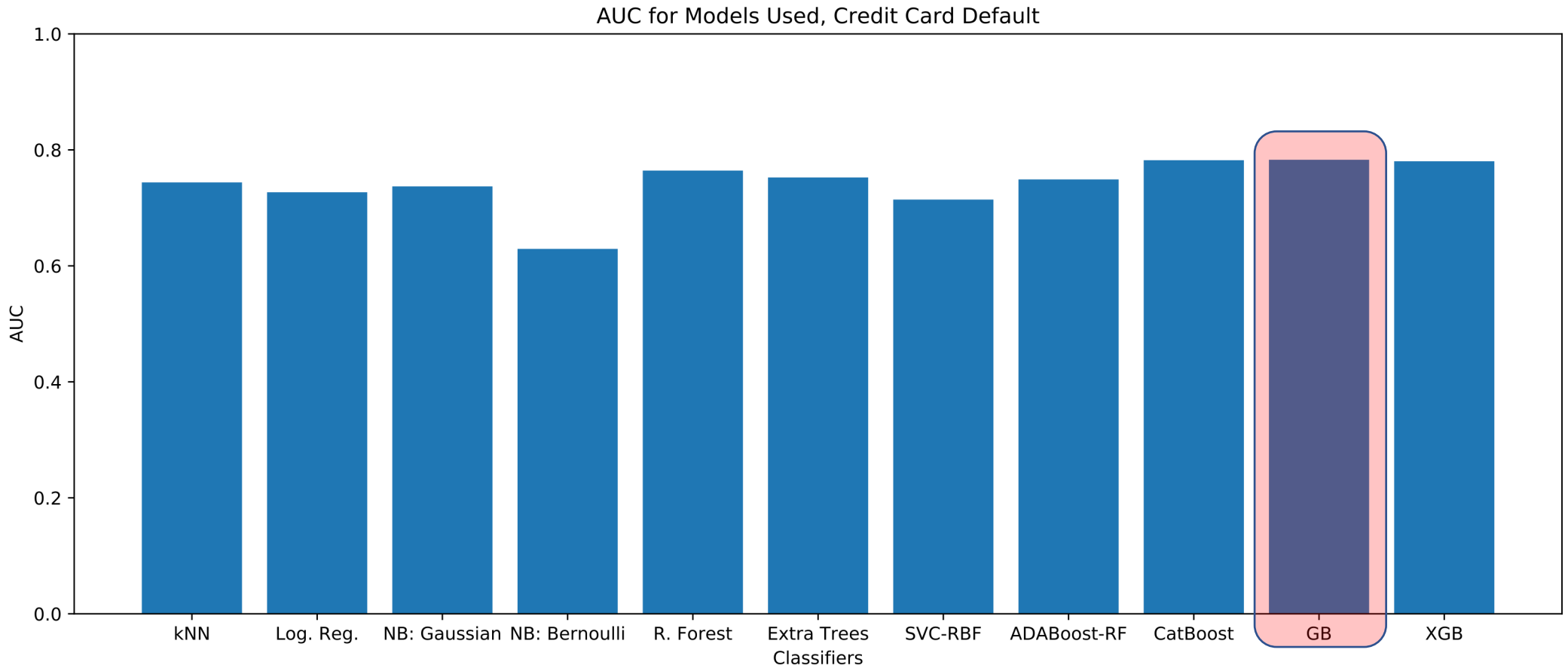
- Dataset obtained from UCI – Machine Learning Database (https://archive.ics.uci.edu/ml/datasets/default+of+credit+card+clients)

Appendix

Loss Curve from Confusion Matrix



AUC Scores of Multiple Classification Models



Correlation Matrix