"SHOULD THIS LOAN BE APPROVED OR REJECTED?" LOAN APPROVAL MODELING

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AGENDA

01 Business Overview

02 Data Modelling

03 Loan Applicant Characteristics

04 Recommendations

05 Future Works

BUSINESS OVERVIEW | 01

OBJECTIVE

A commercial bank in Czech Republic wants to improve their loan services for existing customers and market them accordingly.

DATA DISCOVERY: THE CURRENT STATE

4500

CUSTOMER ACCOUNTS

687

APPROVED LOANS

606 (89%)

76 (11%)

LOAN STANDING

670,000 USD

POTENTIAL DEFAULT LOSS

CHALLENGE

Avoid loan approvals to customers that will result to default.

SOLUTION

Automate the loan approval process with a highly-accurate model that can predict loan commitment to avoid loss from default.

RESEARCH QUESTION

What crucial characteristics of a client can help accurately determine whether a loan should be approved or not?

02

DATA MODELLING

CHALLENGE:
COMBINING STATIC AND DYNAMIC CHARACTERISTICS

ID	Acct. Type	Region	Loan amt.	Credit Card
2	MONTHLY	South Bohemia	$30,276	Classic
4937	MONTHLY	South Bohemia	$318,480	Gold
38	WEEKLY	South Bohemia	$110,736	--

ID	Date	Withdraw amt.	Deposit amt
2	1993-03-31	$114	$250
4937	1993-04-12	$800	$7327
4937	1993-04-13	$0	$958
2	1993-04-30	$110	$0

Not Unique

STATIC ⟶ **?** ⟵ **DYNAMIC**

ASSUMPTION:
AVERAGE MONTHLY CASH FLOW DOES NOT VARY MUCH

Account id	Acct. Type	Region	Loan amt.	Credit Card	Avg. Monthly Withdrawal	Avg. Monthly Deposit
2	MONTHLY	South Bohemia	$30,276	Classic	$786.50	$1126.50
4937	MONTHLY	South Bohemia	$318,480	Gold	$1872.12	$4631.21
38	WEEKLY	South Bohemia	$110,736	--	$3658.63	$5121.45

NEW CALCULATED COLUMNS
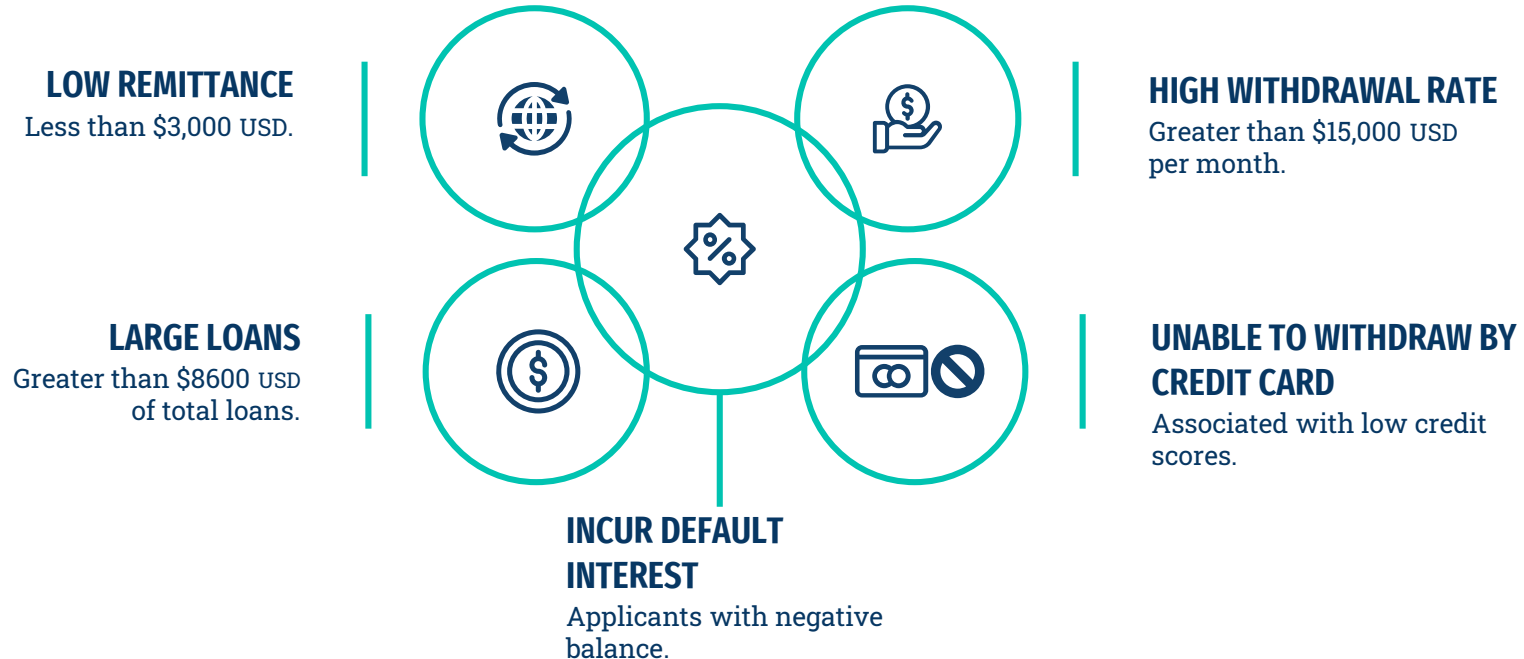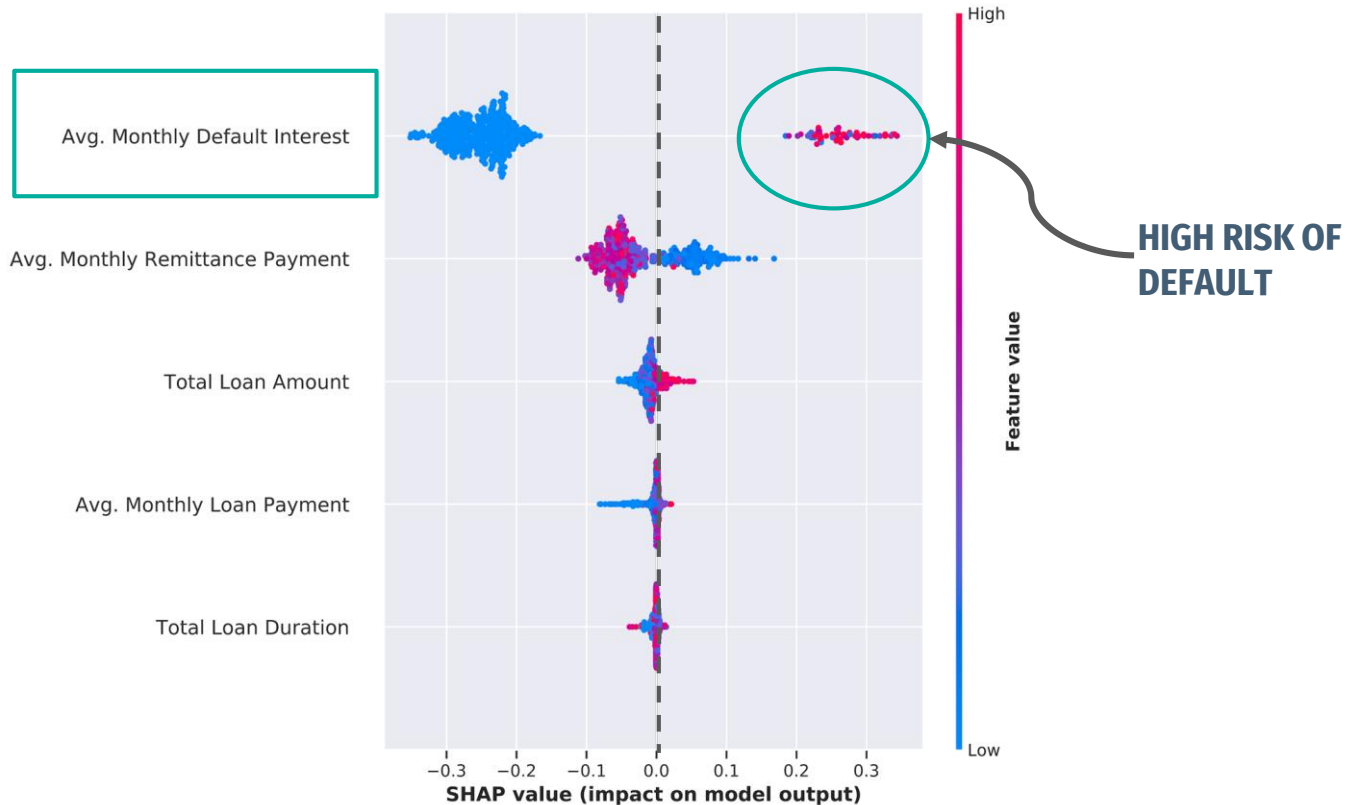
# LOAN REJECTION PREDICTION RELIABILITY: 88%
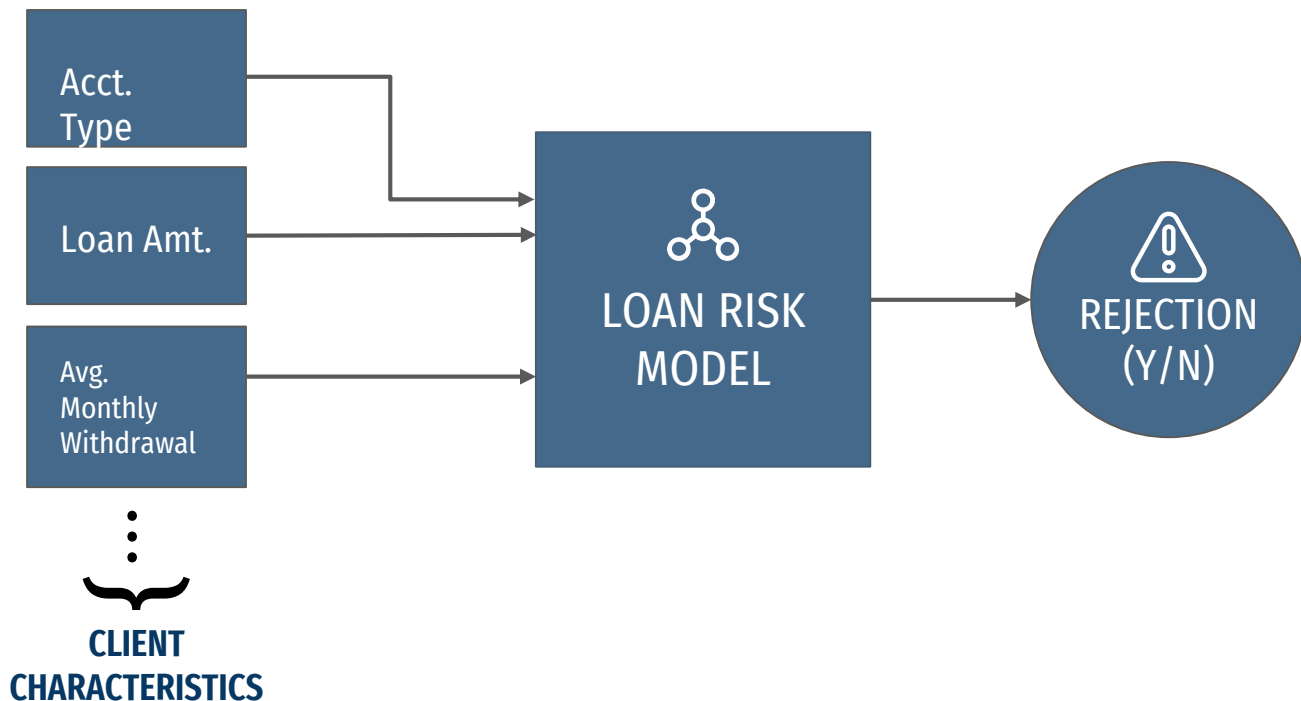
LOAN APPLICANT CHARACTERISTICS | 03

SUMMARY OF SELECTIVE CHARACTERISTICS FOR HIGH-RISK BORROWERS

LOW REMITTANCE
Less than $3,000 USD.

HIGH WITHDRAWAL RATE
Greater than $15,000 USD per month.

LARGE LOANS
Greater than $8600 USD of total loans.

UNABLE TO WITHDRAW BY CREDIT CARD
Associated with low credit scores.

INCUR DEFAULT INTEREST
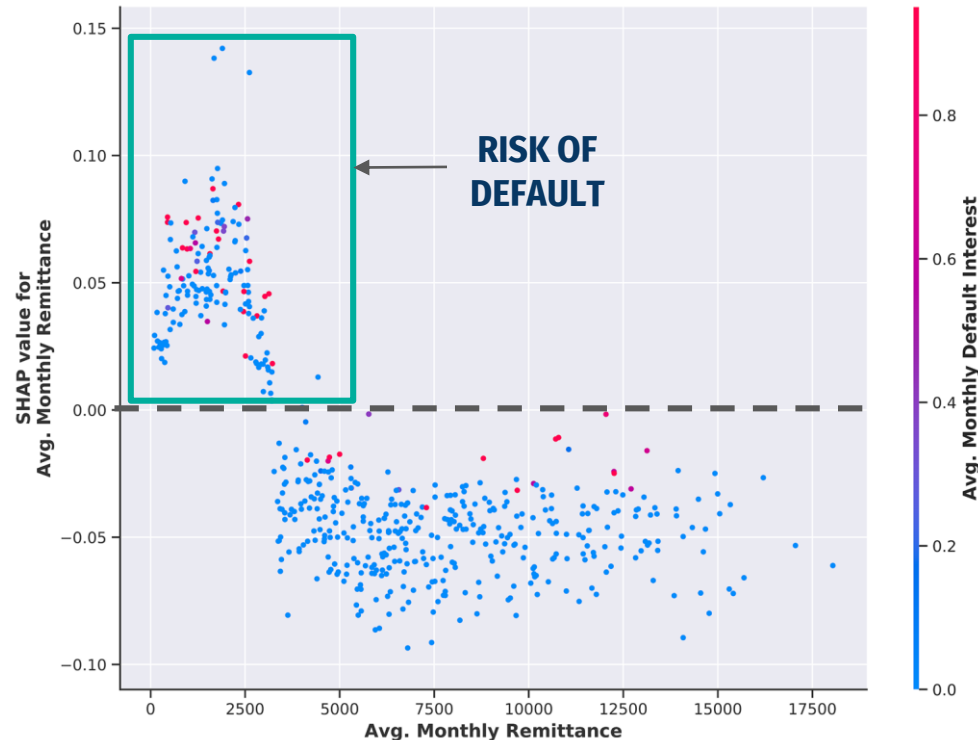Applicants with negative balance.

MOST IMPORTANT CHARACTERISTIC:
Default Interest > 0%

E.g. 1, RISK OF DEFAULT:
Avg. Monthly Withdrawal > $15,000 w/ Default Interest
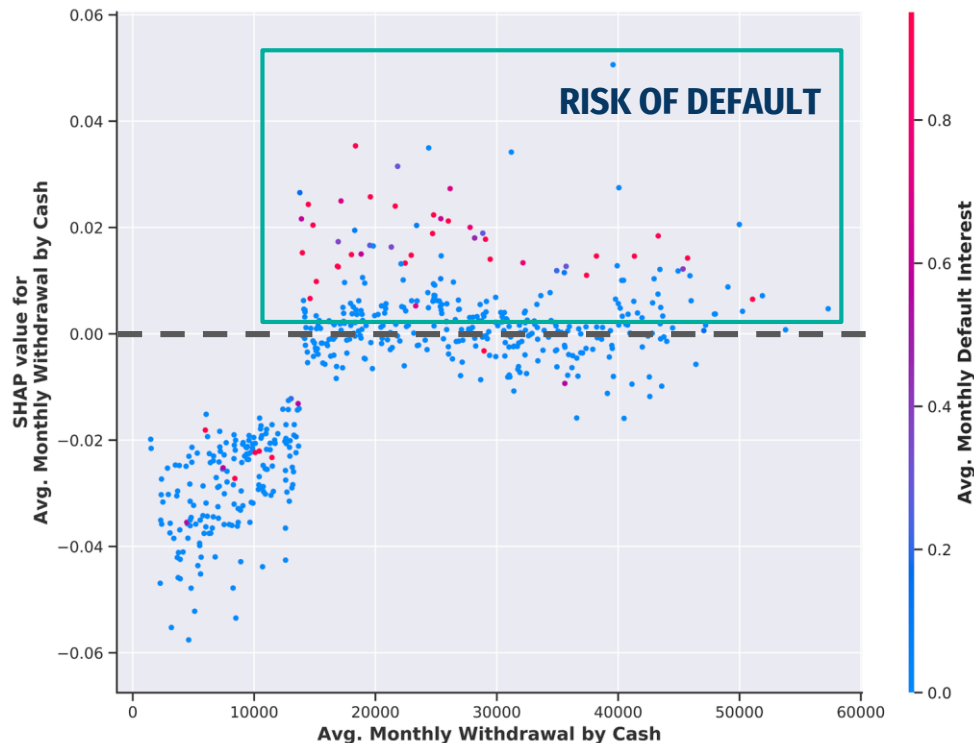
E.g.2 , RISK OF DEFAULT:
Avg. Monthly Remittance < $3,000 w/ Default Interest

04

RECOMMENDATIONS

BE PROACTIVE TO AVOID LOAN DEFAULT

STRONG FOCUS ON CLIENT CASH FLOW

More rigorous review on credit scores. Past credit behaviours can be good indication to future loan commitments.

PROVIDE FLEXIBILITY AND COMMUNICATION

E.g., Extend loan tenure while simultaneously lower monthly payments to meet client needs (i.e., debt consolidation).

PROTECTION PLAN

Reduce potential issues with cash flow due to unexpected events (e.g., illness, disability).

05 | FUTURE WORKS

FUTURE WORKS

- Experiment with approaches on generalizing transaction details.

- Examine the effects of including other factors (e.g., client's job, external economic factors) into the loan risk model.

- Productionize model so it can be used to assess new loan applications.

# APPENDIX: CLASSIFICATION REPORT (TRAIN SET)

- Overall accuracy: 94.8%

Target variable	Precision	Recall	F1	Sample Train Size
Loan not rejected	100%	99%	100%	485
Loan rejected	95%	100%	98%	60

APPENDIX: CLASSIFICATION REPORT (TEST SET)

- Overall accuracy: 94.8%

Target variable	Precision	Recall	F1	Sample Test Size
Loan not rejected	98%	98%	98%	121
Loan rejected	82%	88%	85%	16

APPENDIX: FEATURE IMPORTANCE
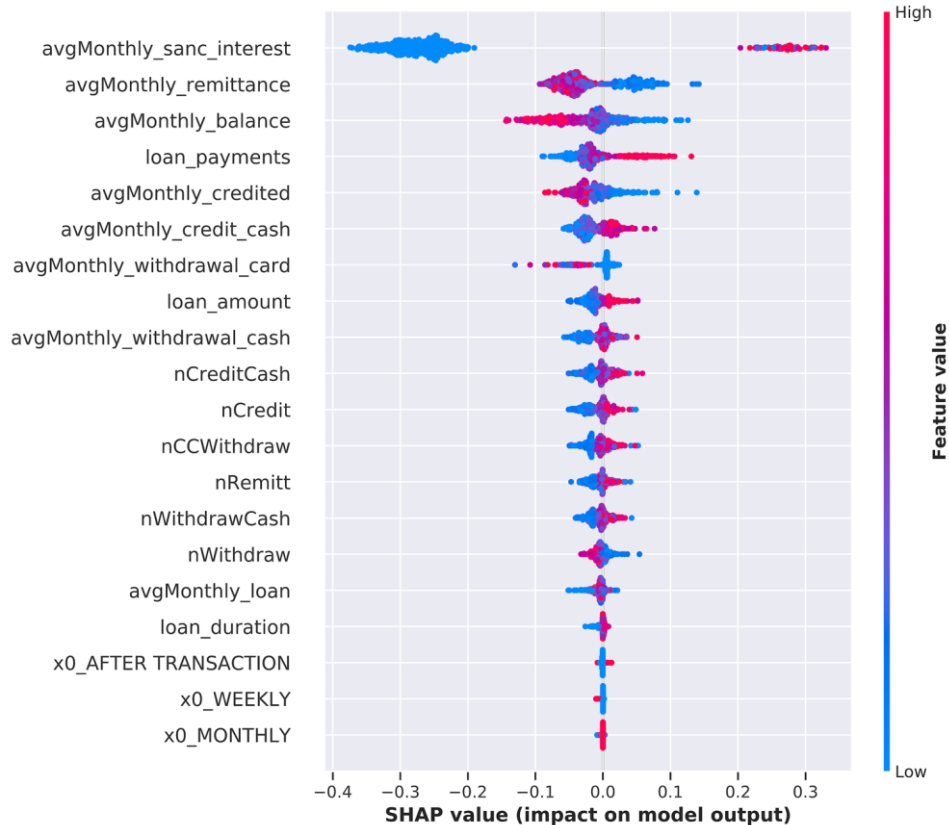
APPENDIX: Withdrawal by Credit Card

APPENDIX: TOTAL LOAN AMOUNT