



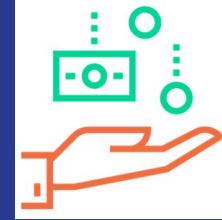
# Nomis Solutions- Business Proposal

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# About

## ***Nomis Solutions :***

- A startup company that offers price-optimization solutions to financial service firms.
- Uses advanced analytic techniques to help its clients to set prices for consumer loans and deposits.



## ***e-Car Loans :***

- Online auto loan lender
- Potential client (*first*) for Nomis Solutions



# Problem

## Company

e-Car aims to improve profitability by offering loans at interest rates tailored for each customer.

The data is collected from the application form filled by the customer

## Context

After an APR has been quoted, within 45 days the customer decides whether he accepts or declines the loan, i.e. if it's a "**Funded Loan**" or a "**Lost Sale**" for the company.

## Problem statement

To find a methodology that increases revenue and decreases lost sales.

# Proposed Solution

If we can predict whether a quote will be “Funded Loan” or a “Lost Sale”, then we can either reconsider the quoted APR to decrease “Lost Sale” or increase revenue.

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# Loan Application Form : e-Car

Type of data collected from the application form:

- **Applicant:** Name / Address / Monthly Income / SSN
- **Car:** Make / Model / Year
- **Loan Type**

--Select Loan Type--

<< Please Select a Loan Type

Loan Type

☒ Individual
 ☐ Joint

Loan Amount\*

\$

E.g. 34000. Minimum loan amount 7500 to a maximum of 50000.

Term\*

--Please Select---

Applicant Information

First Name\*

Middle Initial

Last Name\*

Address 1\*

No PO Box for credit app address will be accepted

Address 2

City\*

State\*

Zip\*

Residence

--Please Select---

Yrs at address\*

Mos

Monthly housing payment\*

\$

Home Phone\*

Mobile Phone

Email\*

Confirm Email\*

Work Status\*

--Please Select---

Employer\*

Occupation\*

Yrs at Employer\*

Mos

Work Address\*

Work City\*

Work State\*

Zip\*

Work Phone\*

Monthly Income\* (PRE-TAX)

\$

Alimony, child support, or separate maintenance income need not be revealed if you do not wish to have it considered as a basis for repaying the obligation.

Monthly Other Income

\$

Other Income Source

Filed for Bankruptcy?

☐ Yes
 ☒ No

Birth Date\* (MM/DD/YYYY)

SSN\* (123-45-6789)

SSN\* (CONFIRM)

Driver's License No\*

State of License\*

# Data-Set

- **Tier** : Segmentation based on FICO Scores ( Values: 1, 2, 3, 4 )
- **FICO** : FICO Score
- **Approve Date** : Date the customer's application was approved
- **Term** : Term of the Loan (36, 48, 66 and 77 Months)
- **Amount** : Loan amount approved
- **Previous Rate** : Only for refinanced applications
- **Car Type** : N- New, U-Used, R-Refinanced
- **Competition Rate** : Competitor's Rate
- **Outcome** : 1- Customer takes loan, O- Otherwise
- **Rate** : APR quoted to customers by e-Car
- **Cost of Funds** : 1.02 to 2.127
- **Partner** : 1- Direct auto finance company, 2-Partner A, 3- Other Partners

Tier	FICO	Approve Date	Term	Amount	Previous Rate	Car Type	Competition rate	Outcome	Rate	Cost of Funds	Partner Bin
3	695	7/1/2002	72	35000		N	6.25	0	7.49	1.8388	1
1	751	7/1/2002	60	40000		N	5.65	0	5.49	1.8388	3
1	731	7/1/2002	60	18064		N	5.65	0	5.49	1.8388	3
4	652	7/1/2002	72	15415		N	6.25	0	8.99	1.8388	3
1	730	7/1/2002	48	32000		N	5.65	0	5.49	1.8388	1
2	725	7/1/2002	36	10000		N	4.95	0	5.79	1.8388	3
1	808	7/1/2002	72	19000		N	6.25	0	6.59	1.8388	3

208,085 Records

# Challenges

## Challenge 1

### Framing the problem

Whether a customer accepts or declines the proposed *annual percentage rate* APR.

## Challenge 2

### Cleaning the Data

- Previous Rate = 0, when car type is “New” or “Used”
- Further, rows with missing values eliminated

## Challenge 3

### Modeling


Deciding on which model to design for better results

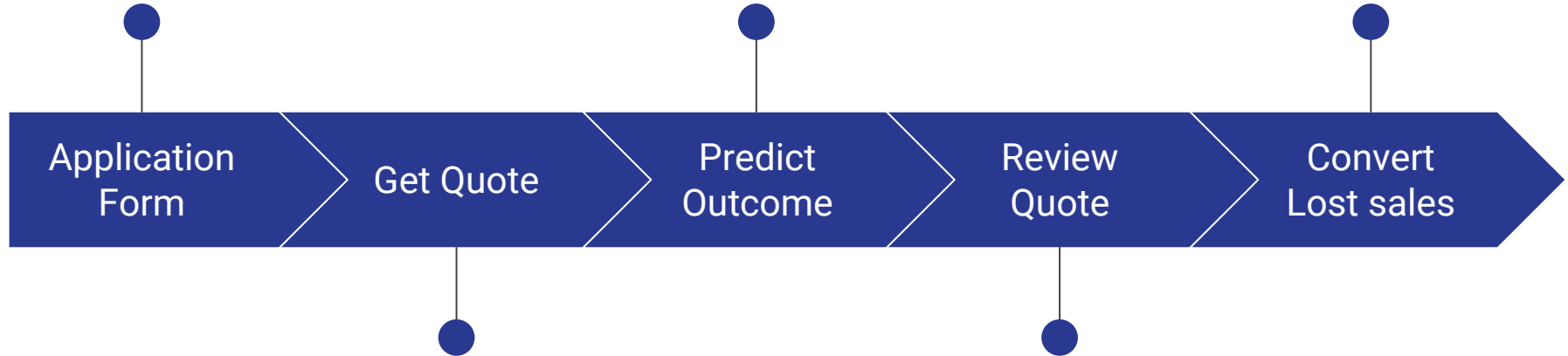
# Implementation and Deployment



Interested Customers

We predict if the customer  
will be a **"Funded Loan"** or a  
**"Lost Sale"**

Celebrate extra \$\$  
with a 

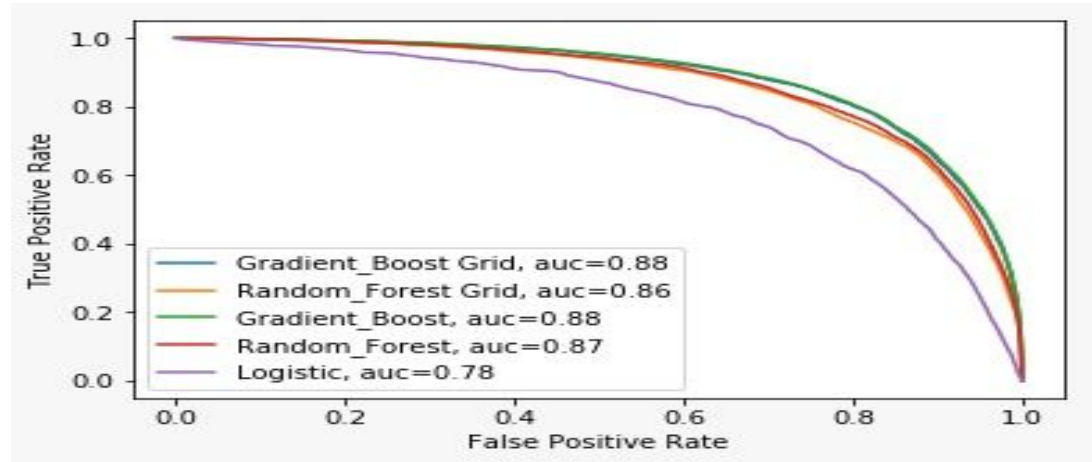


The e\_Car team evaluates the  
customer's credit risk and  
calculates the APR to be  
offered to approved customers

Optimize price to "squeeze"  
more from a Funded Loan and  
"reduce" Lost Sale numbers

# Results

- AUC for the tested models



- Prediction results from the Best Model - **Gradient Boosted Tree Model**

```
print(classification_report(y_test, grid_gb.predict(X_test), target_names=["Lost Sales", "Funded Loans"]))
```

	precision	recall	f1-score	support
Lost Sales	0.87	0.94	0.91	32460
Funded Loans	0.73	0.52	0.61	9157
avg / total	0.84	0.85	0.84	41617



**Thank You !**