Case Analysis: "V-Mobile: Churn Management"

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Customer Analytics

We will develop a proactive churn management program

CHURN MANAGEMENT STEPS

1. **Develop a model to predict customer churn**
2. **Use model to understand main drivers of churn**
3. **Use insights to develop actions/offers/incentives**
4. **Estimate the impact of these actions/offers/incentives on the probability of churn**
5. **Evaluate the economics**

Data for the logistic regression

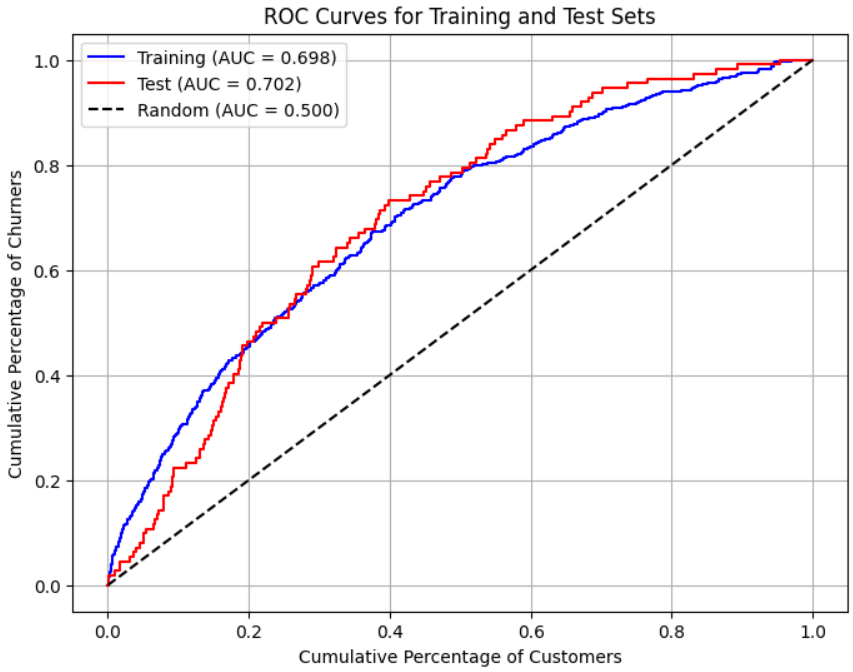
Variable	Description	Type
customer	Customer ID	
churn	Did consumer churn in between May 1 and May 15?	Dependent Var. Dummy
revenue	Mean monthly revenue	Non-Dummy Numeric
mou	Mean monthly minutes of use	Non-Dummy Numeric
overage	Mean monthly overage minutes of use	Non-Dummy Numeric
roam	Mean number of roaming calls	Non-Dummy Numeric
threeway	Mean number of threeway calls	Non-Dummy Numeric
months	# of months the customer has had service	Non-Dummy Numeric
uniqsubs	Number of individuals listed under the account previous 12m	Non-Dummy Numeric
phones	# Handsets associated with the account previous 12m	Non-Dummy Numeric
custcare	Mean number of customer care calls	Non-Dummy Numeric
retcalls	Number of calls previously made to retention team	Non-Dummy Numeric
dropvce	Mean number of dropped voice calls	Non-Dummy Numeric
blckvce	Mean number of blocked voice calls	Non-Dummy Numeric
unansvce	Mean number of unanswered voice calls	Non-Dummy Numeric
eqpdays	Number of days of the current equipment	Non-Dummy Numeric

Variable	Description	Type
webcap	Hanset is web capable	Dummy
children	Presence of children in HH	Dummy
creditaa	High credit rating - aa (as opposed to medium or low)	Dummy
prizmrur	Prizm code is rural (as opposed to urban, suburban)	Dummy
mcycle	Subscriber owns motorcycle/automobile	Dummy
occprof	Occupation - professional (as opposed to other occupations)	Dummy
occcler	Occupation - clerical (as opposed to other occupations)	Dummy
occcrft	Occupation - crafts (as opposed to other occupations)	Dummy
occstud	Occupation - student (as opposed to other occupations)	Dummy
occhmkr	Occupation - homemaker (as opposed to other occupations)	Dummy
occret	Occupation - retired (as opposed to other occupations)	Dummy
occself	Occupation - self-employed (as opposed to other occupations)	Dummy
travel	Has traveled to foreign countries during previous 12 months	Dummy
referred	Account opened with a referral link	Dummy
newphone	Handset bought as new (as opposed to refurbished)	Dummy

We run a logistic regression on the training sample

```
# first create a formula for the model
predictors = [col for col in vmobile.columns if col not in ['customer', 'churn']]
X = vmobile[predictors]
y = vmobile['churn']

# split data into training and test sets (80/20 split)
from sklearn.model_selection import train_test_split
from sklearn.metrics import roc_auc_score

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

train_formula = 'churn ~ ' + ' + '.join(predictors) # the .join() joins the predictors with ' + '

# then run the model
model = smf.logit(formula=train_formula, data=pd.concat([X_train, y_train], axis=1)).fit()
```

There is no strong evidence of overfitting



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Getting Ranking of Importance

```
Feature importance ranking (showing average marginal effects, ranked by absolute magnitude):
referred: -0.019
newphone: -0.015
mcycle: -0.014
occcler: 0.011
occret: -0.011
eqpdays: 0.009
occhmkr: 0.008
travel: 0.008
prizmrur: 0.007
months: -0.007
occstud: 0.006
mou: -0.005
overage: 0.005
children: 0.004
occself: 0.004
occprof: -0.004
dropvce: 0.002
retcalls: 0.002
threeway: -0.002
uniqsubs: 0.002
webcap: 0.002
revenue: -0.002
creditaa: 0.002
unansvce: -0.001
phones: 0.001
roam: 0.001
custcare: 0.000
blckvce: 0.000
occcrft: -0.000
```

- Select variables with p-values below some cut-off (10% or 5%)
- Calculate importance ratings
  - |AME*SD| for continuous,
  - |AME| for dummies

Importance Ranking of Variables with Significance

Variable	Importance
referred	-0.019
newphone	-0.015
occcler	0.011
eqpdays	0.009
travel	0.008
prizmrur	0.007
months	-0.007
mou	-0.005
overage	0.005
dropvce	0.002
retcalls	0.002
uniqsubs	0.002

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Importance Ranking

Variable	Importance
referred	-0.019
newphone	-0.015
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eqpdays	0.009
travel	0.008
prizmrur	0.007
months	-0.007
mou	-0.005
overage	0.005
dropvce	0.002
retcalls	0.002
uniqsubs	0.002

Idea: Offer consumers incentives to upgrade to new phone when phone is refurbished (details later...)

Importance Ranking

Variable	Importance
referred	-0.019
newphone	-0.015
occcler	0.011
eqpdays	0.009
travel	0.008
prizmrur	0.007
months	-0.007
mou	-0.005
overage	0.005
dropvce	0.002
retcalls	0.002
uniqsubs	0.002

Idea: Design special customer acquisition campaign for referral customers

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Offer incentives to upgrade to new phone

```
## Predict the churn probability if we give new phones to customers who have
## a refurbished phone and have higher churn rate than the average (1.94%).

# First check the current churn rate of these customers
refurb_customers = vmobile[(vmobile['newphone'] == 0) &
                           (test_pred > 0.0194)]
print("Current churn rate of customers with refurbished phone and high churn rates:")
print(refurb_customers['churn'].mean().round(4))

# Predict the churn probability for these customers
# if we give them a new phone

# Create a new dataframe with the selected features and the new subscription plan
new_data = refurb_customers.copy()
new_data['newphone'] = 1

# Predict the churn probability for the new data
new_pred = model.predict(new_data)

# Print the predicted churn probability
print("Predicted churn probability for the new phone:")
print(new_pred.mean().round(4))
```

```
Current churn rate of customers with refurbished phone and high churn rates:
0.0316
Predicted churn probability for the new phone:
0.0195
```


Acquire More Referral Customers

```
## Predict the churn probability if we try to acquire more
## customers through referrals.

# First check the current churn rate of non-referred customers
# who are more likely to churn
non_referred_customers = vmobile[(vmobile['referred'] == 0) &
                                 (test_pred > 0.0194)]
print("Current churn rate of non-referred high churn customers:")
print(non_referred_customers['churn'].mean().round(4))

# Predict the churn probability for these customers
# if we give them a new phone

# Create a new dataframe with the selected features and the new subscription plan
new_data = non_referred_customers.copy()
new_data['referred'] = 1

# Predict the churn probability for the new data
new_pred = model.predict(new_data)

# Print the predicted churn probability
print("Predicted churn probability for the new referral:")
print(new_pred.mean().round(4))
```

```
Current churn rate of non-referred high churn customers:
0.0336
Predicted churn probability for the new referral:
0.0128
```

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A plan specifies an action/incentive/offer and a rule for selecting customers

EXAMPLE OF CHURN PLAN FOR S-MOBILE EXAMPLE

Action: *Offer incentive to upgrade to new equipment*
Targeting rule: Customers whose equipments were refurbished and exceed the average churn probability
Expected churn benefit: Baseline churn: 3.16%, projected churn: 1.95%
…

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New Phone Upgrade

Action: *Offer incentive to purchase new equipment*
Targeting rule: Customers whose equipments are refurbished and exceed the average churn probability
Expected churn benefit: Baseline churn: 3.16%, projected churn: 1.95%

Median monthly revenue of this group: $61.56 (based on the variable "revenue" of this group of customers)

What is the value of consumers who accept new equipment?

LTV CALCULATION USING MEDIAN REVENUE

	Now	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
Revenue	$0	$739	$739	$739	$739	$739	$739	
Product/Service Cost	$0	$0	$0	$0	$0	$0	$0	
Action/Offer/Incentive Cost	$0	$0	$0	$0	$0	$0	$0	
Profit	$0	$739	$739	$739	$739	$739	$739	
Prob. active at end of period	100%	68%	46%	31%	21%	15%	10%	
Expected Profit	$0	$503	$342	$233	$158	$108	$73	
Present Value of Exp. Profit	$0	$457	$282	$175	$108	$67	$41	$1,130

Baseline churn: 3.16%

Projected churn: 1.95%

	Now	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
Revenue	$0	$739	$739	$739	$739	$739	$739	
Product/Service Cost	$0	$0	$0	$0	$0	$0	$0	
Action/Offer/Incentive Cost	$0	$0	$0	$0	$0	$0	$0	
Profit	$0	$739	$739	$739	$739	$739	$739	
Prob. active at end of period	100%	79%	62%	49%	39%	31%	24%	
Expected Profit	$0	$583	$460	$364	$287	$227	$179	
Present Value of Exp. Profit	$0	$530	$381	$273	$196	$141	$101	$1,622

Value of Churn Program:
$492 per subscriber