Python Classification Modeling

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Project Description

In an effort to diversify their revenue stream, Apprentice Chef, Inc. has launched Halfway There, a cross-selling promotion where subscribers receive a half bottle of wine from a local California vineyard every Wednesday (halfway through the work week). The executives at Apprentice Chef also believe this endeavor will create a competitive advantage based on its unique product offering of hard to find local wines.

Halfway There has been exclusively offered to all of the customers in the dataset you received, and the executives would like to promote this service to a wider audience. They have tasked you with analyzing their data, developing your top insights, and building a machine learning model to predict which customers will subscribe to this service.

Executive Summary

Encourage customers to follow meal recommendations.
Recommendations for implementation:

- Contact customers and generate a database of reasons why customers do not follow recommendations.
- Make sure each customer has appropriate equipment and is capable to follow recommendations.
- Visit and assist customers who do not feel confident on how to follow recommendations.
- Make meal recommendations accessible online and create videos to teach customers about common/popular recommendations.

Assignment Requirements: Present my 2 best insights, make one actionable recommendations and offer recommendations for business implementation.

Implementation Description

Based on a meal delivery service dataset, I have used the cross-sell success variable as the response variable to build a classification model. After performing the data science process and conducting a business analysis, my best insight is that the variable Average Preparation Video Time has the highest positive correlation with cross sell success. My second-best insight is that cancelations before noon also has a significant correlation with cross sell success.

Response Variable: Cross Sell Success

Click the link to view Python Code: https://juanduranc.github.io/sites/Python%20ClassificationModeling.html

Insights

Table #1

Insight #1: Customers who follow meal recommendations generated for them have a greater chance to cross sell success.

Meal recommendations are designed to facilitate cooking for customers. Table #1 shows that customers who follow recommendations 40% of the time or more have 100% chance of cross sell success. Customers who follow recommendations 30% of the time have the lowest chance of cross sell success. Customers who follow no recommendations have a 70% chance of cross sell success. This means that customers who try to follow recommendations and struggle will probably not cross sell success.

% CROSS_SELL	% FOLLOWED_RECOMMENDATIONS
0.70	0
0.47	10
0.40	20
0.38	30
1.00	40
1.00	50
1.00	60
1.00	70
1.00	80
1.00	90

Most of the customers in the meal delivery service business are between 18 and 44 years old. This is most of the working age population. Men are also more likely to order meal delivery food than women. (Money.com, 2017) A significant segment of potential customers is expected to have a busy schedule, therefore easy meal preparations are convenient for customers. The idea of getting even just a couple hours added back into your day is pretty much priceless. (Dave Ramsey, n.d.)

Most of the meal delivery services shown at Buyers Guide.com, under the category of best meal deliveries, promote meals that cook in 30 minutes or less. (Buyers Guide, 2020) If our food delivery system wants to be in the top list, meal preparations should be quick & easy for customers by taking no more than 30 minutes to be ready. Most meal services at this website show attributes such as cancelation any time and flexible subscriptions.

Table #2:

% CROSS_SELL	CANCELLATIONS_BEFORE_NOON
0.59	0
0.65	1
0.76	2
0.81	3
0.77	4
0.74	5
0.78	6
1.00	7
1.00	8
0.00	9
1.00	10
1.00	13

Insight #2: Customers who cancel orders before noon tend to cross sell success. Table #2 shows that customers who have canceled 7 times or more have 100% chance of cross sell success. The greater the number of cancelations, the greater the chance to cross sell success.

The best meal delivery services allow cancelation at any time. (Best Meal Delivery, 2020) Customers would rather rely on flexible services in case their schedule changes. Facilitating meal delivery cancelations to customers is expected to improve cross sell success for this model. Cancellations before noon has a positive correlation to cross sell success.

The classification modeling process shown in chart #3 revealed that the random forest model is the most accurate. The variables cancelations before noon and followed recommendations are the most relevant explanatory variables for cross sell success.

CHART #3: Random Forest, Feature Importance
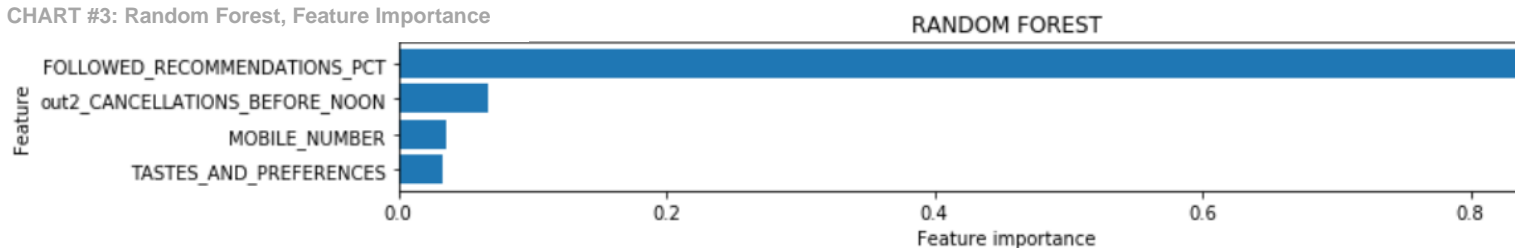
Actionable recommendation:

Encourage customers to follow meal recommendations.

Recommendations for business implementation:

- Contact customers to make sure they are following recommendations.
- Generate a database of reasons why customers do not follow recommendations. This will be used to learn about customer behavior and encourage them to follow recommendations.
- Make sure each customer has appropriate equipment and is capable to follow recommendations.
- Generate a database of most popular recommendations.

Conclusion

The best classification model for the response variables I have selected is the is the Random Forest Classifier. The most significant variables are shown in the following list:

List_variables = ['CANCELLATIONS_AFTER_NOON',
            'MOBILE_NUMBER',
            'CANCELLATIONS_BEFORE_NOON',
            'FOLLOWED_RECOMMENDATIONS_PCT']
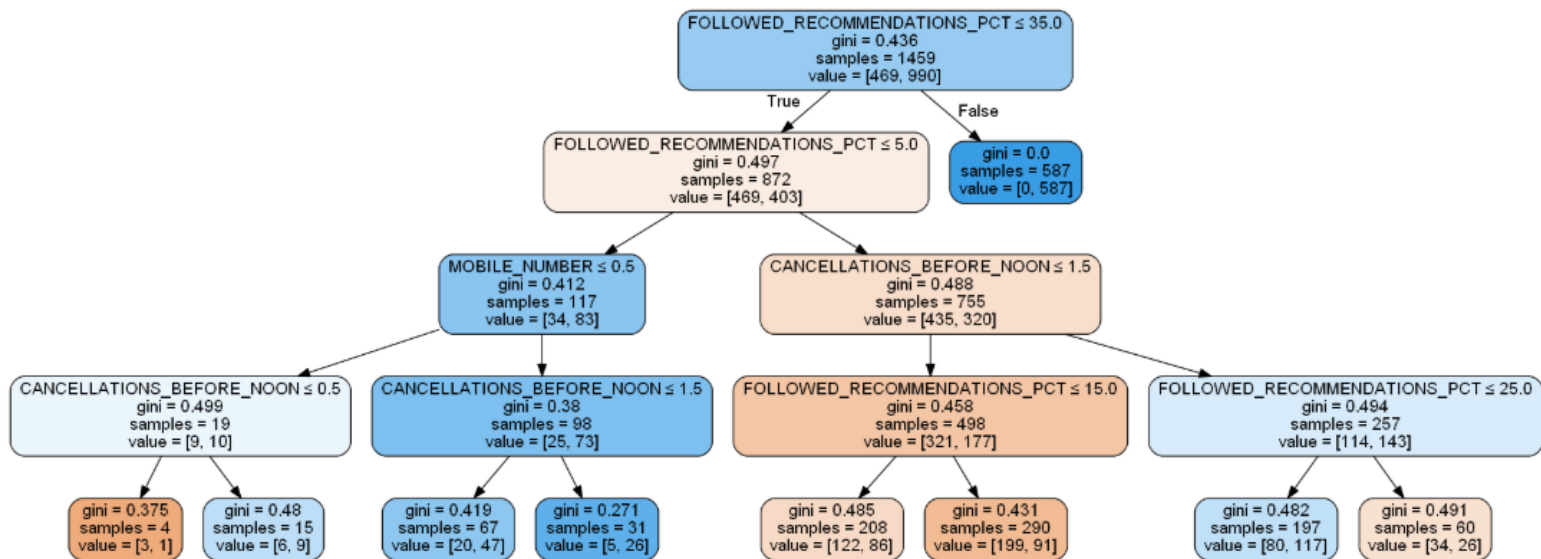
Random Forest Performance:
Training ACCURACY: 0.8026
Testing ACCURACY: 0.7906
AUC Score   : 0.7968

Other Classification Models:

Model	Trainning Accuracy	Testing Accuracy	AUC	Diff
Tree Pruned	0.7834	0.7864	0.7955	-0.0030
LogisticReg	0.7032	0.7248	0.6773	-0.0216
Full Tree	**0.7868**	**0.7823**	**0.7941**	**0.0045**
KNN	0.7711	0.7598	0.7385	0.0113

Pruned Tree output:

Works Cited

Best Meal Delivery. (2020). *Choose the Meal Delivery Service*. Retrieved from top10bestmealdelivery: https://www.top10bestmealdelivery.com/?utm_source=google&kw=&c=414395625305&t=search&p=&m=b&adpos=1t1&dev=c&devmod=&mobval=0&network=g&campaignid=9119643783&adgroupid=93868975642&targetid=dsa-483619816742&interest=&physical=9031944&feedid=&a=9604&ts=&topi

Buyers Guide. (2020, 02 01). *Best Meal Delivery Services - 2020 Buyer's Guide*. Retrieved from Buyers Guide: https://buyersguide.org/meal-delivery/t/best?kw=13439659852007388223&m=b&d=c&c=414916341516&p=&oid=aud-406121842492:kwd-800289261765&lp=9031944&li=&nw=g&nts=1&gclid=Cj0KCQiA7aPyBRChARIsAJfWCgIqR7bm38wXf5zBaLXjGhbvrScZt65VeG1BysBmEnHIstC9Fi9xNJcaAn0EEALw_w

Dave Ramsey. (n.d.). *Are Meal Kit Delivery Services Budget Friendly?* Retrieved from Dave Ramsey: https://www.daveramsey.com/blog/meal-delivery-service-worth-it