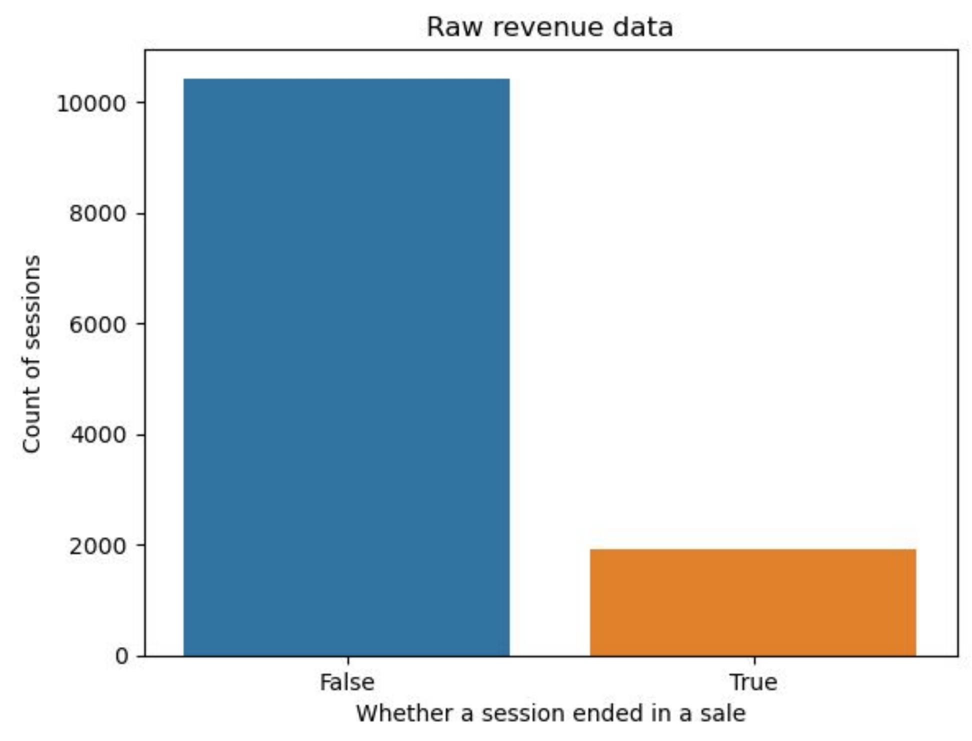
Online Shopping Intention and Customer Classification

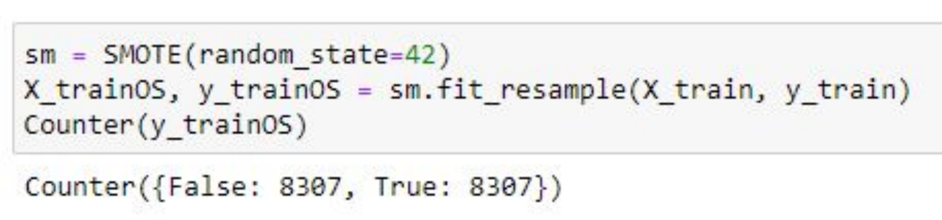
An analysis by Kai Tamashiro

Can companies use machine learning to increase revenue from both online sales and passively through ads?

Revenue Classification



Finding the best model for revenue classification



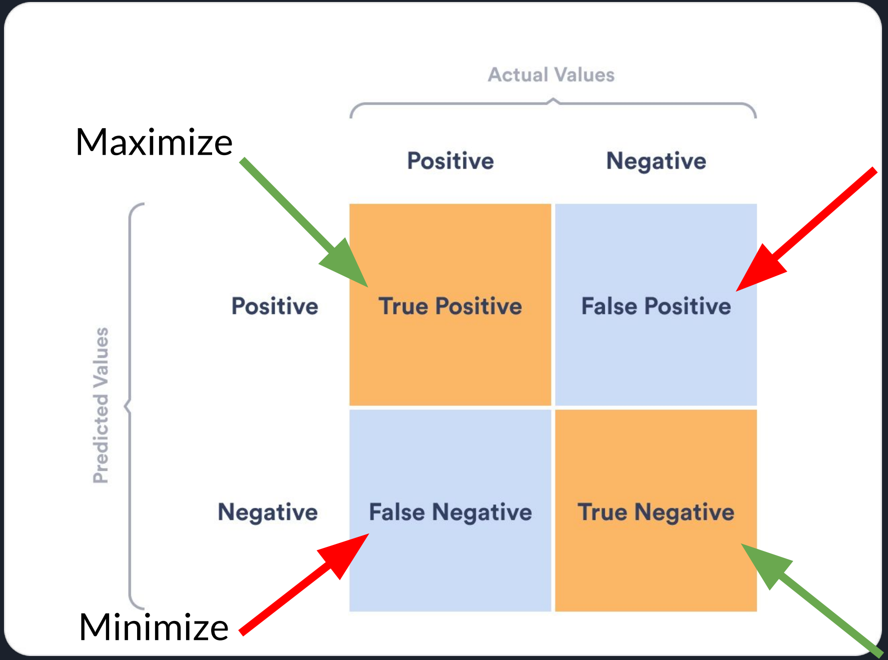
```
sm = SMOTE(random_state=42)
X_trainOS, y_trainOS = sm.fit_resample(X_train, y_train)
Counter(y_trainOS)
```

```
Counter({False: 8307, True: 8307})
```

Over sampling to create equal classes

Identifying best model

Scores closer to 1



		Actual Values	
		Positive	Negative
Predicted Values	Positive	True Positive	False Positive
	Negative	False Negative	True Negative

Maximize

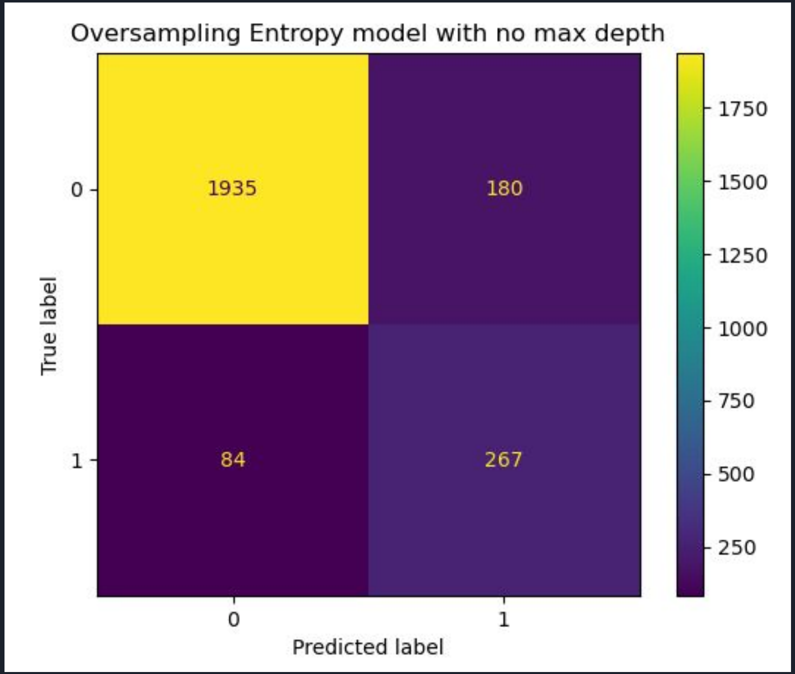
Minimize

Random Forest: Entropy

Avg precision: .91

Avg recall: .89

F1-score: .90

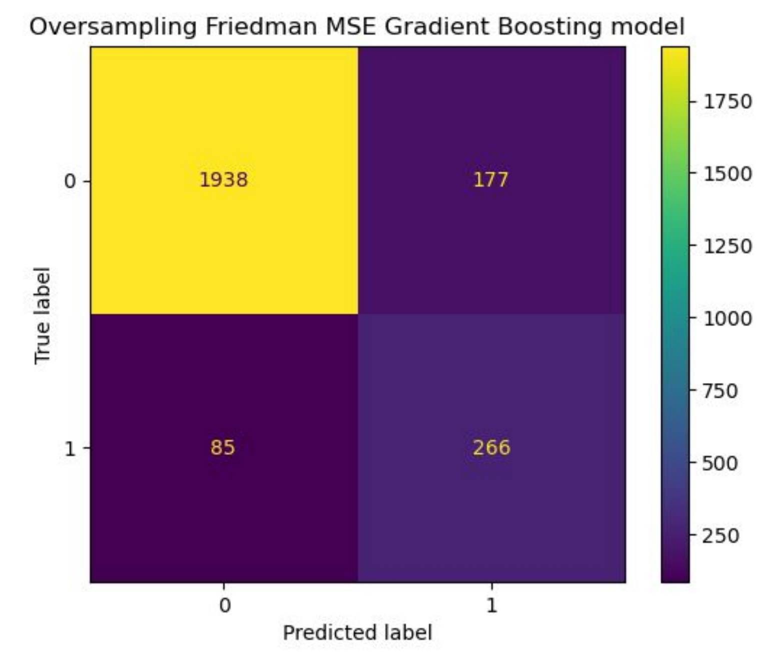


Gradient Boosting

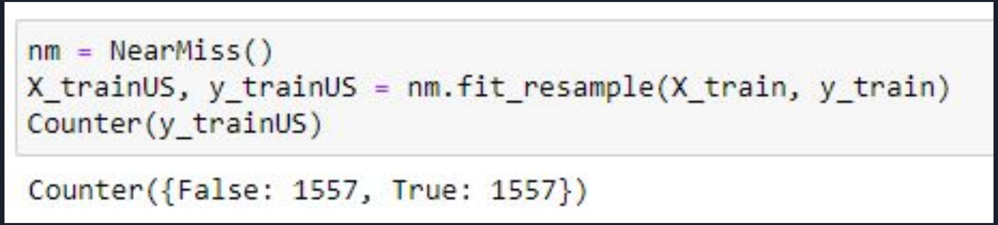
Avg precision: .91

Avg recall: .89

F1-score: .90



Identifying the best model, part 2



```
nm = NearMiss()
X_trainUS, y_trainUS = nm.fit_resample(X_train, y_train)
Counter(y_trainUS)

Counter({False: 1557, True: 1557})
```

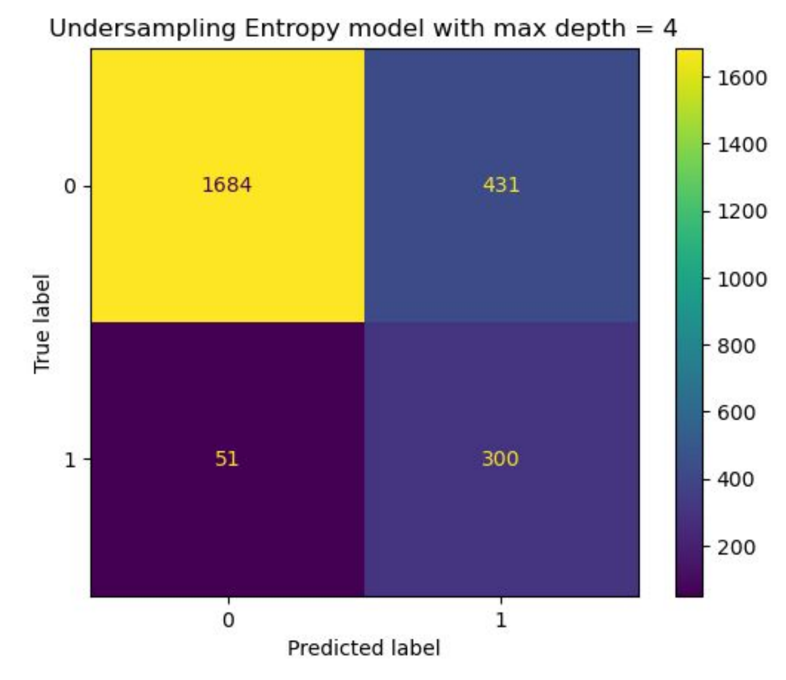
Under sampling to create equal classes

Random Forest: Entropy with max depth

Avg precision: .89

Avg recall: .80

F1-score: .83

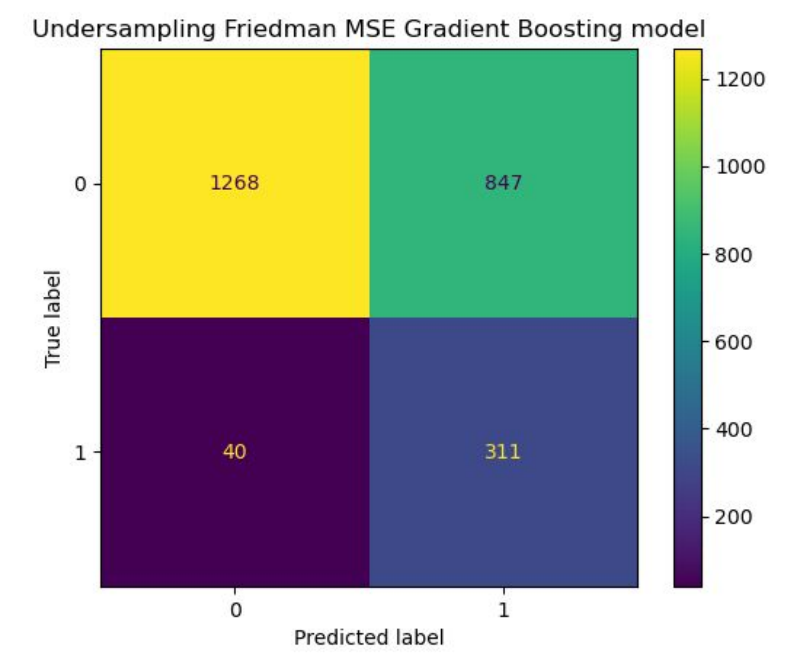


Gradient Boosting, part 2

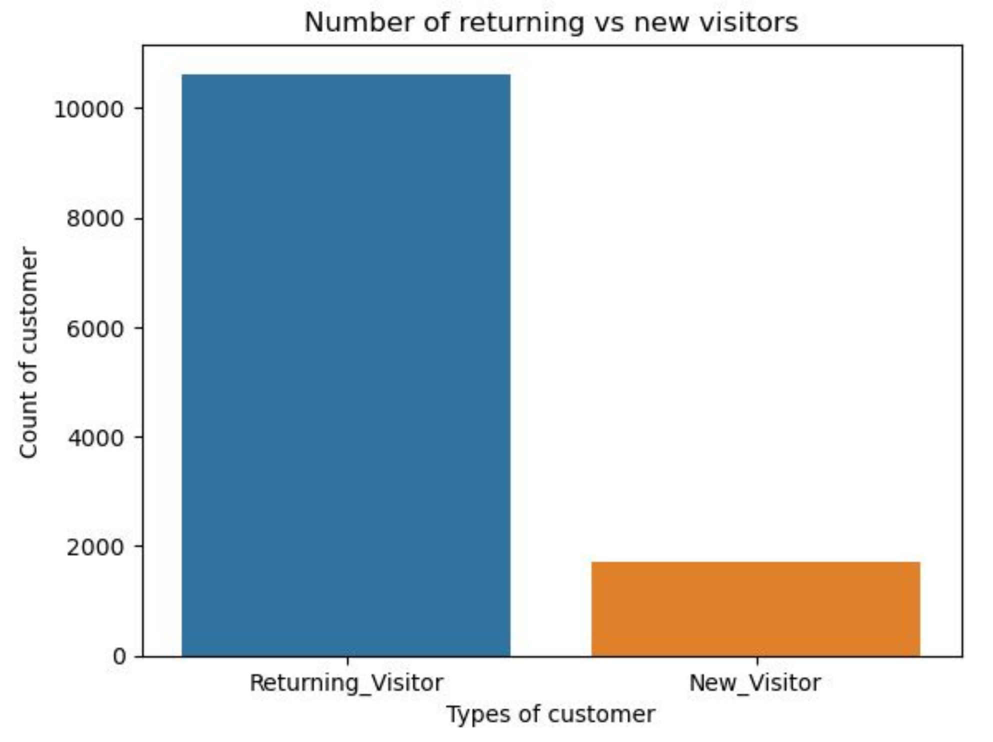
Avg precision: .87

Avg recall: .64

F1-score: .69



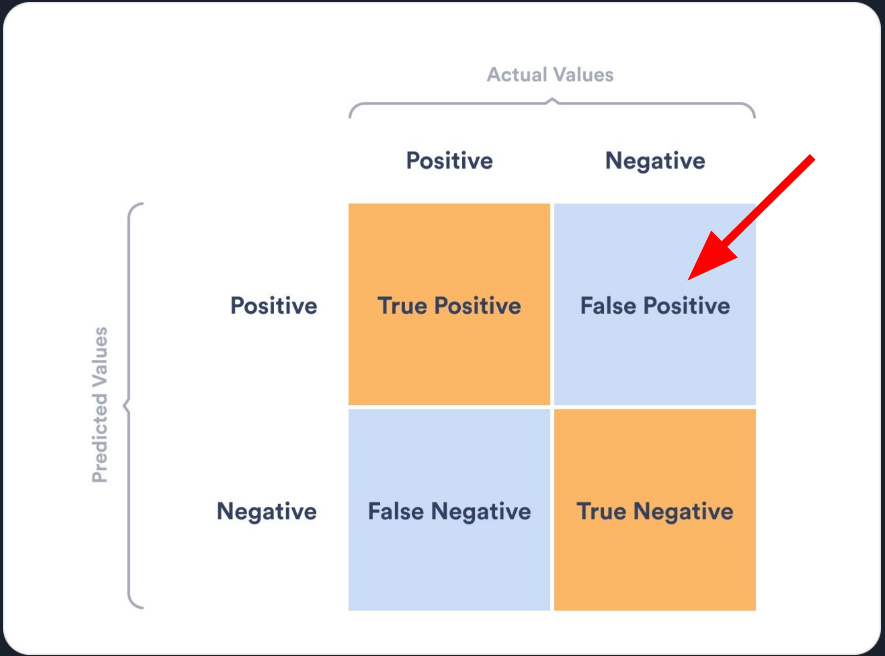
Customer Classification



Finding the best model for customer classification

Same steps as revenue classification

Smallest number of false positives

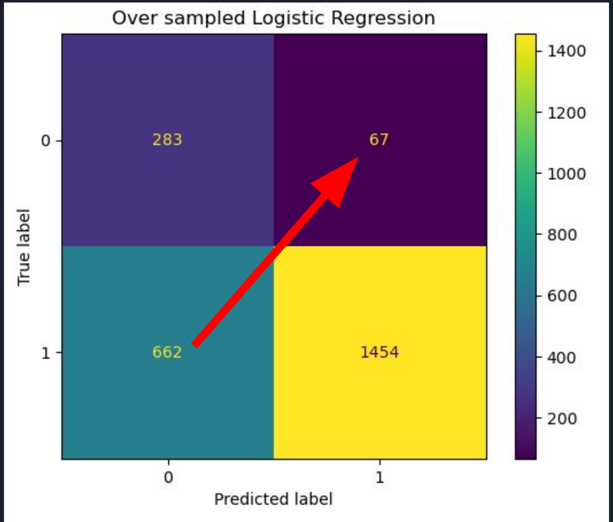


Actual Values

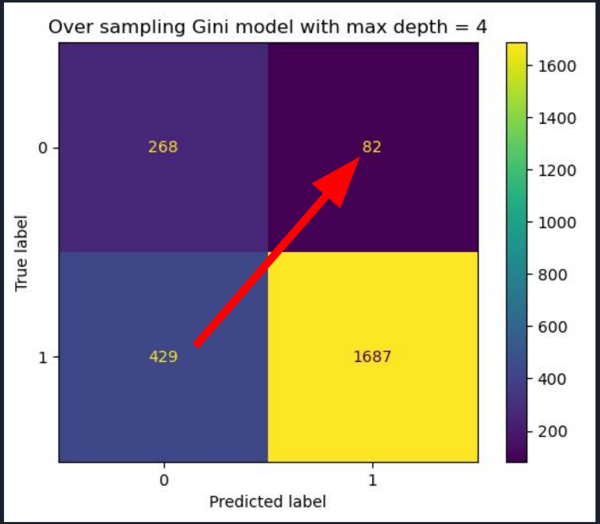
Predicted Values	Positive	Negative
Positive	True Positive	False Positive
Negative	False Negative	True Negative

Lowest false positives

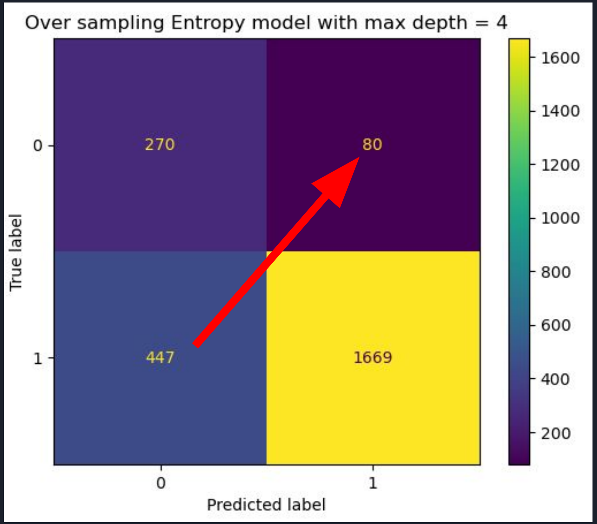
Logistic Regression?



Over sampled Logistic Regression



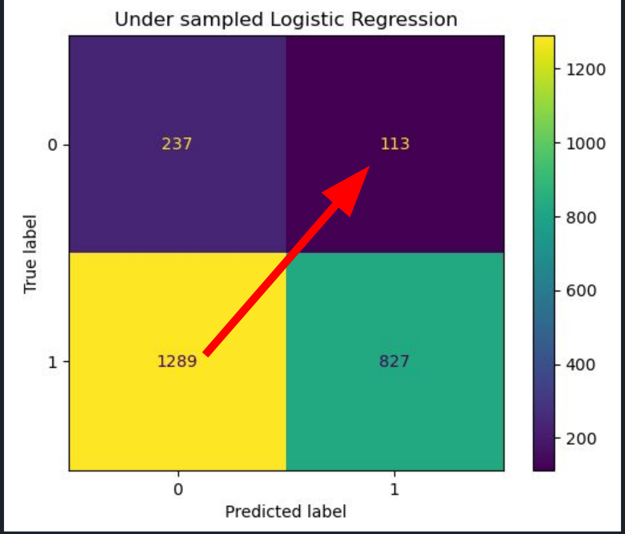
Over sampling Gini model with max depth = 4



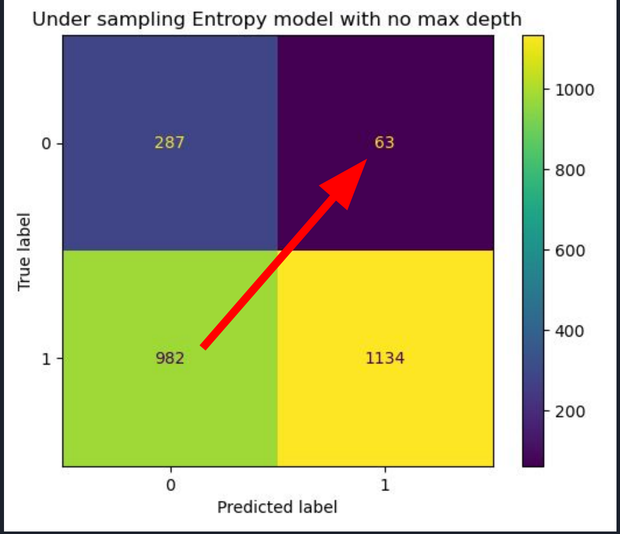
Over sampling Entropy model with max depth = 4

Under sampling to test flexibility

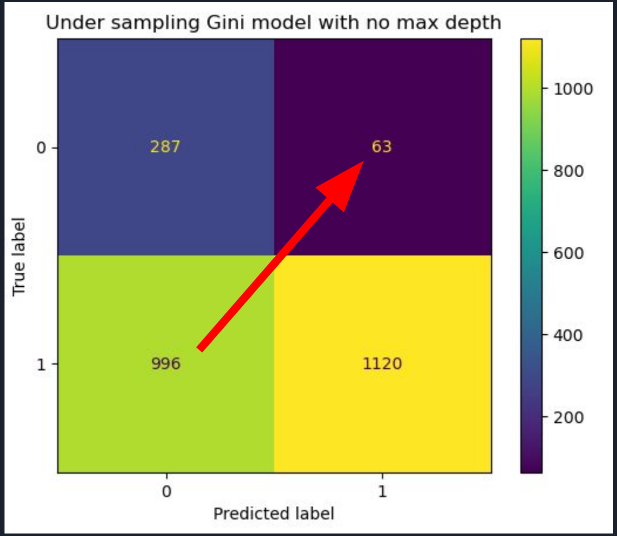
Random Forests Triumph



Under sampled Logistic Regression



Under sampling Entropy model with no max depth



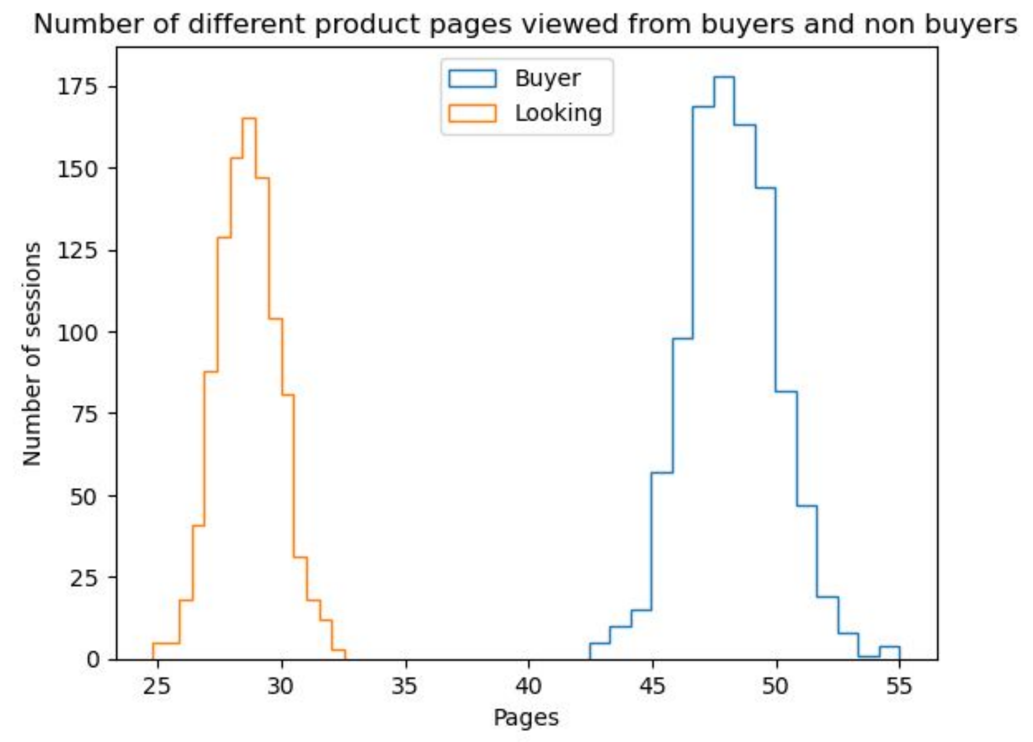
Under sampling Gini model with no max depth

Implement Entropy Random Forest Model

Tweak model to appropriate max depth

Push pop-ups to customers as they are browsing the site

Utilize pages viewed



Invest in premium ad network

Passive revenue from ad impressions