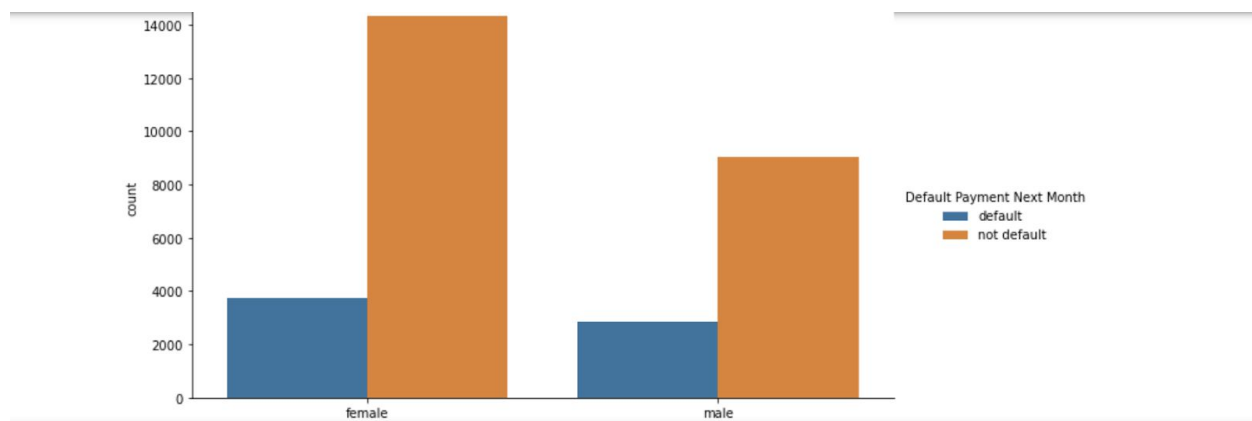


Problem: An increase in customer default rates is bad for Credit One since its business is approving customers for loans in the first place. This is likely to result in the loss of Credit One's business customers. You need to build a model that can better predict what credit limit a customer should be assigned. In my efforts of understanding the data provided and utilizing predictive analytics, I sought to answer the questions outlined in my report.

### How do you ensure that customers can/will pay their loan?

Through the process of my exploratory data analysis, I was able to identify a few unique features in customer data that provides Credit One insight into whether or not a customer can and will pay their loan.

- **Gender:** While women had more loans than men in this data set, men tended to default at a higher rate than women.



- **Education:** Those with a high school diploma defaulted the most and those with advanced degrees defaulted the least. The following visual provides the percentage breakdown by education level. As one further advances in their education level, their likelihood of defaulting on their loan decreases.

Education	Default Payment Next Month	
graduate school	default	19.234766
	not default	80.765234
high school	default	25.157616
	not default	74.842384
other	default	7.051282
	not default	92.948718
university	default	23.734854
	not default	76.265146

- **Marital Status:** Divorced individuals tend to default at higher rates than married and single customers. In the following percentage breakdown 1 refers to married, 2, refers to single and 3 refers to divorce:

1	default	23.471704
	not default	76.528296
2	default	20.928339
	not default	79.071661
3	default	26.006192
	not default	73.993808

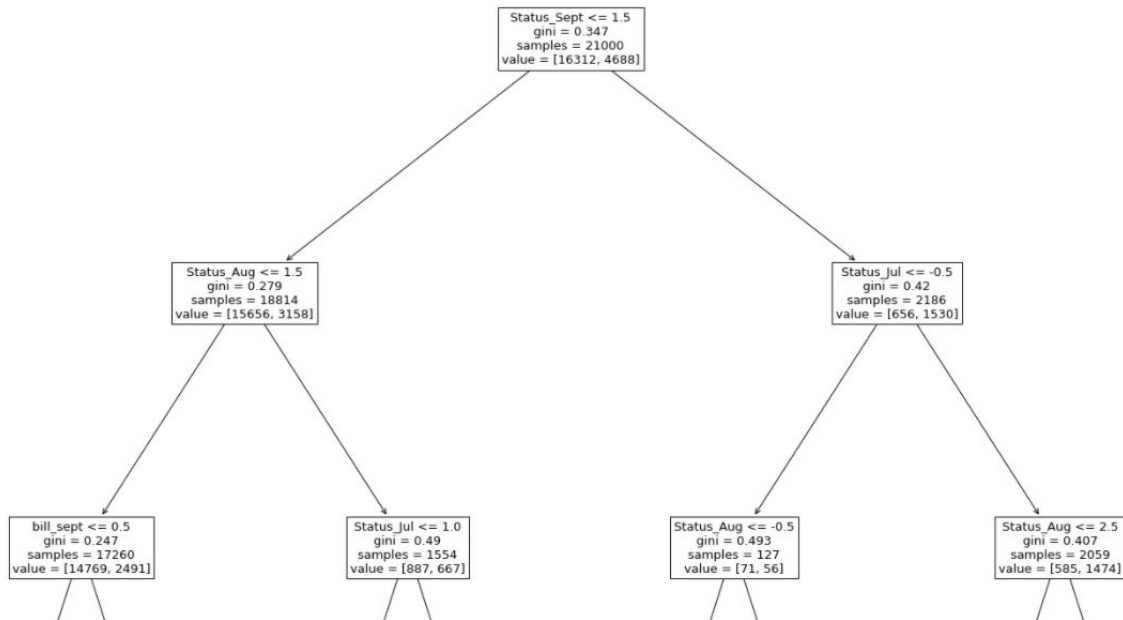
### Can we approve customers with high certainty?

While we cannot identify why a customer will default, we can say with a high degree of certainty that if a customer's payment status is delayed for one month, it is likely that the customer will continue to delay payment and eventually default as highlighted with the Decision Tree Classifier model.

```
: #Decision Tree Classifier
dtc8 = DecisionTreeClassifier(max_depth=3)
dtcFit8 = dtc8.fit(X_train,y_train)

: #Predictions
dtc8pred = dtcFit8.predict(X_test)
print(classification_report(y_test, dtc8pred))
```

	precision	recall	f1-score	support
0	0.84	0.96	0.89	7052
1	0.70	0.33	0.44	1948
accuracy			0.82	9000
macro avg	0.77	0.64	0.67	9000
weighted avg	0.81	0.82	0.80	9000



### Recommendations for Credit One:

- Use marital status, gender, and education level to determine stricter credit limit balances on customers.
- Reduce credit limits on all customers to ensure that customers can pay their limit in full. Once a pattern is established with a customer who has paid in full over a period of time, begin increasing credit limit for customers.
- If the limit balance is not changed or reduced, after 60 days of no payment from a customer with current credit limits, freeze the account and/or work develop a flexible adjusted pay schedule with the customer to minimize on defaults