pythonCreditEDA

March 22, 2018

0.1 Credit EDA

```
In [3]: #Packages
        #for data manipulation and operations
        import pandas as pd

        #for plotting
        from matplotlib import pyplot as plt
        %matplotlib inline
        import seaborn as sns

        #for statistical modeling
        import statsmodels.api as sm
        import numpy as np
```

```
C:\Users\Matt\Anaconda3\lib\site-packages\statsmodels\compat\pandas.py:56: FutureWarning: The pandas.cor
  from pandas.core import datetools
```

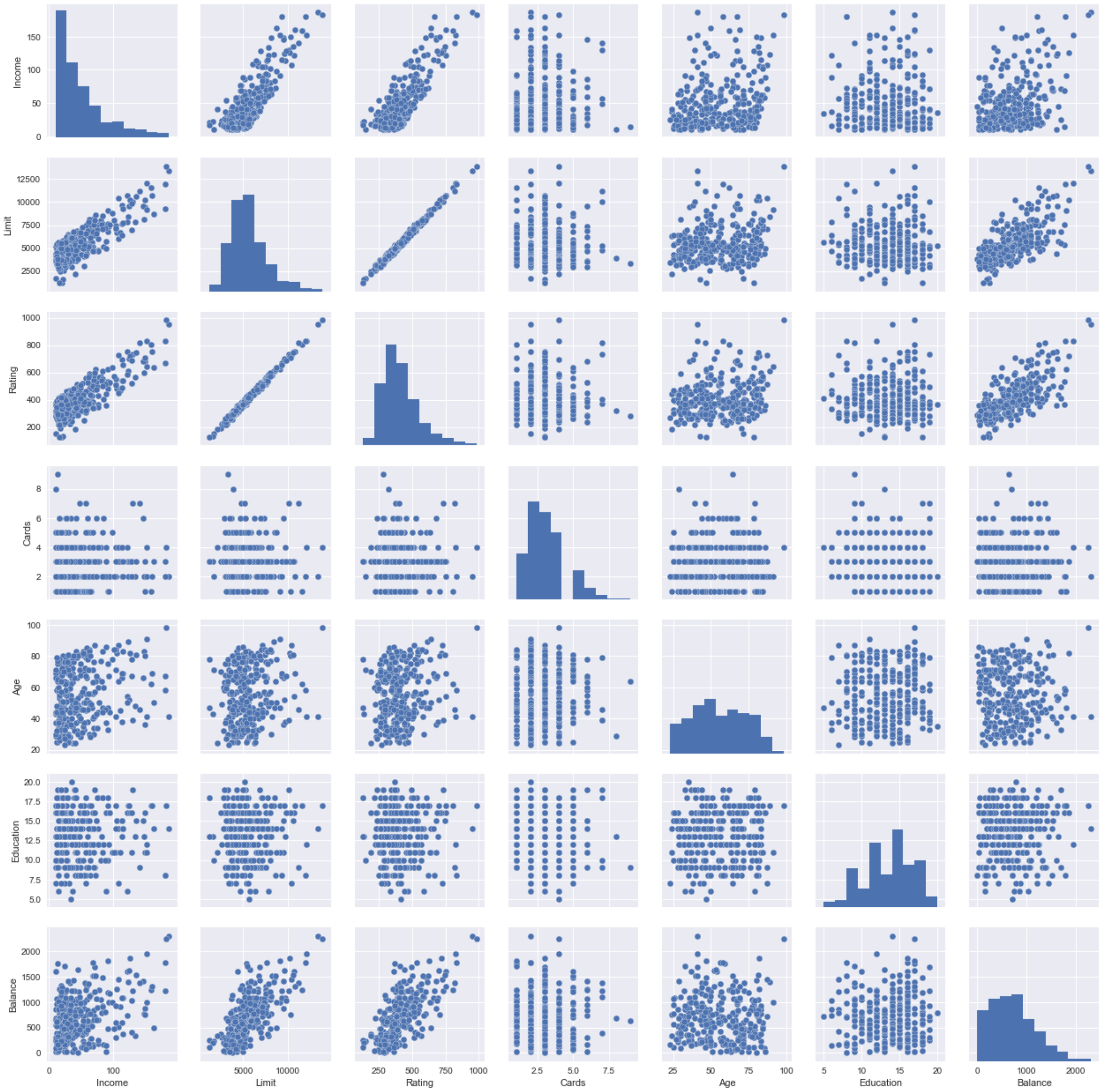
```
In [4]: #read in the data and verify
        data = pd.read_csv('creditdata.csv')
        data.head()
```

```
Out[4]:      Income  Limit  Rating  Cards  Age  Education  Gender Student Married  \
        0    14.891   3606     283      2   34         11    Male      No     Yes
        1   106.025   6645     483      3   82         15  Female     Yes     Yes
        2   104.593   7075     514      4   71         11    Male      No      No
        3   148.924   9504     681      3   36         11  Female      No      No
        4    55.882   4897     357      2   68         16    Male      No     Yes

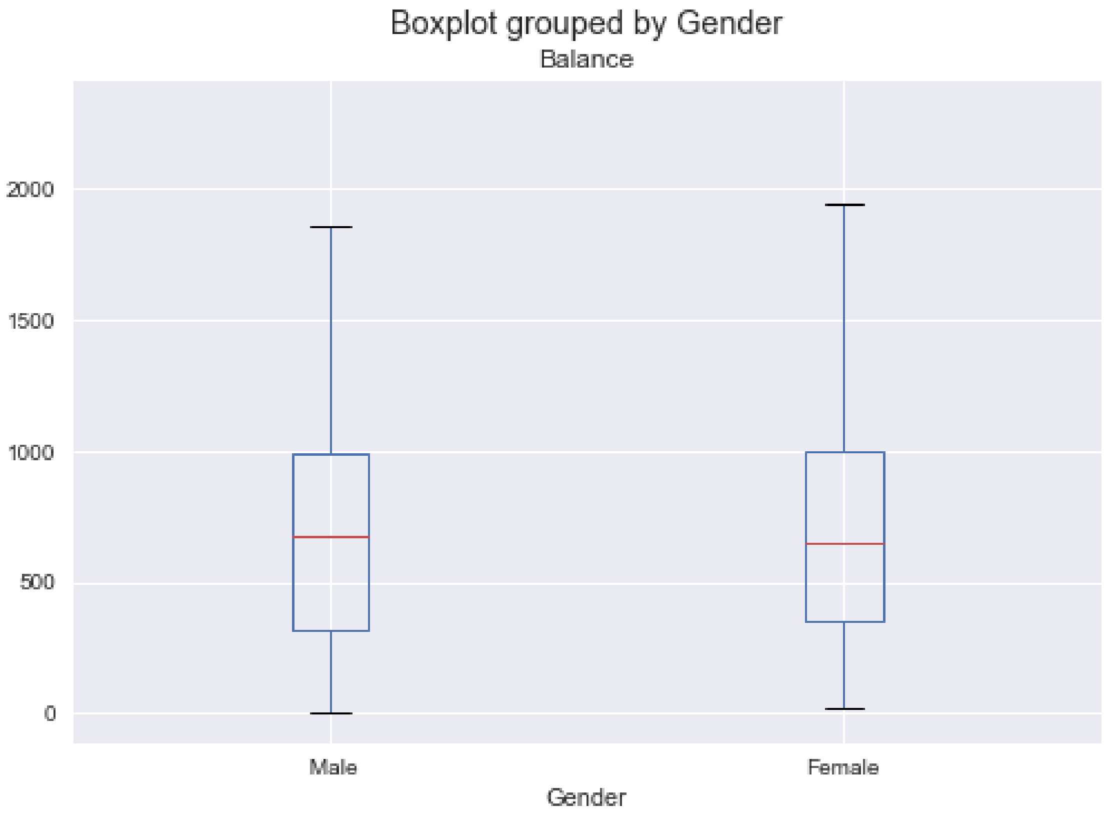
           Ethnicity  Balance
        0  Caucasian   581.74
        1      Asian  1259.22
        2      Asian   301.46
        3      Asian   878.14
        4  Caucasian   509.92
```

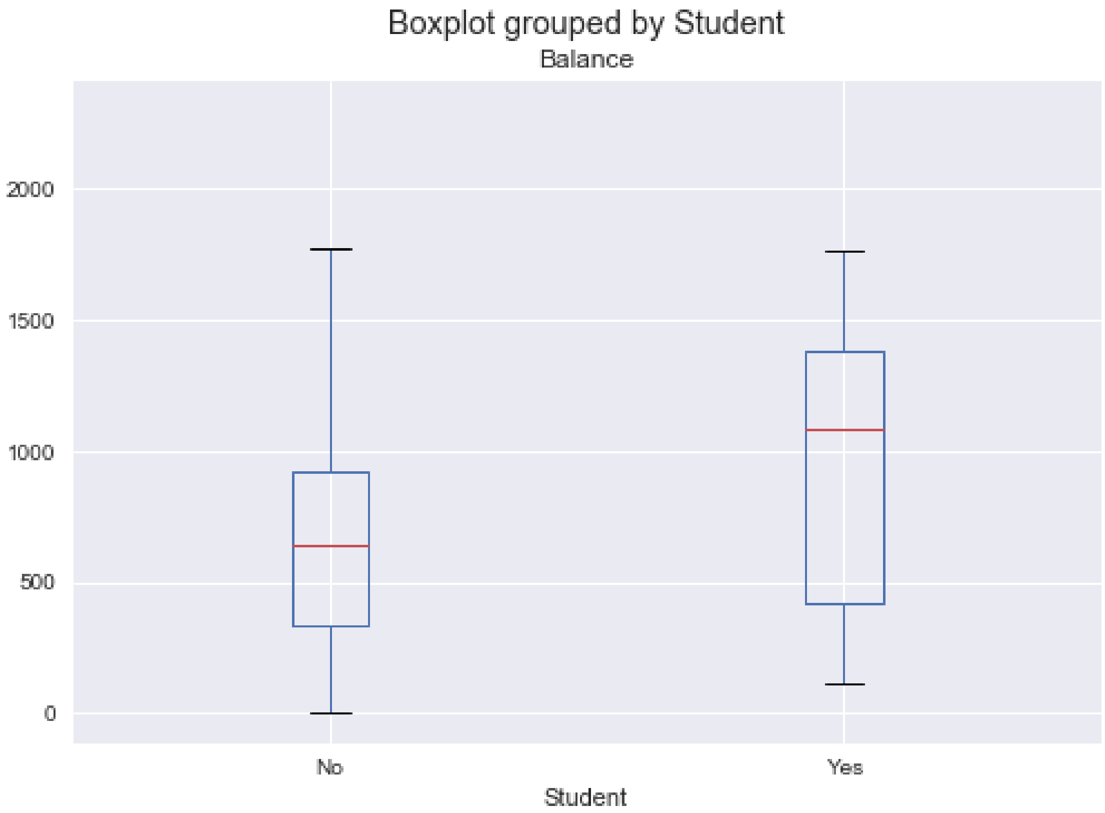
```
In [5]: # #make histograms of all the variables
        # data.hist(bins=50,figsize=(20,15))
        # plt.show()

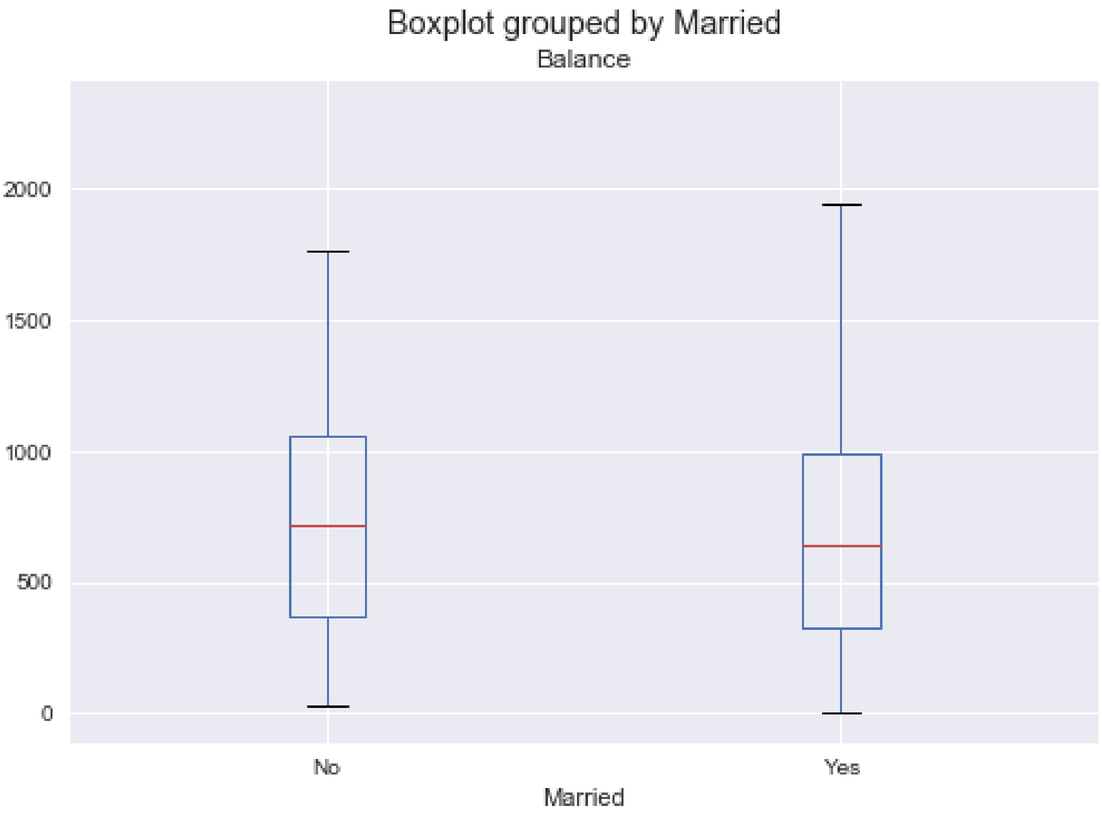
        # g = sns.pairplot(iris, hue="species")
        # sns.pairplot(data,hue='Ethnicity')
        # sns.pairplot(data,hue='Student')
        sns.pairplot(data)
sns.despine()
```

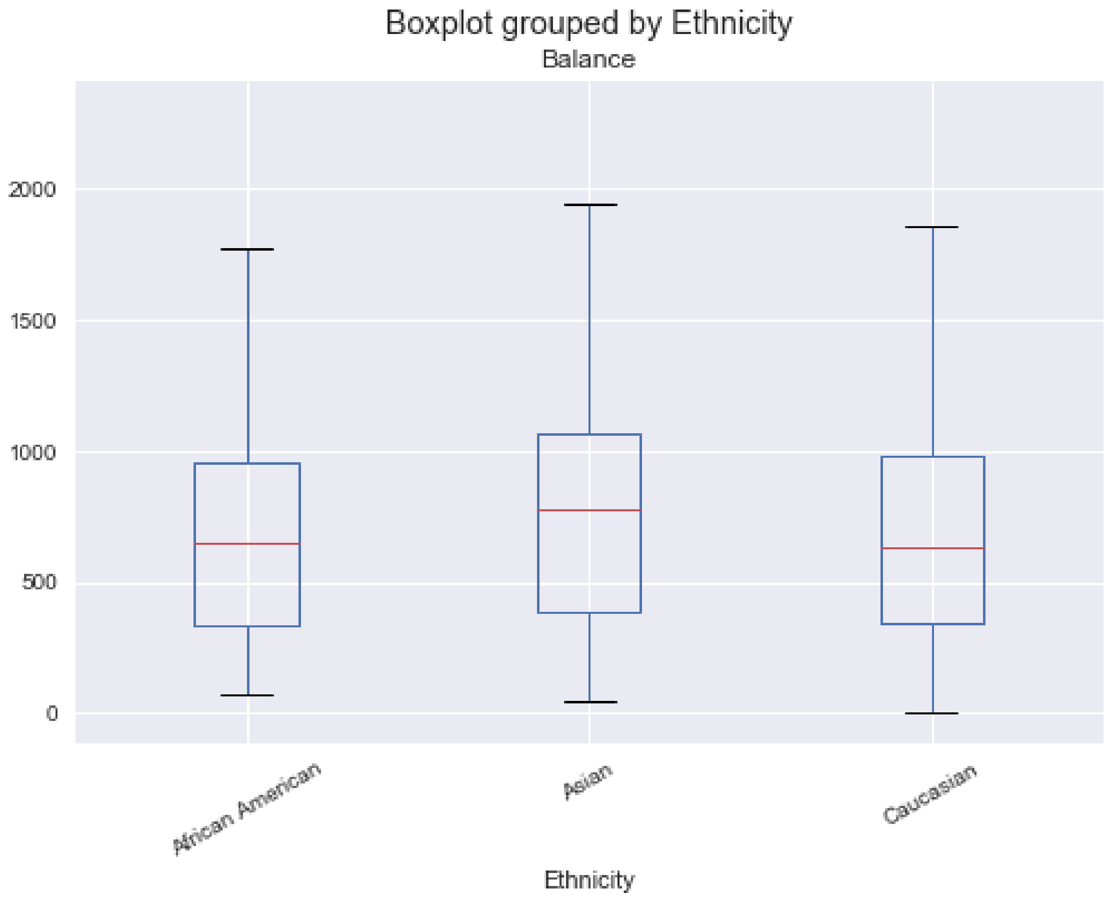


```
In [30]: data.boxplot('Balance',by='Gender')
         plt.show()
         data.boxplot('Balance',by='Student')
         plt.show()
         data.boxplot('Balance',by='Married')
         plt.show()
         data.boxplot('Balance',by='Ethnicity',rot=30)
         plt.show()
```

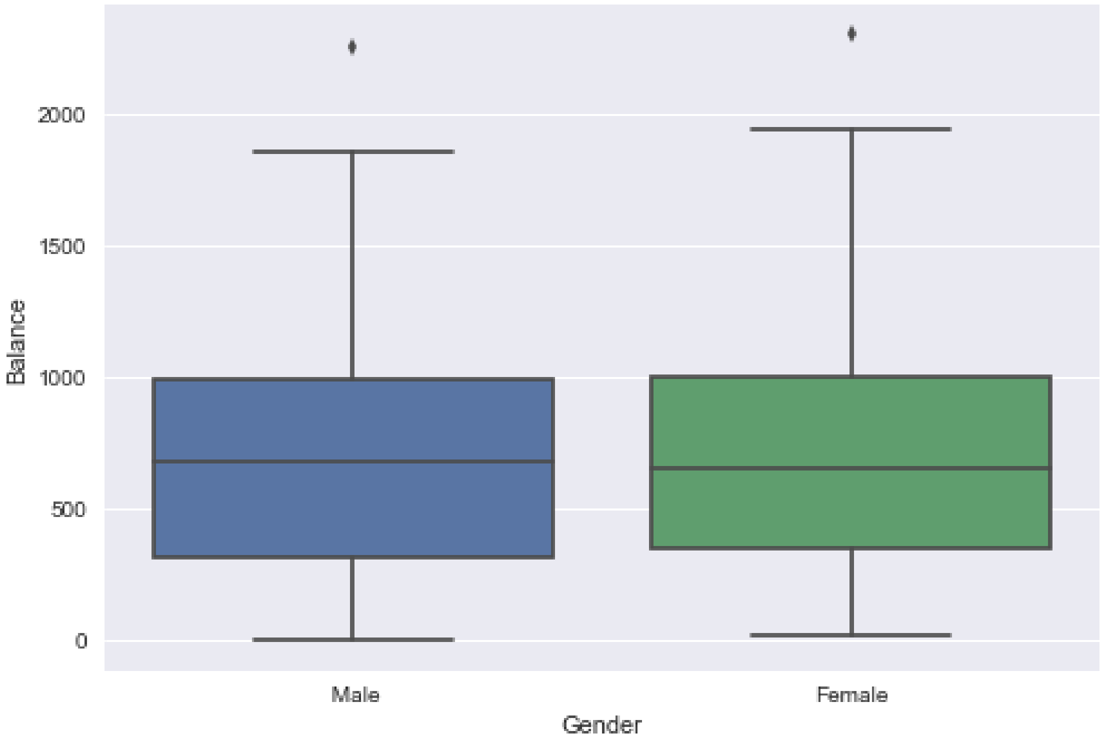

Boxplot grouped by Gender
Balance
2000
1500
1000
500
0
Male
Female
Gender

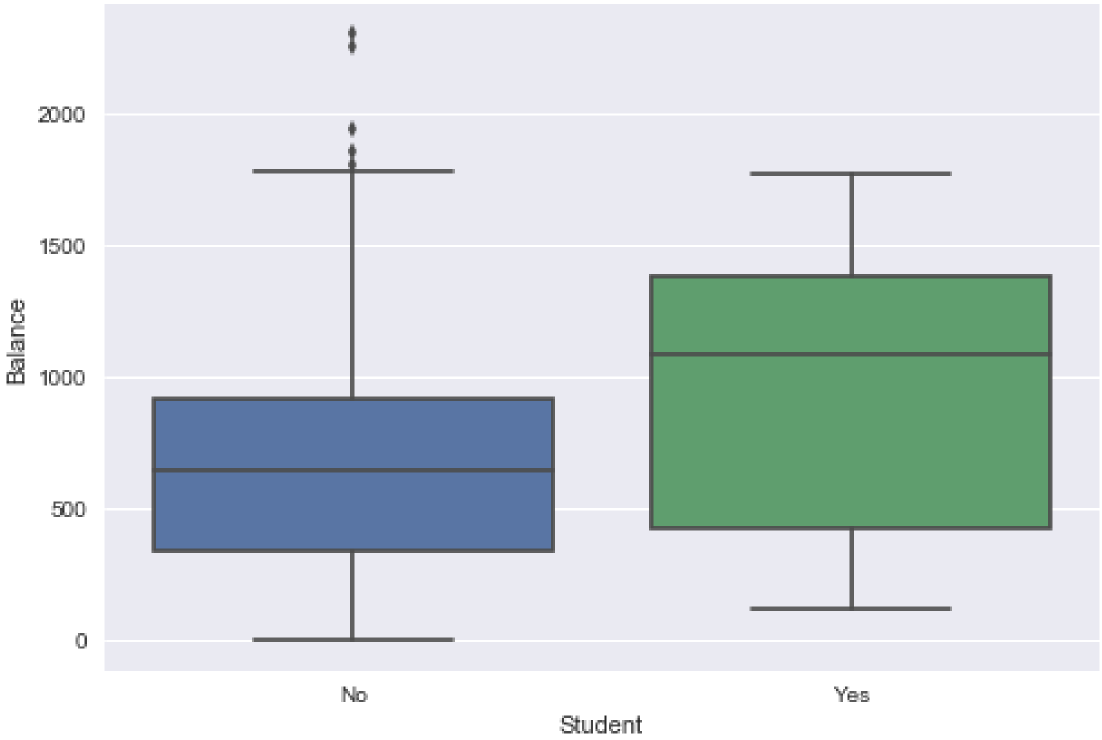

Boxplot grouped by Student
Balance
2000
1500
1000
500
0
No
Yes
Student

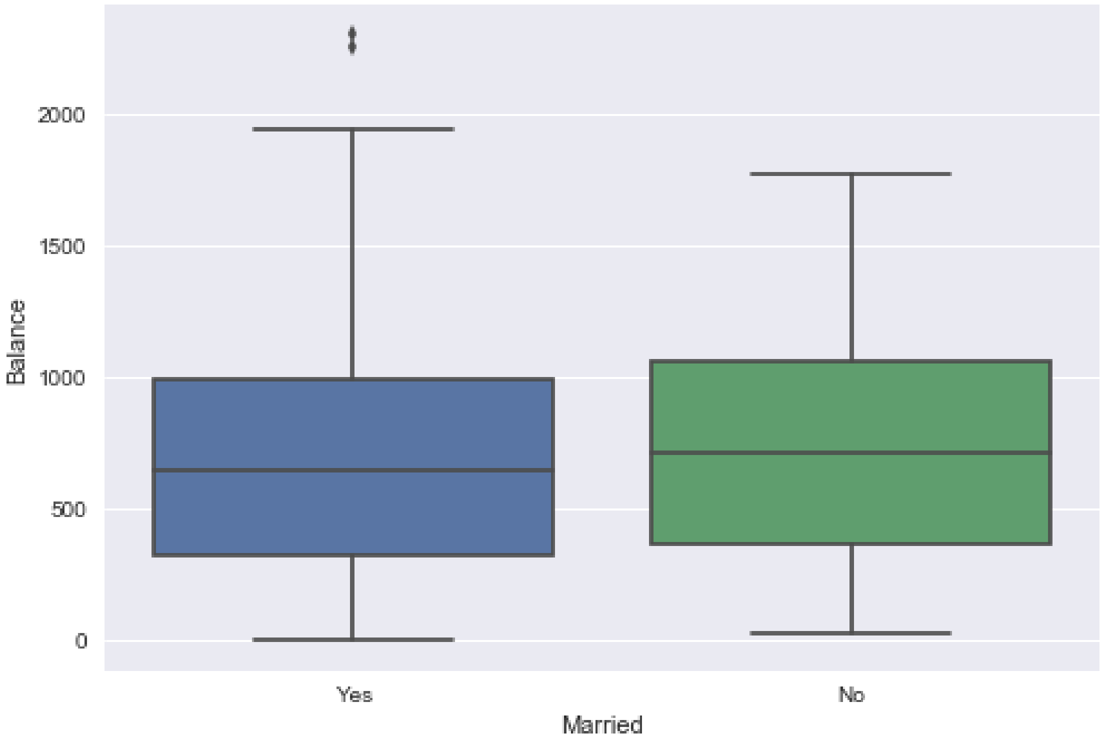

Boxplot grouped by Married
Balance
2000
1500
1000
500
0
No
Yes
Married

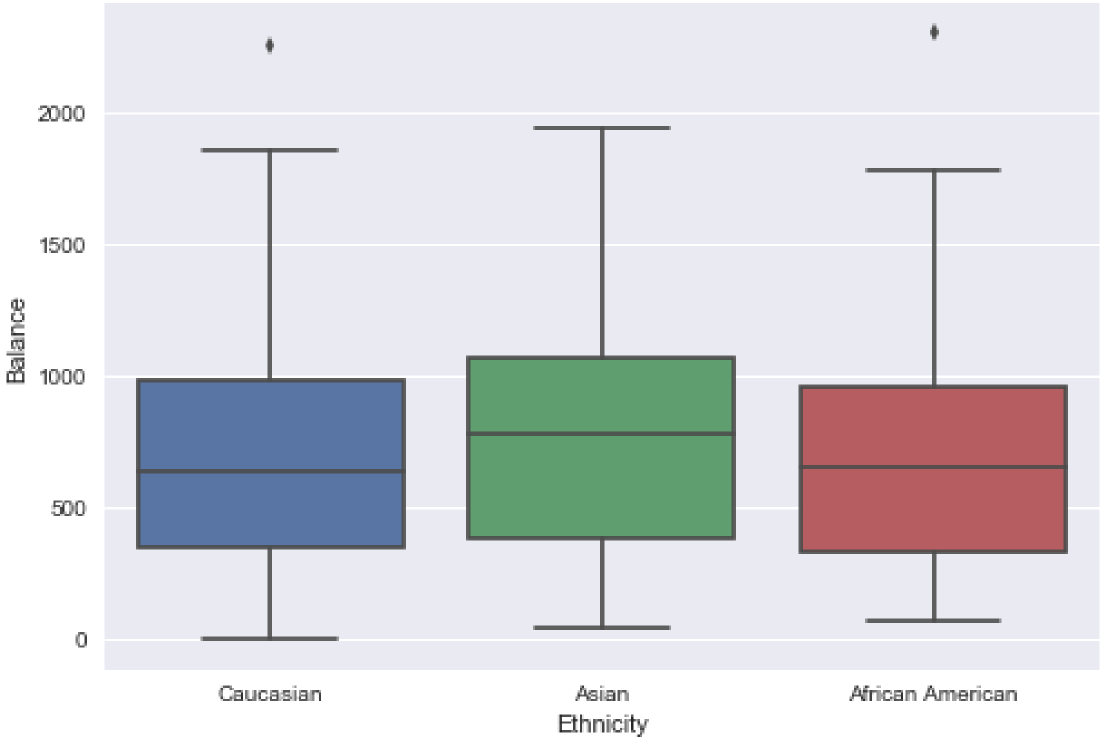


```
In [23]: # ax = sns.boxplot(x="day", y="total_bill", hue="smoker",data=tips, palette="Set3")
         sns.boxplot(y='Balance',x='Gender',data=data)
         plt.show()
         sns.boxplot(y='Balance',x='Student',data=data)
         plt.show()
         sns.boxplot(y='Balance',x='Married',data=data)
         plt.show()
         sns.boxplot(y='Balance',x='Ethnicity',data=data)
         plt.show()
         sns.despine()
```


Balance
0
500
1000
1500
2000
Male
Female
Gender


Balance
0
500
1000
1500
2000
No
Yes
Student


2000
1500
1000
500
0
Balance
Yes
No
Married


2000
1500
1000
500
0
Balance
Caucasian
Asian
African American
Ethnicity

```
<matplotlib.figure.Figure at 0x2149d81ccf8>
```

```
In [7]: data.shape

Out[7]: (294, 11)

In [8]: type(data)

Out[8]: pandas.core.frame.DataFrame

In [9]: type(data.drop('Balance',axis=1))

Out[9]: pandas.core.frame.DataFrame

In [10]: import statsmodels.formula.api as smf

In [11]: ### basic linear regression (without variable selection)

         # adding '1' as a predictor forces the inclusion of an intercept
         # model = smf.ols(formula='DLHRWAGE ~ 1 + DEDUC1 + AGE + AGESQ + WHITEH + MALEH + EDUCH + \
         #                      WHITEL + MALEL + EDUCL + DEDUC2 + DTEN + DMARRIED + DUNCOV', data=twinT
         model = smf.ols(formula='Balance ~ 1 + Income + Limit + Rating + Cards + Age + Education + \
                         Gender + Student + Married + Ethnicity',data=data).fit()
         model.summary()

Out[11]: <class 'statsmodels.iolib.summary.Summary'>
         """
                                     OLS Regression Results
         ==============================================================================
         Dep. Variable:                Balance   R-squared:                       0.787
         Model:                            OLS   Adj. R-squared:                  0.779
         Method:                 Least Squares   F-statistic:                     94.99
         Date:                Tue, 09 Jan 2018   Prob (F-statistic):           4.95e-88
         Time:                        11:42:02   Log-Likelihood:                -1985.2
         No. Observations:                 294   AIC:                             3994.
         Df Residuals:                     282   BIC:                             4039.
         Df Model:                          11
         Covariance Type:            nonrobust
         ==========================================================================================
                                      coef    std err          t      P>|t|      [0.025      0.975]
         ------------------------------------------------------------------------------------------
         Intercept               -543.4223     90.126     -6.030      0.000    -720.828    -366.016
         Gender[T.Female]         -19.7824     24.938     -0.793      0.428     -68.870      29.306
         Student[T.Yes]           535.7803     39.204     13.666      0.000     458.610     612.950
         Married[T.Yes]           -14.2811     26.093     -0.547      0.585     -65.642      37.080
         Ethnicity[T.Asian]        53.3056     36.427      1.463      0.144     -18.398     125.009
         Ethnicity[T.Caucasian]    41.4142     30.790      1.345      0.180     -19.192     102.021
         Income                    -8.4707      0.605    -13.992      0.000      -9.662      -7.279
         Limit                      0.3681      0.082      4.502      0.000       0.207       0.529
         Rating                    -0.9379      1.207     -0.777      0.438      -3.313       1.437
         Cards                     20.5028     10.235      2.003      0.046       0.356      40.650
         Age                       -2.2444      0.734     -3.056      0.002      -3.690      -0.799
         Education                 -0.1777      3.957     -0.045      0.964      -7.966       7.611
         ==============================================================================
         Omnibus:                        2.257   Durbin-Watson:                   2.041
         Prob(Omnibus):                  0.323   Jarque-Bera (JB):                1.956
         Skew:                           0.178   Prob(JB):                        0.376
         Kurtosis:                       3.182   Cond. No.                     4.39e+04
         ==============================================================================

         Warnings:
         [1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
         [2] The condition number is large, 4.39e+04. This might indicate that there are
         strong multicollinearity or other numerical problems.
         """

In [ ]: ## This one doesn’t work
        ## Without a constant
        # import statsmodels.api as sm

        # # X = df["RM"]
        # # y = target["MEDV"]

        X = data[[’’]]
        y = data.Balance
        # Note the difference in argument order
        model = sm.OLS(y, X).fit()
        predictions = model.predict(X) # make the predictions by the model

        # # Print out the statistics
        model.summary()

In [1]: pwd

Out[1]: ’C:\\Users\\Matt\\Documents\\Matt BYU\\10 Winter 2018\\Stat 536\\EDA 1 Credit’

In [ ]:

In [ ]:

In [ ]:

In [ ]:

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