Client Report - [Can you predict that?]

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Elevator pitch

To distinguish if a house is built before 1980 or after. Data I got had more than 20,000 rows, so I didn't want to look up each row. I mainly used a python module called "scikit" to let machine to distinguish which is which. It's basically machine learning and accuracy never became 100%, but at least more than 90%, so it's pretty accurate. Here is the step I made to get the accuacy.

GRAND QUESTION 1

Create 2-3 charts that evaluate potential relationships between the house variables and the variable before1980 Explain what you learn from the charts that could help a machine learning algorithm.

ANALYSIS

I made some charts to see the relationship between variables(finbsmnt and basement) (livearea and basement) and before1980. Some of the charts didn't have a good 45% line but those variables above had.

TECHNICAL DETAILS

```
#%%
# Chart 1 for GQ1
chart = sns.lmplot(data=h_subset, x="finbsmnt", y="basement",
col="before1980", hue="before1980")
chart

#%%
# Chart 2 for GQ1
sns.lmplot(data=h_subset, x="livearea", y="basement", col="before1980",
hue="before1980")
```

GRAND QUESTION 2

Build a classification model labeling houses as being built “before 1980” or “during or after 1980”. Your goal is to reach 90% accuracy. Explain your final model choice (algorithm, tuning parameters, etc) and describe what other models you tried.

Analysis

Accuracy with my model was 0.9120265316809216, so about 91%. I tried so many combinations of columns in ml dataframe to get accuracy of more than 90%. What i tried was mainly to change the number of columns or samples. First, I used all columns, but ["parcel", "yrbuilt", "before1980"] and checked each

column's importance. Then, I re-created a dataframe with 10 to 15 columns whose importance was higher than other columns.

TECHNICAL DETAILS

```
x7 = ml.filter(["arcstyle_ONE-STORY", "gartype_Att", "quality_C",
"livearea", "basement", "stories", "tasp", "netprice", "sprice",
"abstrprd", "numbaths", "status_V", "numbdrm"])
y7 = ml["before1980"]

x_train, x_test, y_train, y_test = train_test_split(
  x7,
  y7,
  test_size = .25,
  random_state = 10
)
```

GRAND QUESTION 3

Justify your classification model by discussing the most important features selected by your model. This discussion should include a chart and a description of the features.

Anylysis

In my model, the 3 highest features are, from highest, "livearea", "arcstyle_ONE-STORY", "gartype_Att".

features	importance
status_V	0.0257227
numbdrm	0.0352429
abstrprd	0.0559222
quality_C	0.0684837
basement	0.0728315
sprice	0.0734354
netprice	0.0745685
tasp	0.0806549
numbaths	0.0823371
stories	0.086096
gartype_Att	0.0888687
arcstyle_ONE-STORY	0.11373

features	importance
livearea	0.142107

TECHNICAL DETAILS

```
feature_df = pd.DataFrame({'features':x7.columns,
'importance':classifier.feature_importances_})
feature_df.sort_values(by="importance", inplace=True)
feature_df
```

GRAND QUESTION 4

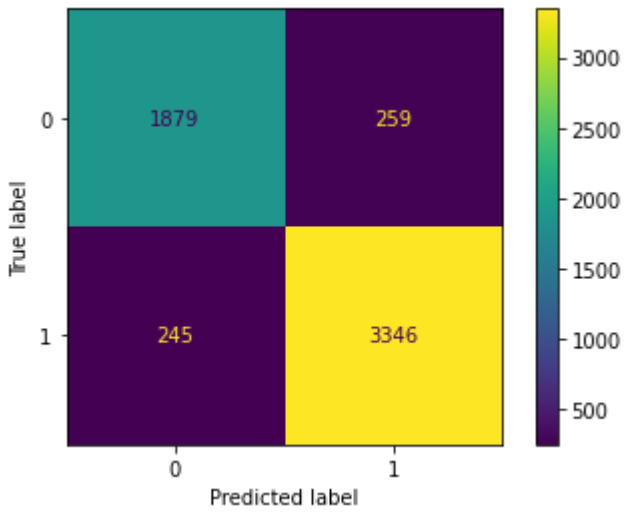
Describe the quality of your classification model using 2-3 different evaluation metrics. You also need to explain how to interpret each of the evaluation metrics you use.

Anylysis

Two metrics I used to evaluate my classification model are to check the accuracy score and confusion matrics. I got 91.2% as above, and east-to-read confusioin matrics.

TECHNICAL DETAILS

```
# Accuracy
print("Accuracy:", metrics.accuracy_score(y_test, y_predicted))
# confusion matrix
metrics.plot_confusion_matrix(classifier, x_test, y_test)
```



(1879+3346) / (1879+259+245+3346) = .0912

Appendix

Q1

```

```

Q2

```
#%%
# Create a decision tree
classifier= RandomForestClassifier()
# classifier= DecisionTreeClassifier()

# Fit the decision tree
classifier.fit(x_train, y_train)

# Test the decision tree (make predictions)
y_predicted = classifier.predict(x_test)

# Evaluate the decision tree
print("Accuracy:", metrics.accuracy_score(y_test, y_predicted))
```

Q3

```

```

Q4

```

```