UDACITY

PROJECT

Predicting Boston Housing Prices

A part of the Machine Learning Engineer Nanodegree Program

PROJECT REVIEW

CODE REVIEW

NOTES

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Requires Changes

2 SPECIFICATIONS REQUIRE CHANGES

Dear student,

well done with your very good submission. There are only two issues to be addressed in order to meet requirements, please refer to my comments in the appropriate section for some hints. I've left some Pro Tips as well in case you might be interested in learning more about some specific topics.

Keep up your excellent work!

Data Exploration

All requested statistics for the Boston Housing dataset are accurately calculated. Student correctly leverages NumPy functionality to obtain these results.

The project rubric mandatorily requires to use NumPy to compute your results: *"All requested statistics for the Boston Housing dataset are accurately calculated. Student correctly leverages NumPy functionality to obtain these results."*
Please do so to meet requirements, you can refer to the following link for a list of common functions:
http://docs.scipy.org/doc/numpy/reference/generated/numpy.std.html#numpy.std

Student correctly justifies how each feature correlates with an increase or decrease in the target variable.

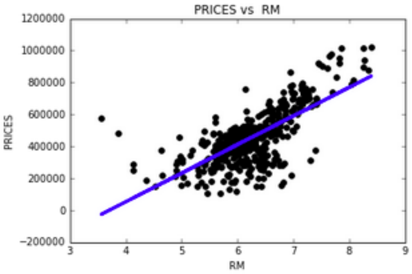
Pro tip: Visually inspecting correlations.

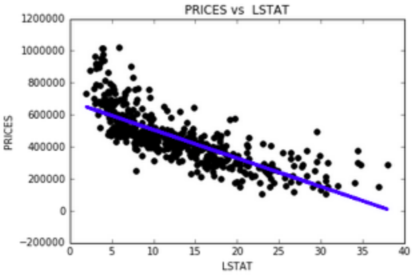
In this question you are required to provide a rationale for your conclusions, plotting the actual variables against the prices, and **adding a trendline**, could help you visually inspect the correlations and therefore assess the validity of your very conclusions.

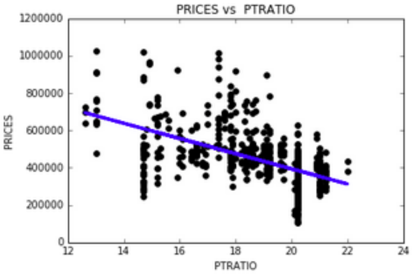
```
import matplotlib.pyplot as plt
import numpy as np

for col in features.columns:

    fig, ax = plt.subplots()
    fit = np.polyfit(features [col], prices, deg=1) # We use a linear fit to compute the trendline
    ax.scatter(features [col],  prices)
    plt.plot(features [col], prices, 'o', color='black')
    ax.plot(features[col], fit[0] * features[col] + fit[1], color='blue', linewidth=3) # This plots a trendline with the
 regression parameters computed earlier. We should plot this after the dots or it will be covered by the dots themselves
    plt.title('PRICES vs  '+ str(col)) # title here
    plt.xlabel(col) # label here
    plt.ylabel('PRICES') # label here
```







Developing a Model

Student correctly identifies whether the hypothetical model successfully captures the variation of the target variable based on the model's R^2 score.
The performance metric is correctly implemented in code.

The statement: "This means 92.3% of the data is predictable with the input data given." Is not correct, the R squared is not related with predictability though with that portion of variability captured by the model.

https://en.wikipedia.org/wiki/Coefficient_of_determination

Student provides a valid reason for why a dataset is split into training and testing subsets for a model. Training and testing split is correctly implemented in code.

Analyzing Model Performance

Student correctly identifies the trend of both the training and testing curves from the graph as more training points are added. Discussion is made as to whether additional training points would benefit the model.

Student correctly identifies whether the model at a max depth of 1 and a max depth of 10 suffer from either high bias or high variance, with justification using the complexity curves graph.

Student picks a best-guess optimal model with reasonable justification using the model complexity graph.

Evaluating Model Performance

Student correctly describes the grid search technique and how it can be applied to a learning algorithm.

Pro tip: There are other techniques that could be used for hyperparameter optimization in order to save time like RandomizedSearchCV, in this case instead of exploring the whole parameter space just a fixed number of parameter settings is sampled from the specified distributions. This proves useful when we need to save time but is not necessary in cases in cases like ours where the data set is relatively small.

Student correctly describes the k-fold cross-validation technique and discusses the benefits of its application when used with grid search when optimizing a model.

Student correctly implements the `fit_model` function in code.

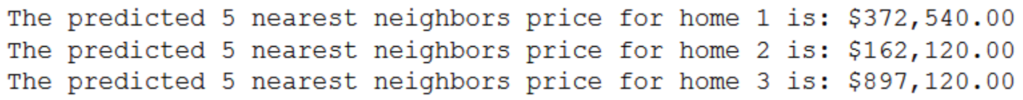
Student reports the optimal model and compares this model to the one they chose earlier.

Student reports the predicted selling price for the three clients listed in the provided table. Discussion is made for each of the three predictions as to whether these prices are reasonable given the data and the earlier calculated descriptive statistics.

Pro tip: To assess if your prediction is reasonable, besides from comparing it with the median, the mean and checking if it is included in one standard deviation range, you could use SKlearn to find the nearest neighbours of the feature vector. You can then contrast your results with the closest neighbours, the ones that have similar characteristics.

```
from sklearn.neighbors import NearestNeighbors
num_neighbors=5
def nearest_neighbor_price(x):
    def find_nearest_neighbor_indexes(x, X):  # x is your vector and X is the data set.
        neigh = NearestNeighbors( num_neighbors )
        neigh.fit(X)
        distance, indexes = neigh.kneighbors( [x] )
        return indexes
    indexes = find_nearest_neighbor_indexes(x, features)
    sum_prices = []
    for i in indexes:
        sum_prices.append(prices[i])
    neighbor_avg = np.mean(sum_prices)
    return neighbor_avg
index = 0
for i in client_data:
    val=nearest_neighbor_price(i)
    index += 1
    print "The predicted {} nearest neighbors price for home {} is: ${:,.2f}".format(num_neighbors,index, val)
```

http://scikit-learn.org/stable/modules/neighbors.html#finding-the-nearest-neighbors



```
The predicted 5 nearest neighbors price for home 1 is: $372,540.00
The predicted 5 nearest neighbors price for home 2 is: $162,120.00
The predicted 5 nearest neighbors price for home 3 is: $897,120.00
```

Student thoroughly discusses whether the model should or should not be used in a real-world setting.

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Ben shares 5 helpful tips to get you through revising and resubmitting your project.

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