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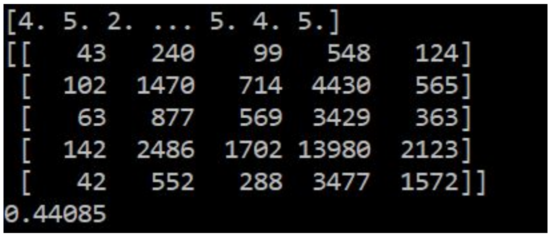
Report

I think the model predicts the number of stars earned well. It seems to do so especially well when it is predicting at the level of 2 and 4 stars but appears to slack off some at extremes and for businesses that rank in the very middle. Overall, the model works very well for predicting restaurants more generally. I think that the model would perform best classifying businesses into buckets like good bad and okay, I was able to get a little closer to this type of classification by rounding to the nearest whole star.

Below are prediction results a confusion matrix and the accuracy score.



```
[4. 5. 2. ... 5. 4. 5.]
[[   43   240    99   548   124]
 [  102  1470   714  4430   565]
 [   63   877   569  3429   363]
 [  142  2486  1702 13980  2123]
 [   42   552   288  3477  1572]]
0.44085
```

The results window shows that the random forest machine receives an accuracy score of 44%. I was able to get accuracy scores up to 54% by adjusting the n_estimators and max_depth however the confusion matrix did not look as promising.

The confusion matrix pictured here shows us that the model does better at predicting results for businesses around 2 stars and 4 stars and does relatively well overall.

I think that a random forest is a very strong choice for this type of dataset because random forests do not suffer greatly from multicollinearity problems. I used a lot of dummy variables to convey the differences in the businesses to the machine, some of which are possibly heavily correlated like valet and classy, classy and upscale, and pizza and takeout. The model also seemed to perform well comparatively, for example, I ran a linear regression model also and found that the predictive power of the linear regression model was much lower (judging by the R^2 measurement, also the code for the linear regression is included in linearcomparison.py)

Overall, I am happy with the model. If I had more time, I would make the model more specific to a city or state by deciding map ranges based on latitude and longitude and cluster the data to see for which locations stars cluster together (metro, downtown, financial) to gain more predictive power. Although the model could be improved upon, I think that it does well predicting stars, and would be very effective classifying businesses into buckets like good bad and okay.