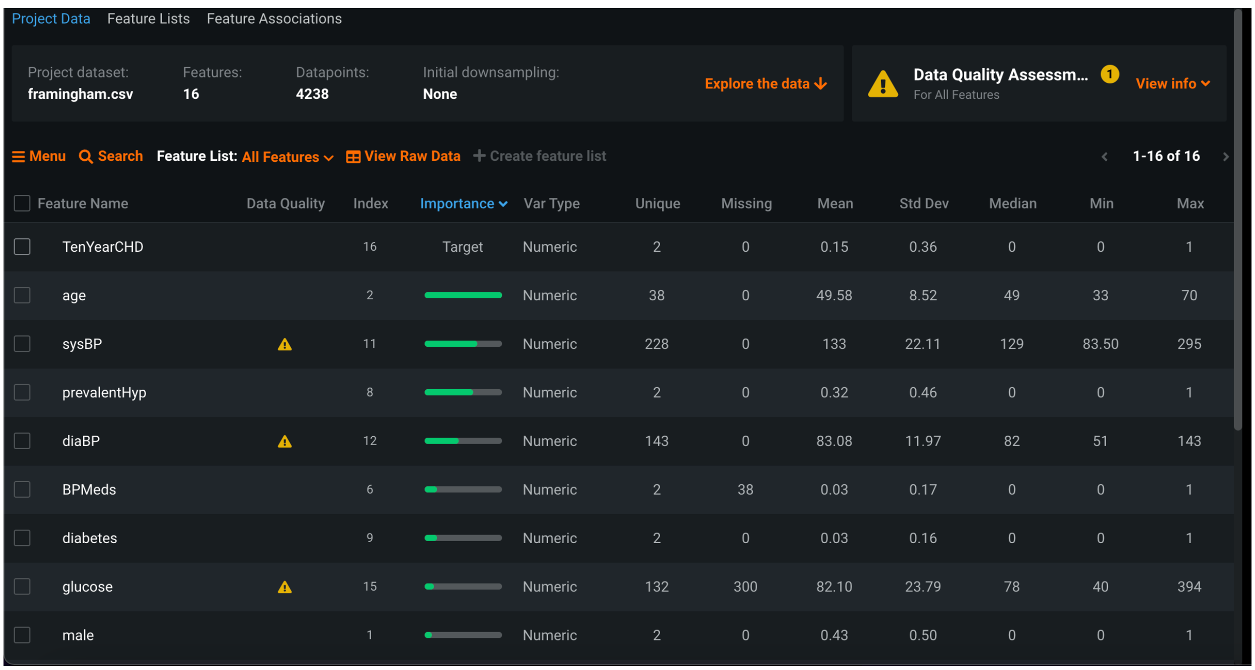
Predictive Modeling with DataRobot

In this assignment, I will use DataRobot to explore Auto Machine Learning and try to tunning the parameter.

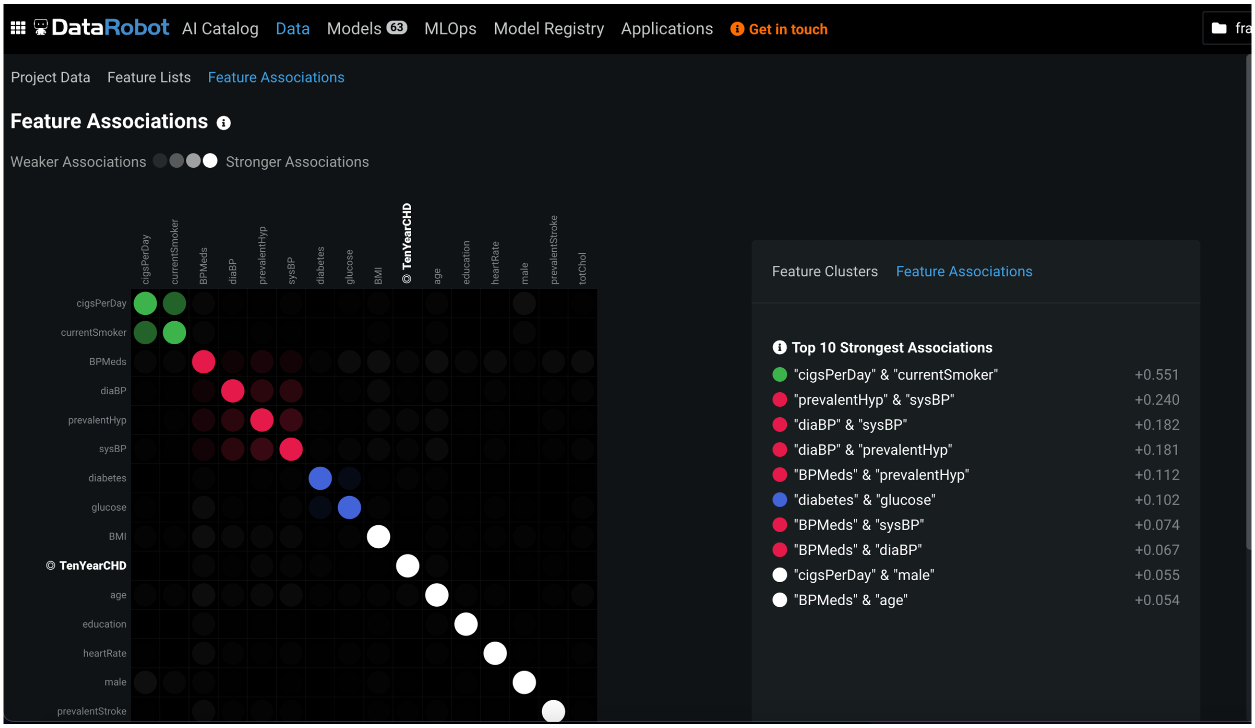
First of all, my data comes from Kaggle, which is about heart disease and its target is TenYearCHD. TenYearCHD is a binary data and “1” represents “yes” for 10 year risk of coronary heart disease CHD and “0” represents “no” for 10 year risk of coronary heart disease CHD. The dataset features have sex, age, Current Smoker, BP Meds and so on.



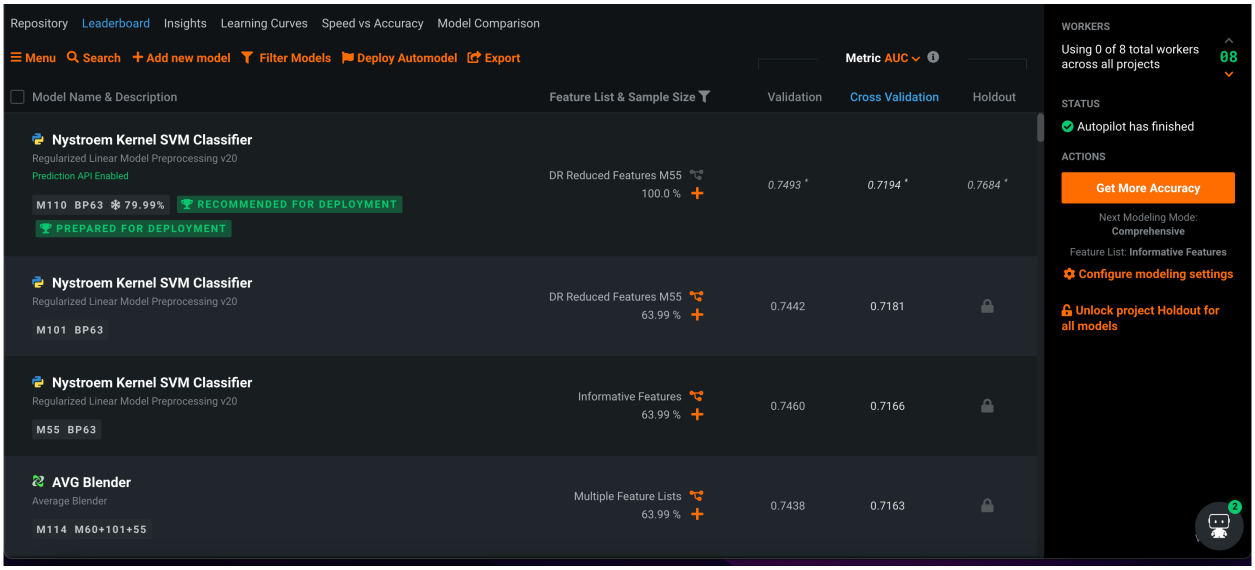
Feature Name	Data Quality	Index	Importance	Var Type	Unique	Missing	Mean	Std Dev	Median	Min	Max
TenYearCHD		16	Target	Numeric	2	0	0.15	0.36	0	0	1
age		2		Numeric	38	0	49.58	8.52	49	33	70
sysBP		11		Numeric	228	0	133	22.11	129	83.50	295
prevalentHyp		8		Numeric	2	0	0.32	0.46	0	0	1
diaBP		12		Numeric	143	0	83.08	11.97	82	51	143
BPMeds		6		Numeric	2	38	0.03	0.17	0	0	1
diabetes		9		Numeric	2	0	0.03	0.16	0	0	1
glucose		15		Numeric	132	300	82.10	23.79	78	40	394
male		1		Numeric	2	0	0.43	0.50	0	0	1

After I uploaded this dataset on DataRobot, it auto analyze the data and show the result to me. We can see that all of the data is numeric and their missing number, min, max and mean. The yellow triangle means that there is an outlier in this feature.

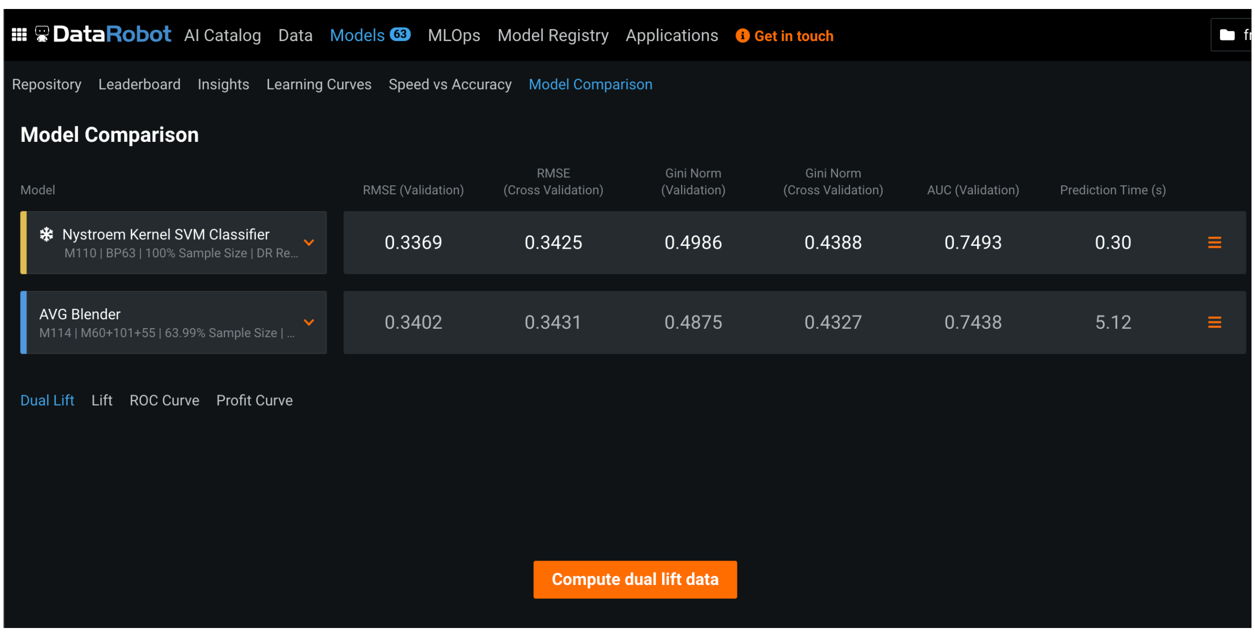
When we click on the right data-name button, we can see the Hyperparameter of this dataset. From this screenshot, we can know there are 63 models run on this dataset. The holdout data percentage is 20.0095%. Why is it the float number? I think maybe it used the number of datasets to times 20% and got a float number for the holdout data. But the number must be int. So it rounds the result and uses the approximate number of holdouts to divide by the total number of dataset and finally got such a float number 20.0095. We also can know the data size and the number of features from this screenshot.



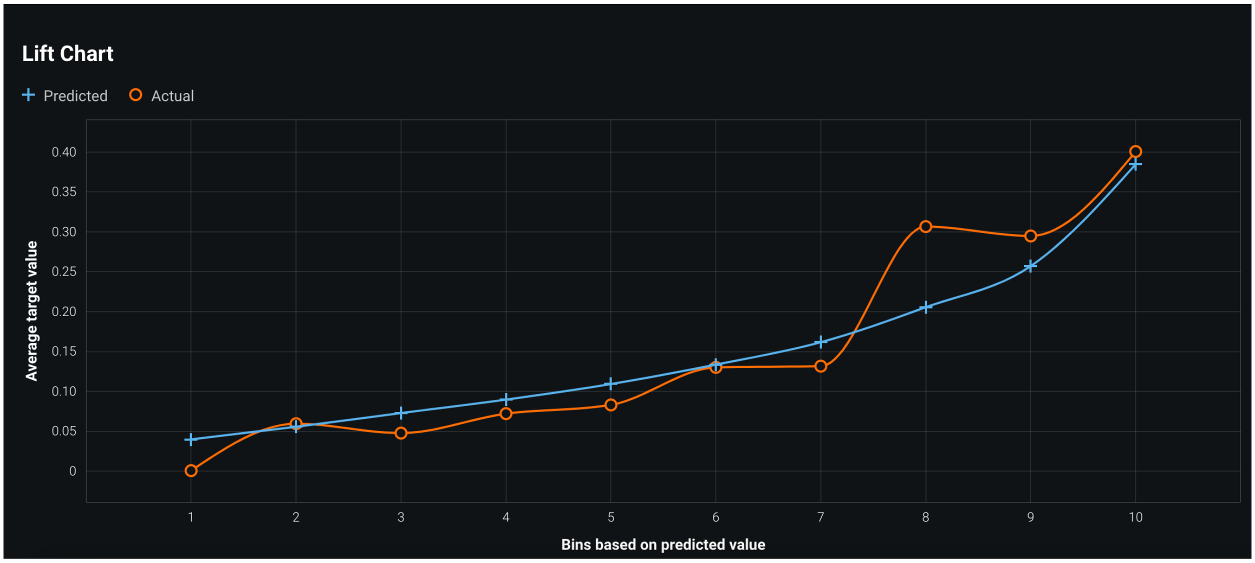
When I clicked on the feature association in the Data tag, I can see the heat plot and know the relationship between each feature. Obviously, "cigsPerDay" and "currentSmoker" have the highest correspond. If we want to calculate the PCA, we can eliminate one of their features.



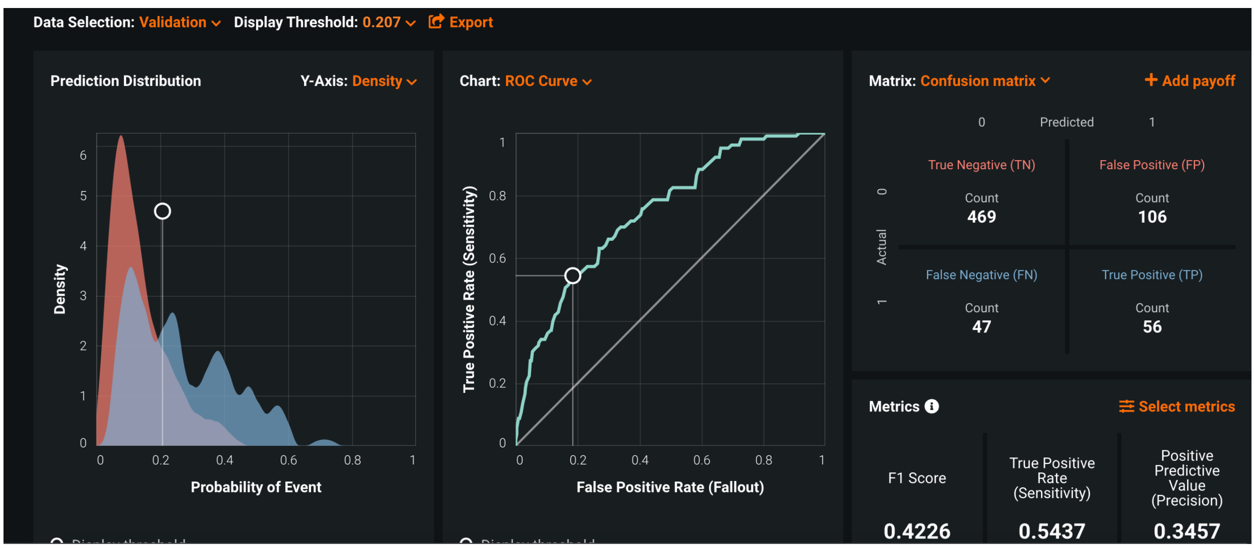
Here the screen shows that the Nystroem Kernel SVM Classifier model has the best performance. It has the highest AUC, lowest RMSE and so on.



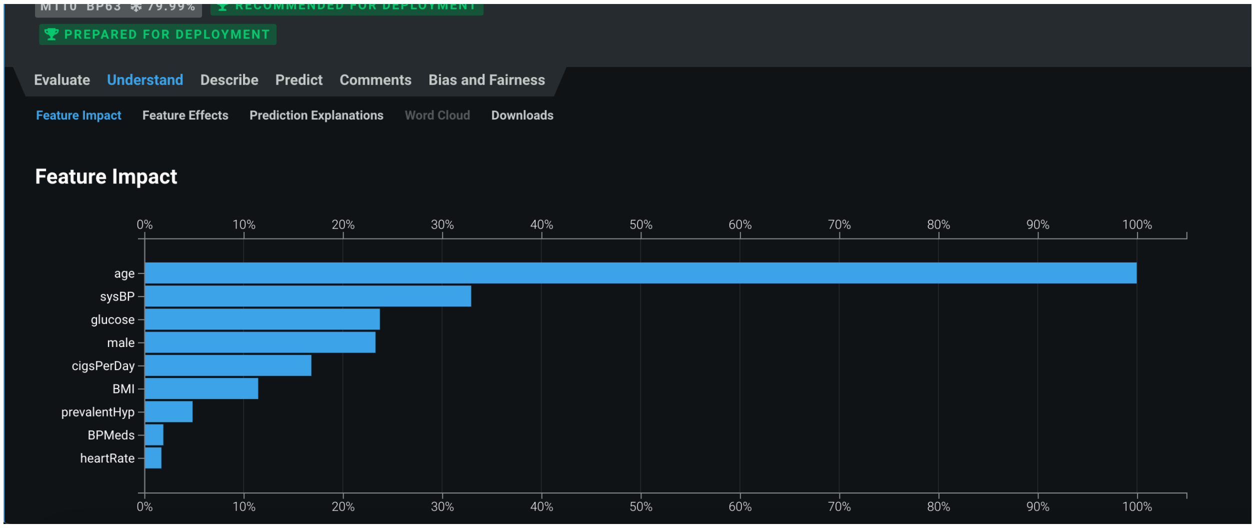
It can be easy to compare any two models. For example, in this picture, Nystroem Kernel SVM Classifier model has lower RMSE, higher AUC and less prediction time than the AVG Blender model.



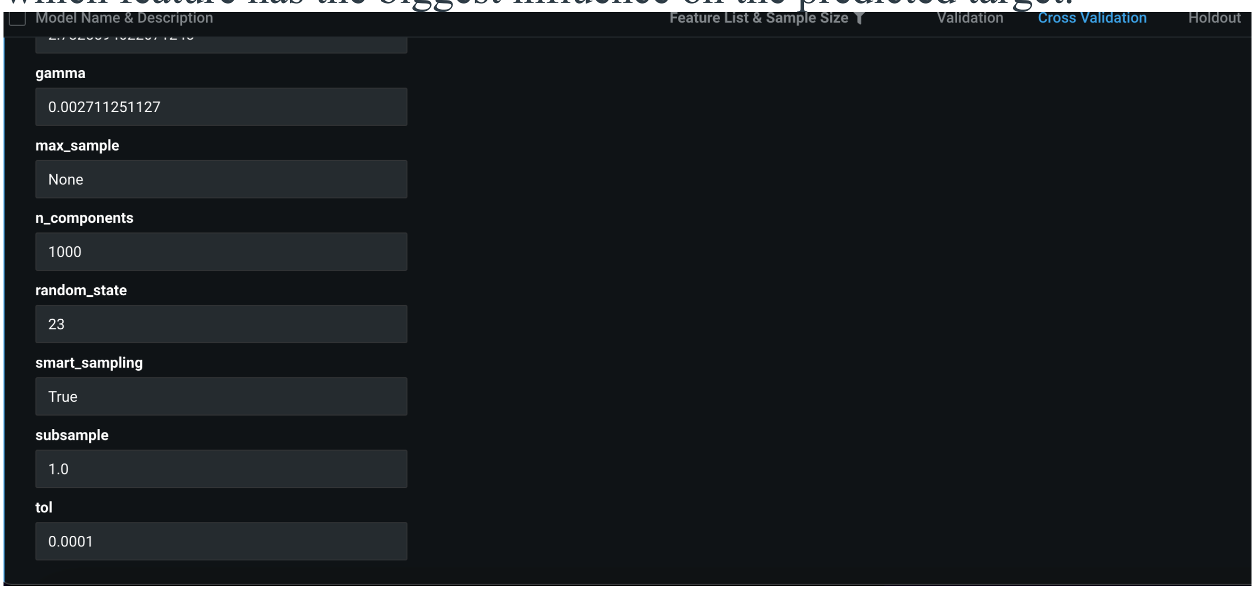
Here we can see the Lift Chart. The predicted is very close to the Actual.



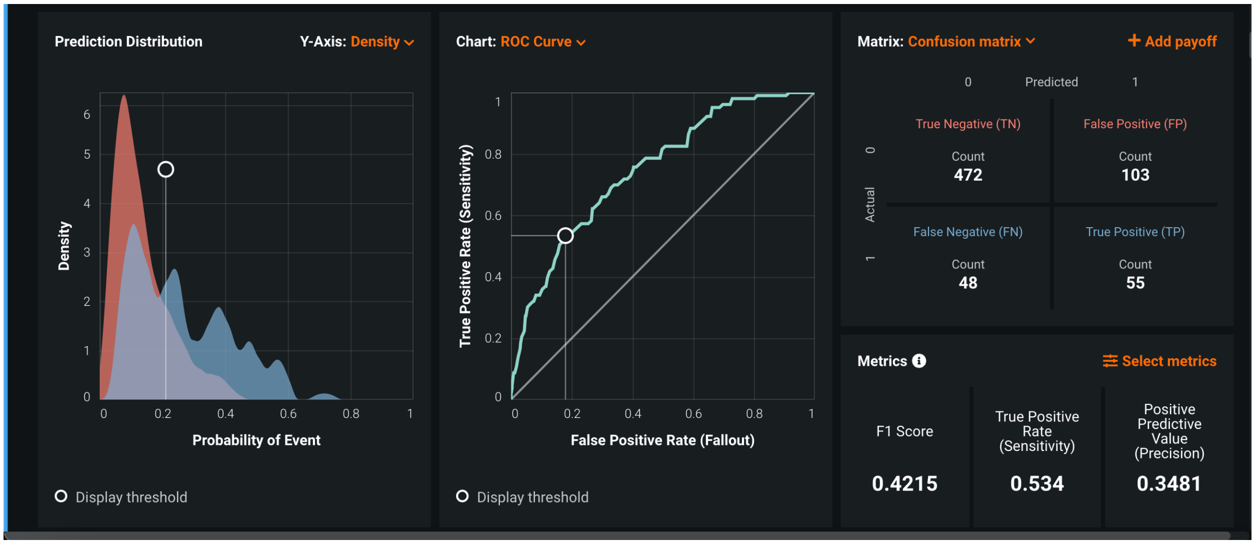
When we choose ROC Curve, we can see that the roc curve is far away from the diagonal and close to the right button. It means that is model is useful. And DataRobot also helps me to show the confusion matrix and calculate its F1, sensitivity and precision.



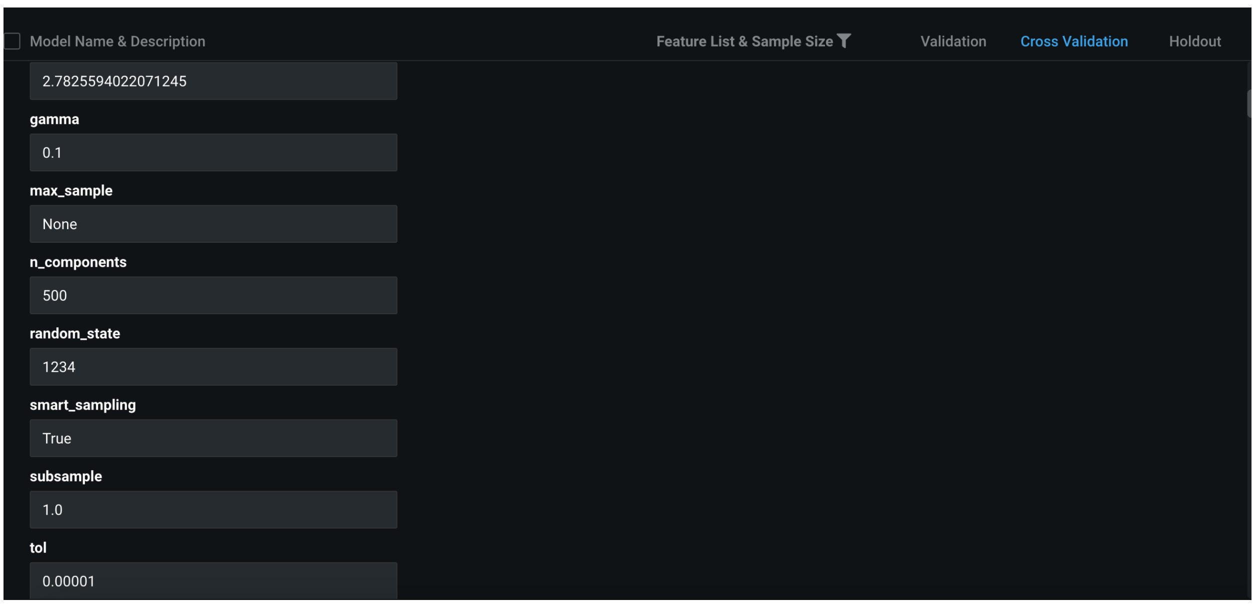
This is one of the functions that I like about the datarobot tool. Although it is easy to calculate the coefficient of the dataset, we can easy to know which feature has the biggest influence on the predicted target.



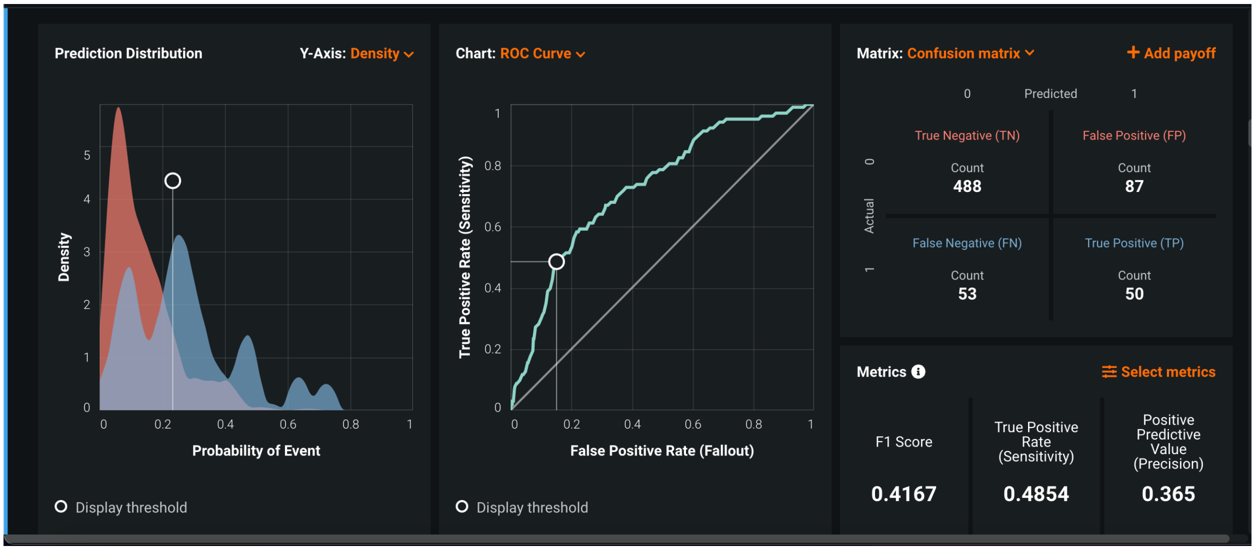
I tried to adjust the data on the tunning page and changed the n_components from 500 to 1000 and change its random_state from 1234 to 23.



Its count of true negative was improved and got a better precision.

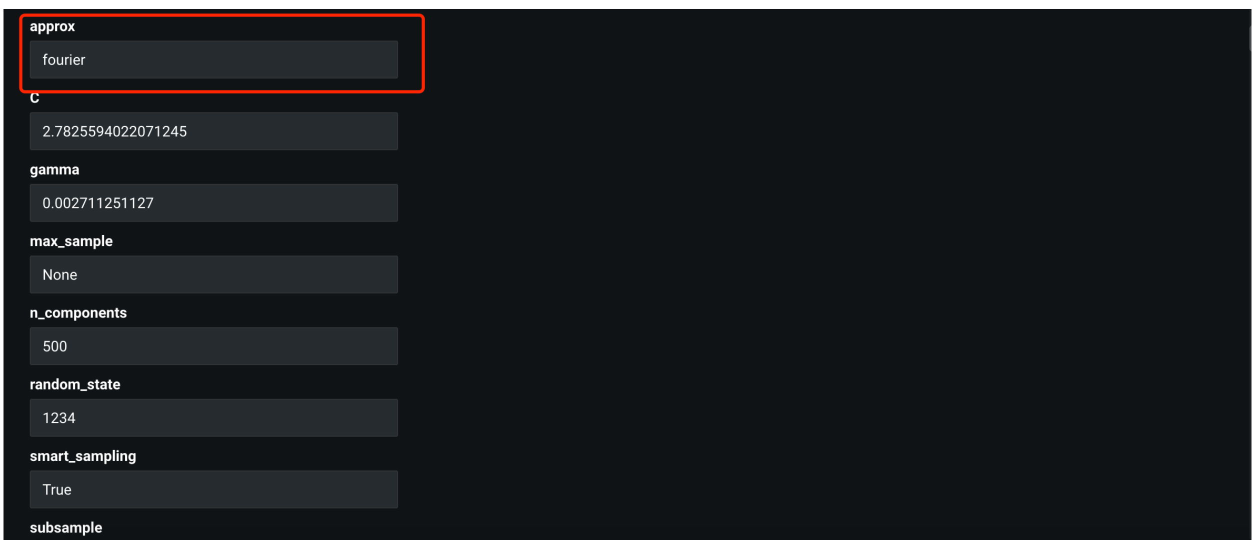


I try to large its gama and reduce its tol.

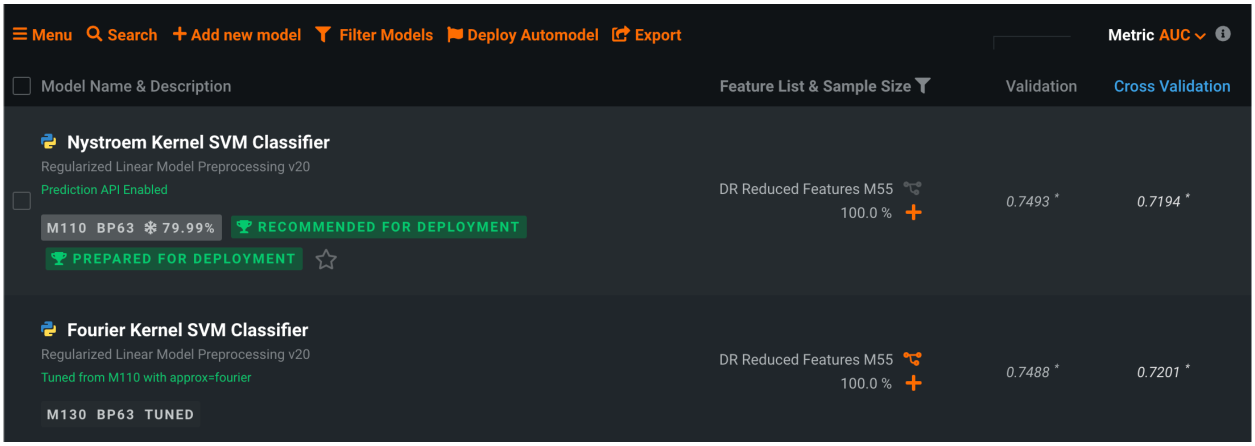


Also, we got a higher count of true negative and higher precision.

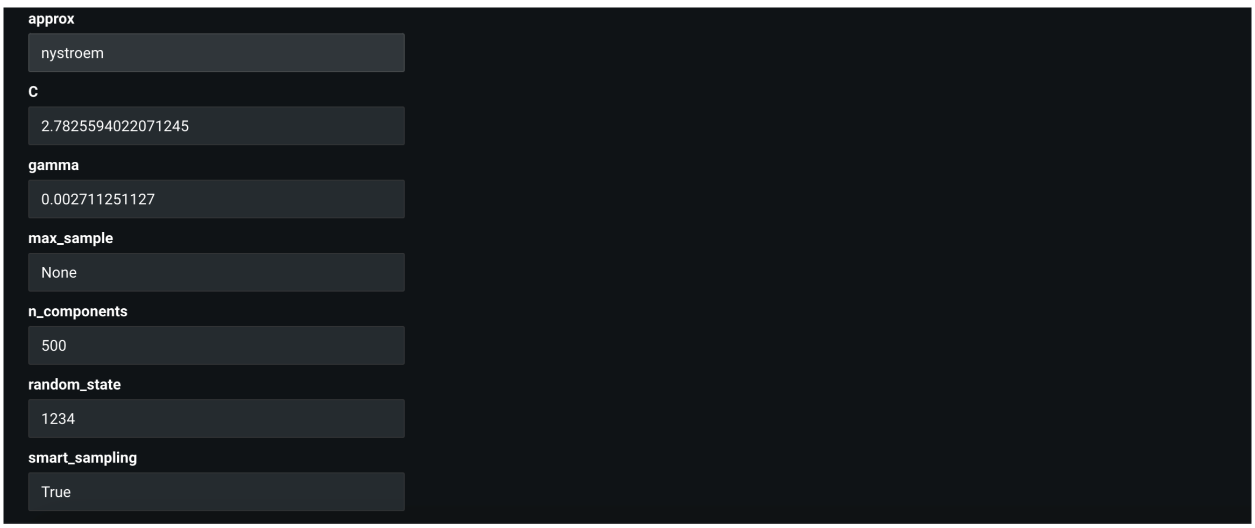
These two try means that we got a lower AUC and didn't get a better model.



I tried again to change its approx from balanced_nystroem to fourier.

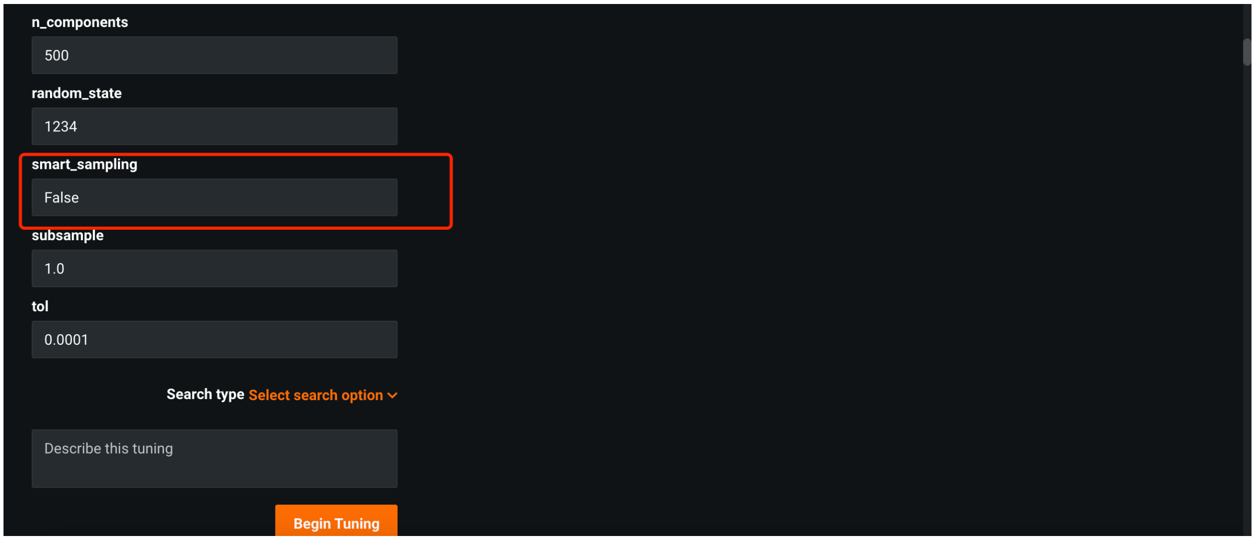


We can see that we improve the AUC in cross-validation.

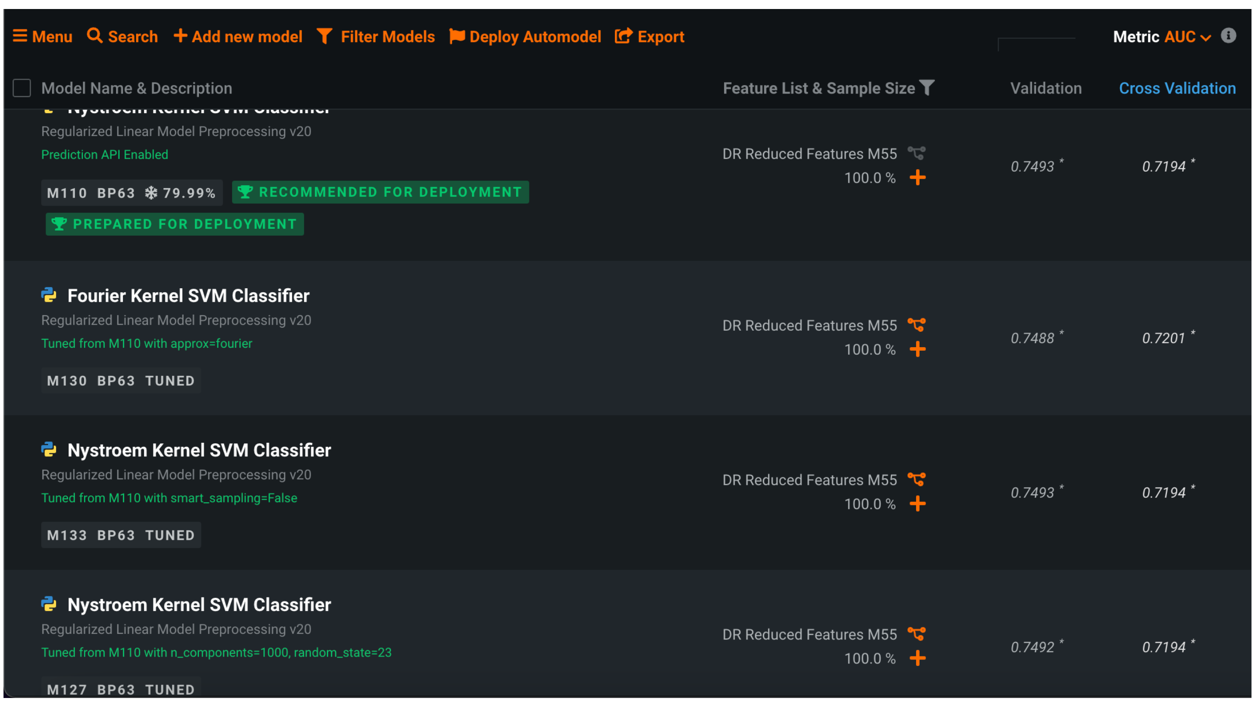


I tried another approx.

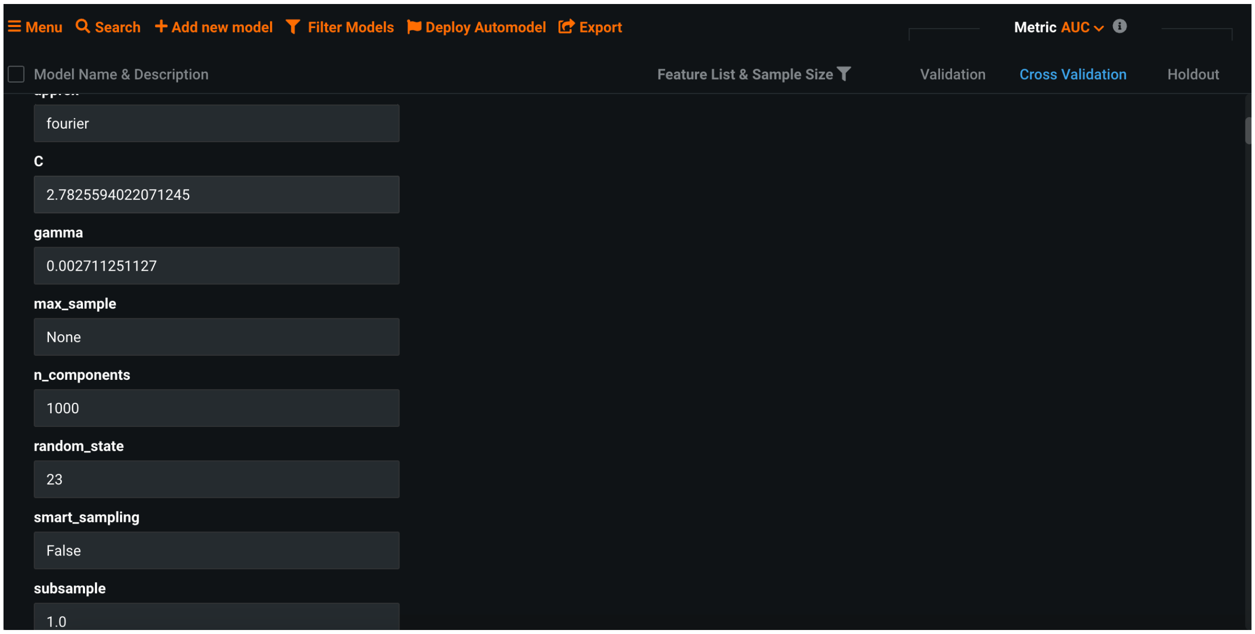
And we got the worst model. I found the sort tool of DataRobot website really can help us to easily test the tunning.



I tried to close the smart sample and see what would happen.



We can see that the close smart sample also didn't let me get a better model. I thought why I don't try to combine these several "good" changes together and see what would happen.



And I got a nearly worst model. It seems like that DataRobot has already helped us to tunning the parameter and help us to choose the best model. Near all of the parameters were tested by DataRobot and it's a lower probability to find a better model than the model choice by DataRobot.

This is really a good website to use to choose a model. Compared with python, this website can auto help us to load many suitable models and train them. If we use python to build a model, we just can test several models which keep in our mind. What's more, DataRobot also help us to do much thing such as plot the ROC, calculate F1, AUC, confusion matrix, heat plot and so on. The most important is that we nearly can't do so much thinking in such a little time. Even when we try to adjust some parameters on the model, we may need to spend lots of time to find the variable in python, but DataRobot can easily help us to quickly change it and retrain the model. Furthermore, in python, we may often forget to split data into training data and test data. DataRobot auto helps us to quickly split them into training data and holdout data. And it also helps us to do cross-validation.I think the convenience and quickness of DataRobot are what I am most concerned about.

By the way, I don't want to put python in the opposite of DataRobot. Maybe we can combine them together and let we develop better. DataRobot is a super well website to choose and build a model, but sometimes python is more flexible. Maybe we can use DataRobot to help us choose the model and use python to do something else. For example, when we design a wholly new model and we want to compare it with another existing model. We can use DataRobot to run the data in the existing model and use python to build our new model then compare them. Both of them are very well tool.