Task 1

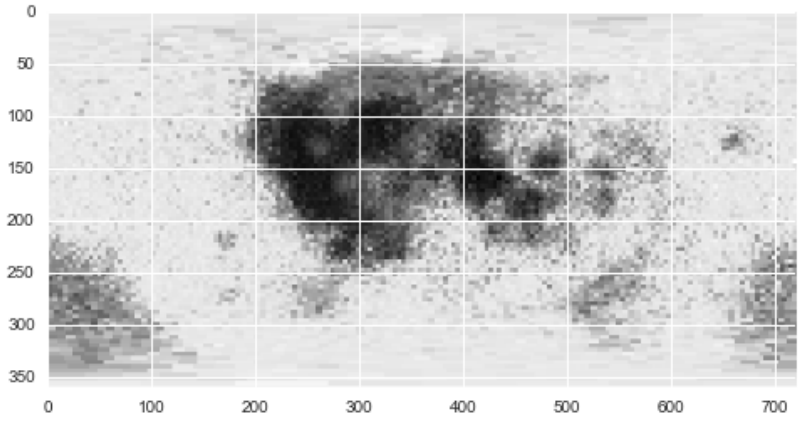
Predictive model for the Lunar albedo based on the chemical composition data from the Lunar Prospector.

Results

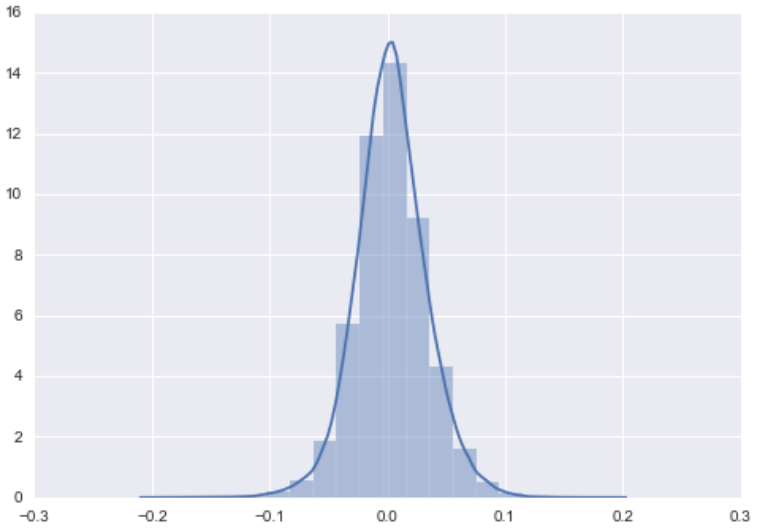
MODEL	MEAN SQUARED ERROR (MSE)
Linear Regression	0.001025152221398643
Support Vector Machine Regression	0.0010564847231500207
Random Forest	0.000986584356014296
XGBOOST	0.0009304179266331601
Neural Network	0.0010610954305026602

- **Best results were obtained using XGBOOST, a decision-tree-based ensemble Machine Learning algorithm that uses a gradient boosting framework.**
- **Neural Networks surprisingly didn't perform as well as expected even after basic hyper parameter tuning , but there may be a scope of improvement.**

IMAGE



Residual



Task 2

Predicting Mercury's elemental composition from Albedo (with MESSENGER Data)

Result

MODEL	MEAN SQUARE ERROR (MSE)
Linear Regressor	0.0493852192423984

KNN	0.0493852192423984
Random Forest	0.0460496631614707
XGBOOST using MultiOutputRegressor	0.04604761323853671
XGBOOST using Chained Multi Output Regression	0.05224619983675919
Neural Network using Tensorflow	0.04938523022003832
Neural Network using MLPRegressor	0.0460977998711275

Best Model – XGBOOST (MSE = 0.04604761323853671)

IMAGE

	Fe	Al	Mg	S	Ca
0	0.541922	0.786952	0.556812	0.462441	0.484005
1	0.566629	0.757382	0.526328	0.475923	0.527736
2	0.561151	0.890483	0.498289	0.452601	0.507011
3	0.566629	0.757382	0.526328	0.475923	0.527736
4	0.541922	0.786952	0.556812	0.462441	0.484005