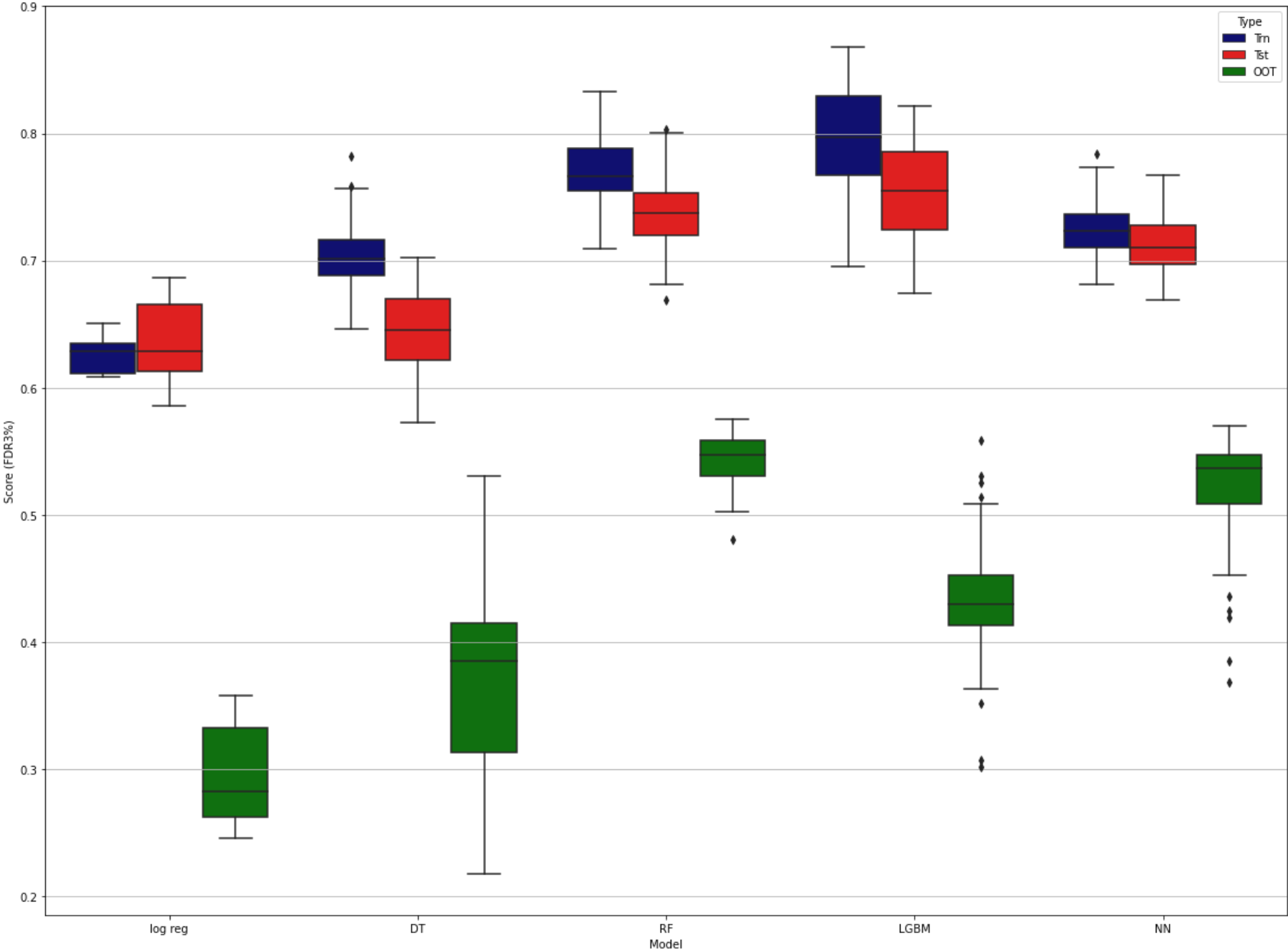


## Credit Card Transaction Models Comparison

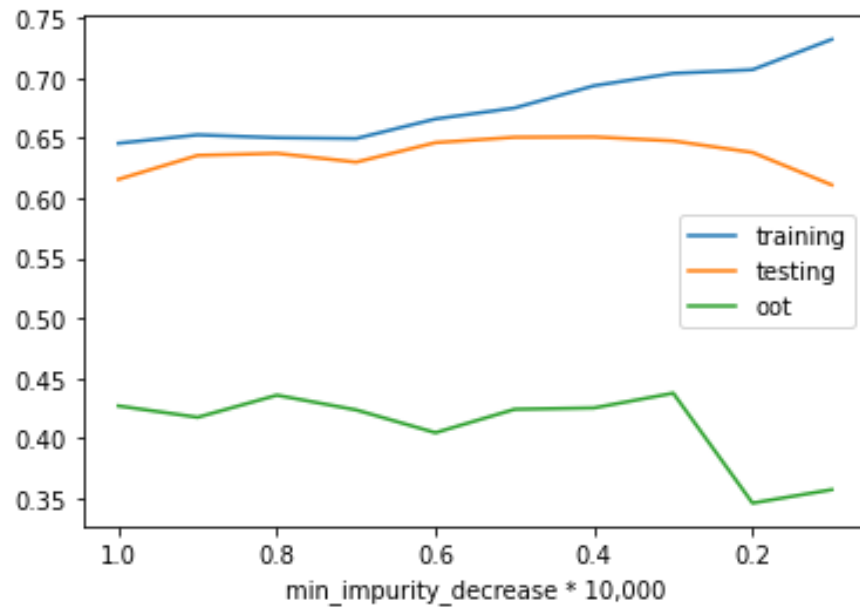
Model		Num of Variables	Parameters				Average FDR at 3%		
Logistic Regression	Iteration	Num of Variables	penalty				Train	Test	OOT
	1	10	N/A				0.626	0.636	0.295
	2	10							
Decision Tree	Iteration	Num of Variables	min_impurity_decrease	min_sample_split	min_samples_leaf		Train	Test	OOT
	1	10	0.00003	30	15		0.700	0.664	0.451
	2	10	0.00003	60	30		0.692	0.688	0.436
	3	10	0.00003	120	60		0.691	0.664	0.456
	4	10	0.00002	30	15		0.711	0.648	0.390
Random Forest	Iteration	Num of Variables	min_impurity_decrease	min_sample_split	min_samples_leaf	n_estimators	Train	Test	OOT
	2	10	0.0001	2	1	20	0.693	0.687	0.522
	3	10	0.00001	60	30	20	0.779	0.760	0.549
	4	10	0.00002	60	30	20	0.753	0.736	0.540
	5	10	0.000005	60	30	20	0.794	0.759	0.530
LightGBM	Iteration	Num of Variables	min_split_gain	max_depth	min_child_samples	num_leaves	Train	Test	OOT
	1	10	1	2	100	20	0.766	0.747	0.511
	2	10	0.01	2	100	20	0.768	0.751	0.541
	3	10	1	5	1000	20	0.803	0.763	0.447
	4	10	1	10	1000	20	0.816	0.784	0.437
Neural Network	Iteration	Num of Variables	hidden_layer_sizes	alpha	learning_rate_init		Train	Test	OOT
	1	10	(10, 10)	0.01	0.01		0.710	0.710	0.528
	2	10	(15, 15)	0.01	0.01		0.720	0.702	0.553
	3	10	(20, 20)	0.01	0.01		0.748	0.724	0.501
	4	10	(25, 25)	0.01	0.01		0.755	0.734	0.479
	5	10	(30, 30)	0.01	0.01		0.764	0.733	0.478



**DecisionTreeClassifier**

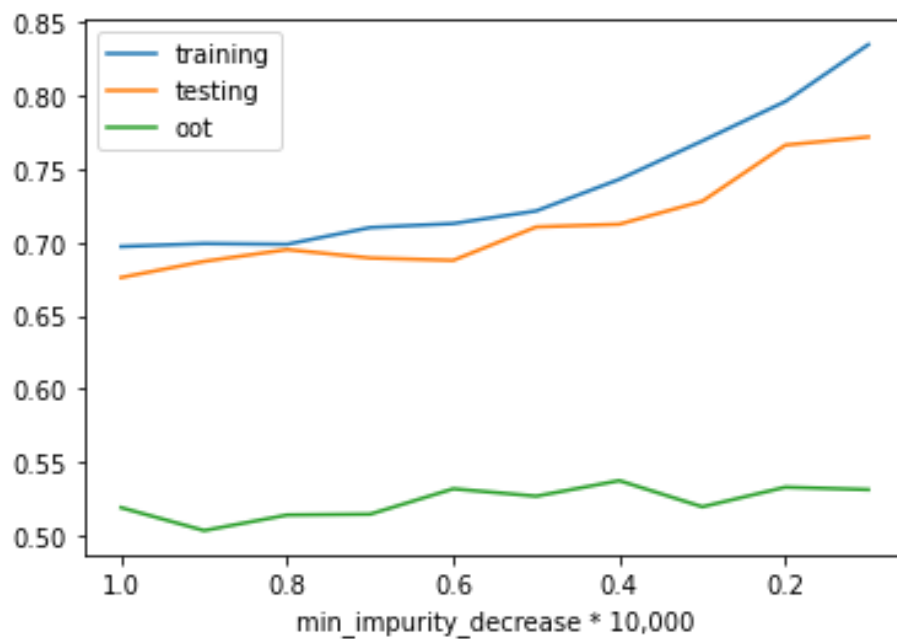
Complexity: min\_impurity\_decrease from 0.0001 to 0.00001

Hyperparameters: max\_depth=None, min\_samples\_split=2, min\_samples\_leaf=1

**RandomForestClassifier**

Complexity: min\_impurity\_decrease from 0.0001 to 0.00001

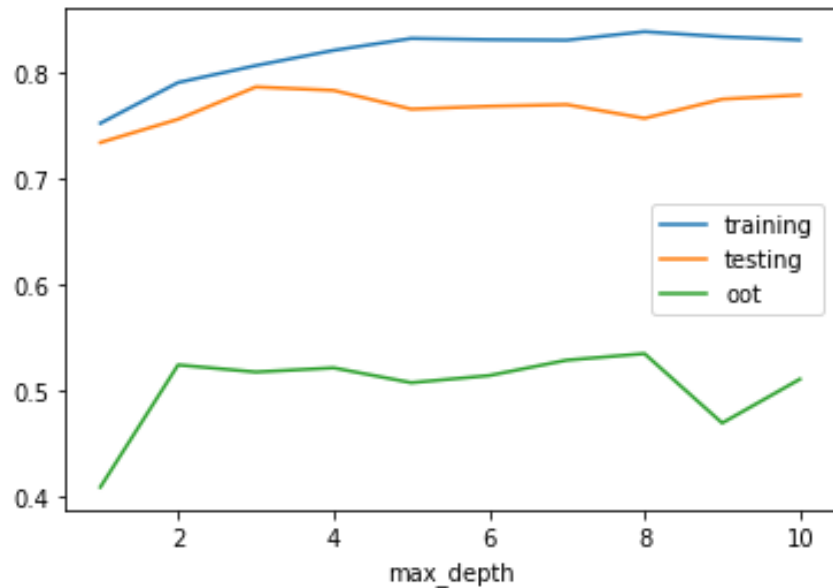
Hyperparameters: max\_depth=None, min\_samples\_split=2, min\_samples\_leaf=1



**LGBMClassifier**

Complexity: max\_depth from 1 to 10

Hyperparameters: min\_split\_gain = 1, min\_child\_samples = 100, n\_estimators = 1000, num\_leaves = 10

**Neural Network**

Complexity: layer\_sizes from (5, 5) to (40, 40)

Hyperparameters: alpha=0.0001, learning\_rate\_init=0.001, learning\_rate='constant'

