Project 3:

Dogs, Chicken or Muffins?

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Feature Detectors

- SIFT
- GIST
- HOG
- LBP

Classify Algorithms

- GBM (Baseline Model)
- Non-linear SVM
- Random Forest
- XGBoost
- Logistic regression

GBM + SIFT

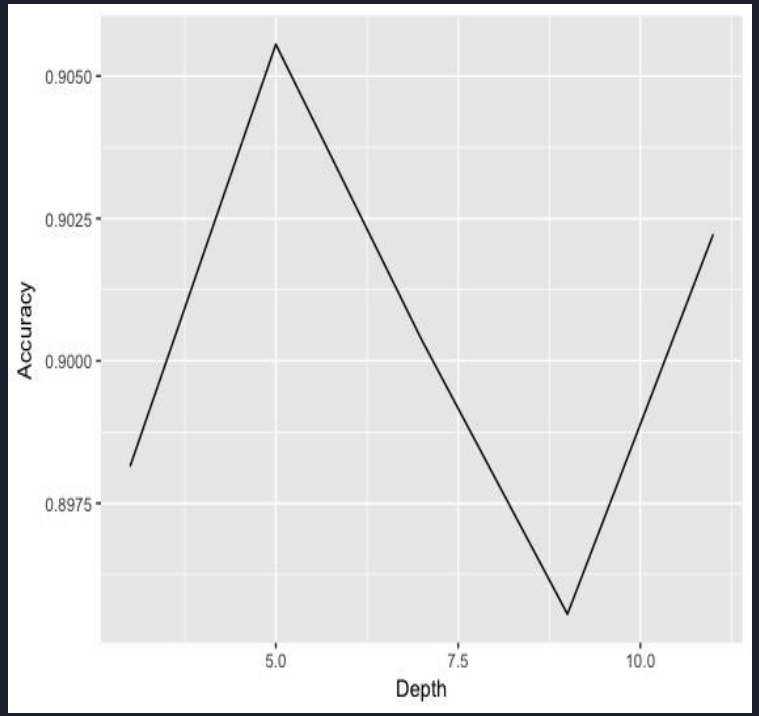
Parameter :

Depth of trees

Best Model:

Number of trees 100
Shrinkage (Lambda) 0.01
Depth of trees 5

Test Error	Time
28%	153s

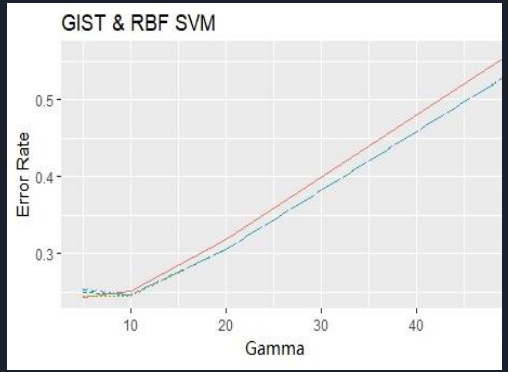


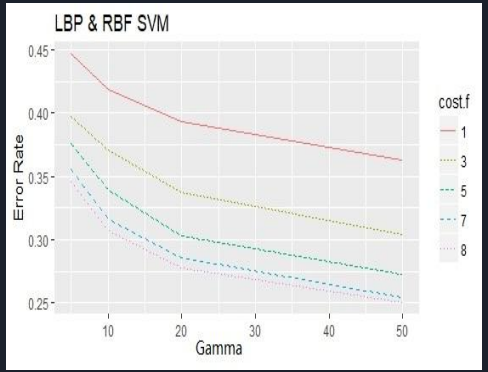
SVM

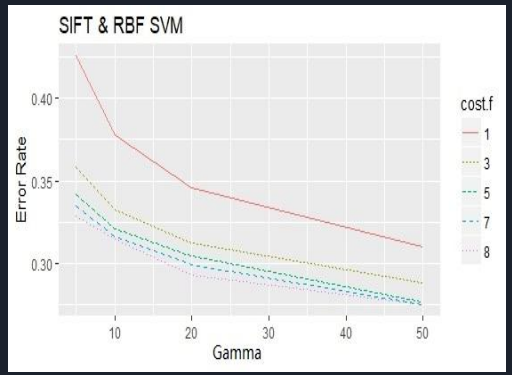
Parameters:

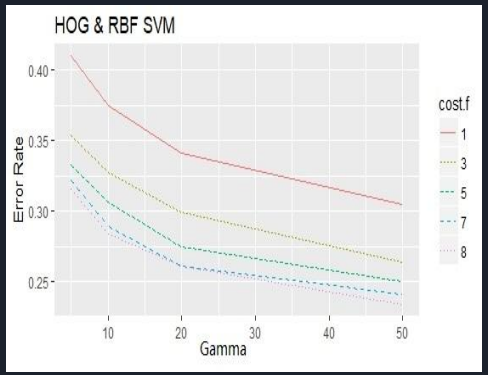
Cost & Gamma

Feature	(Cost, Gamma)	Error	Time
GIST	(1, 5)	24%	16.5s
LBP	(8, 50)	25%	1.86s
SIFT	(7, 50)	23%	45.2s
HOG	(8, 50)	27%	2.96s





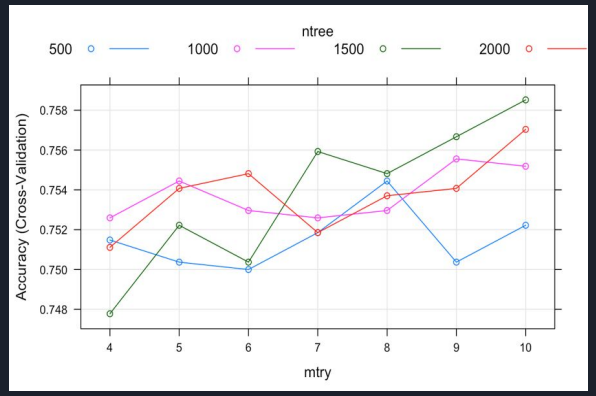




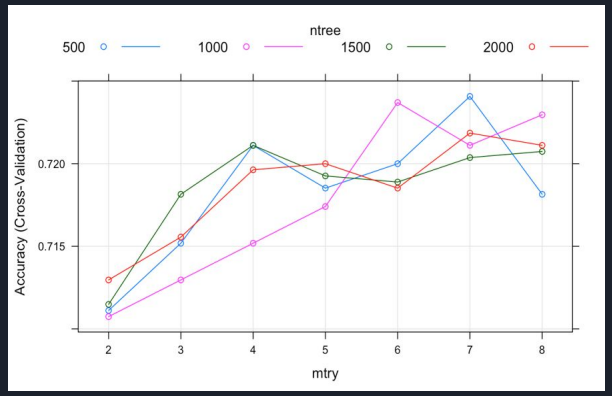
Random Forest

Parameters:

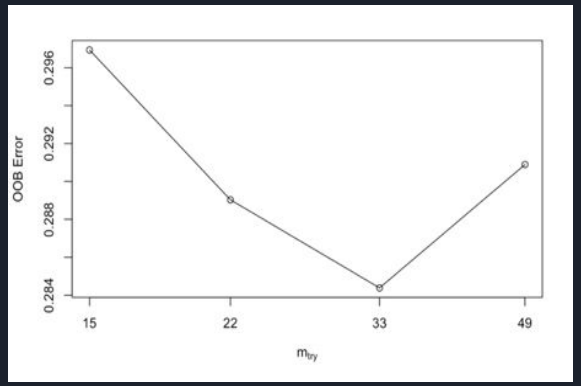
Ntree & mtry



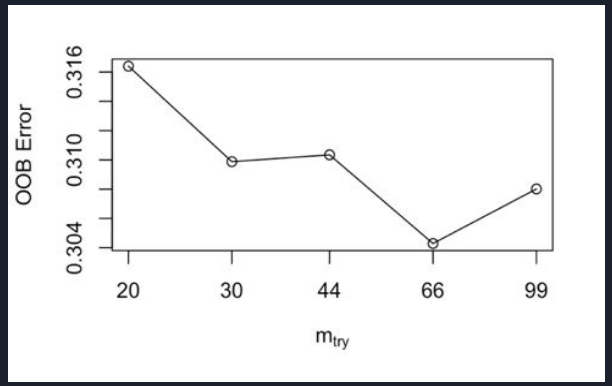
HOG



LBP



GIST



SIFT

Random Forest

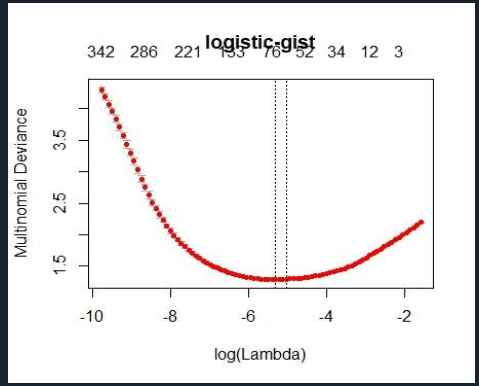
		Customized RF		tuneRF()	
		HOG	LBP	GIST	SIFT
ntree		1500	500	600	
mtry		10	7	33	66
Training time	user	28.987	5.424	107.004	618.718
	system	1.092	0.138	0.447	1.686
	elapsed	32.963	6.447	107.940	622.495
Test Error		0.2533	0.2867	0.28	0.2633

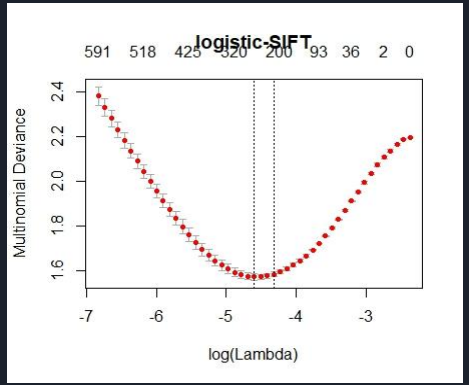
Logistic Regression

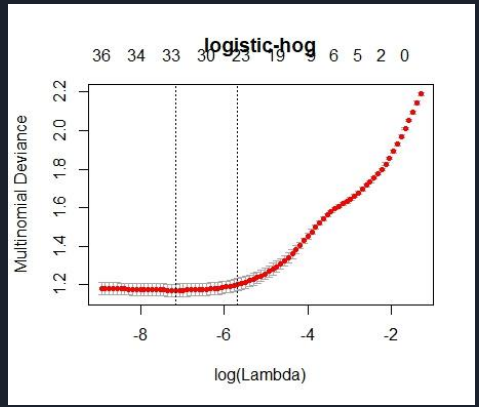
Parameter:

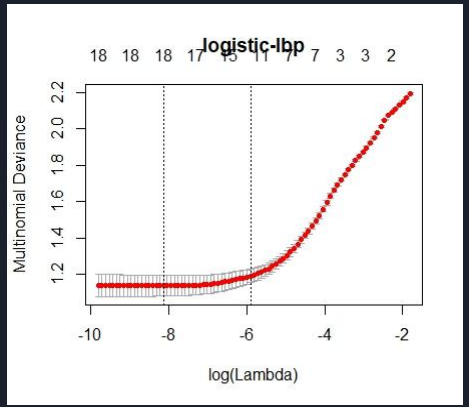
Lambda

Feature	Lambda	Error	Time
Gist	0.0065	29%	7.04s
SIFT	0.0155	34%	2.92s
HOG	0.0034	21%	0.88s
LBP	0.0019	24%	1.29s









CNN

Number of Convolutional Layers: 3

Number of Fully Connected Layers: 2

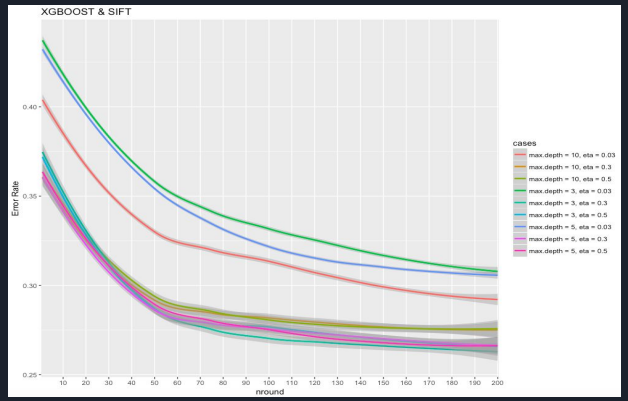
Time to Train the Neural Net: More than 4 hours.

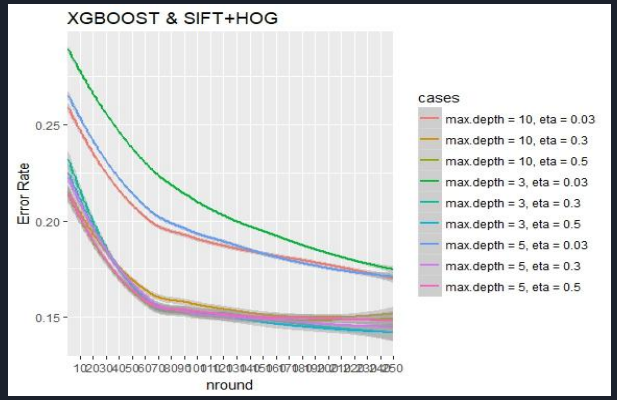
Test error: around 30%

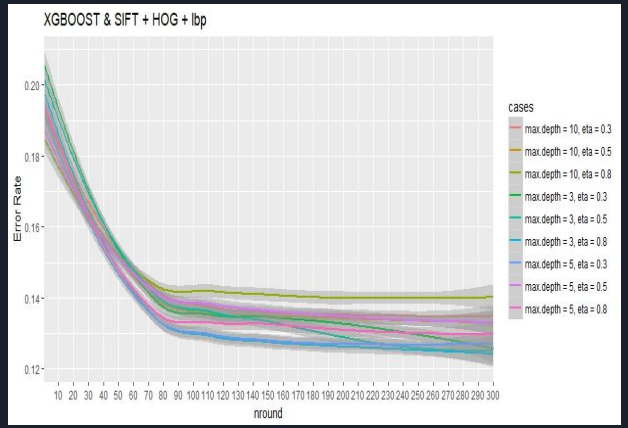
XGBOOST

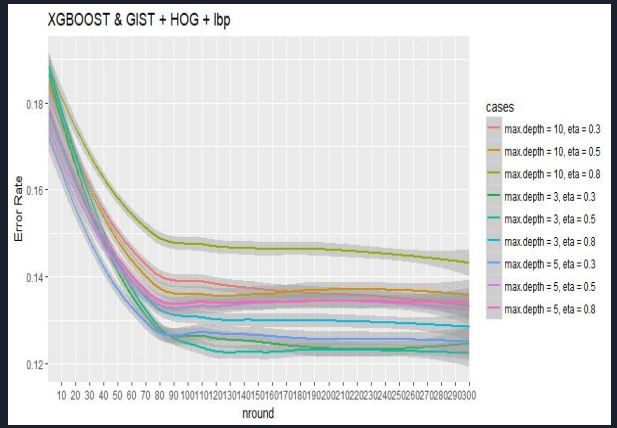
Parameter:

- Max depth of trees
- Eta (Shrinkage)
- Number of rounds









XGBOOST

Feature	(Depth, eta, nround)	Error	Time
SIFT	(3, 0.3, 200)	22.33%	43.72s
SIFT + HOG	(3, 0.5, 200)	14.67%	43.72s
SIFT + HOG + LBP	(4, 0.5, 200)	8%	43.35s
GIST + HOG + LBP	(4, 0.5, 200)	13.67%	40.08s

SIFT + HOG + LBP with XGBOOST

nrounds	Error	Time
80	9.33%	17.84s
150	8.33%	33.21s
200	8%	43.35s

Final Model

Feature : SIFT + HOG + LBP

Classify Algorithm : XGBoost

With parameters:

Max depth of trees: 4

Shrinkage: 0.5

Number of round: 80