

ADS Project 3 Group 3

Predictive Modeling –

Fried Chickens vs. Labradoodles vs. Blueberry Muffins



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INTRODUCTION

Goal:

Classify images of Fried Chickens vs. Labrodoodles vs. Blueberry Muffins considering accuracy, time and memory cost

Baseline:

Gradient Boosting Model with SIFT feature

What we do next:

Try new models (XGBoost, Random Forest, SVM,
Logistic Regression, Neural Network)

Try new features (HOG, LBP, Gray scale)

Proposed model:

Model: XGBoost

Feature: SIFT + HOG + LBP + Gray

OUTLINE

Models

Feature Extraction

Analysis

Compare baseline vs proposed model

MODELS

Candidate models:

GBM, XGBoost, Random Forest, SVM, Logistic Regression, Neural Network

We used cross validation to tune the parameters of each model.

GBM:

n.trees(number of trees), shrinkage(learning rate)

XGBoost:

max.depth(maximum depth of a tree), num_round(The number of rounds for boosting)

Random Forest:

n.trees(number of trees)

MODELS

GBM

Choose:

Number of trees: 250

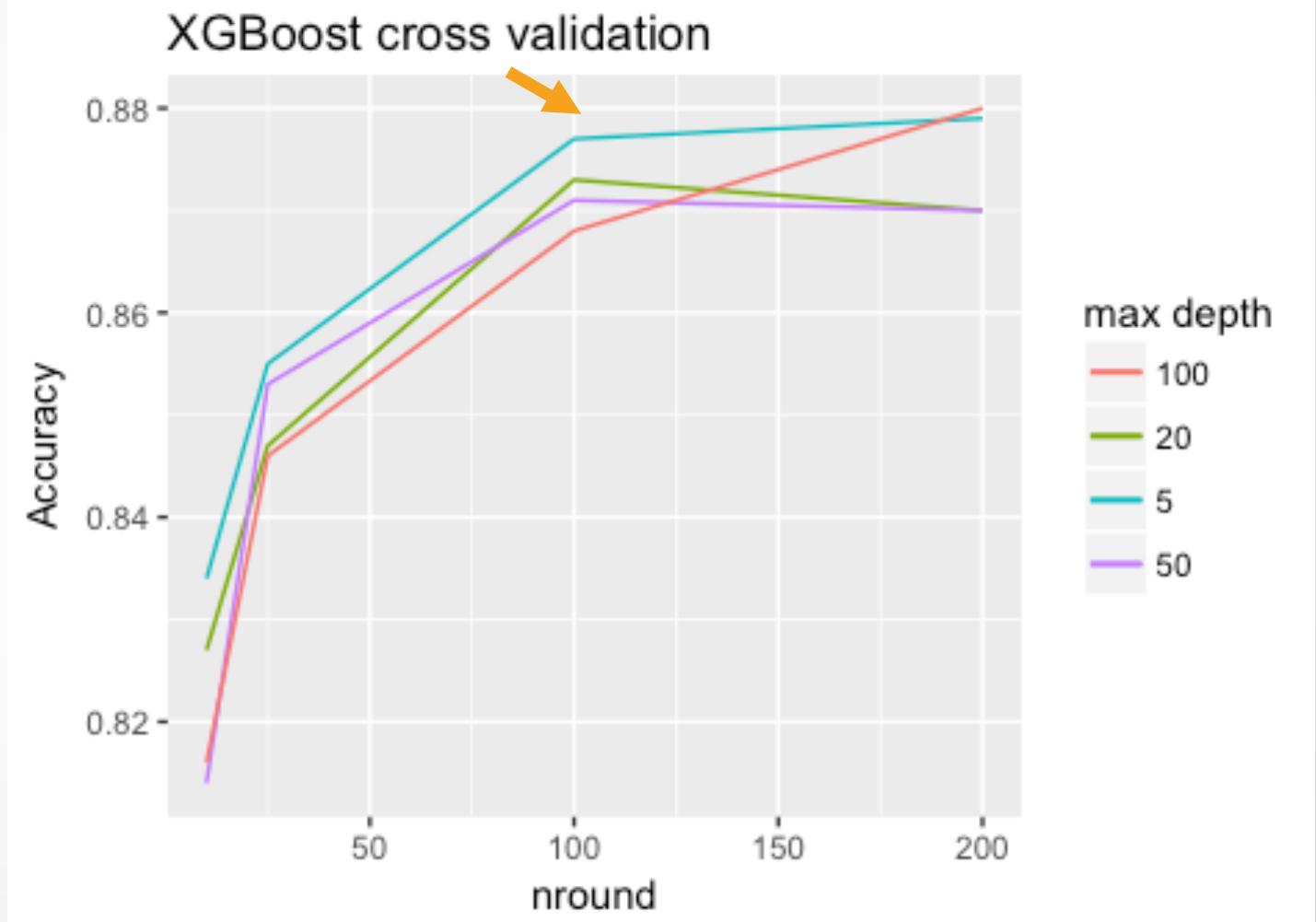
Shrinkage: 0.1



MODELS

XGBoost

Choose:
Max depth = 5
Nround = 100



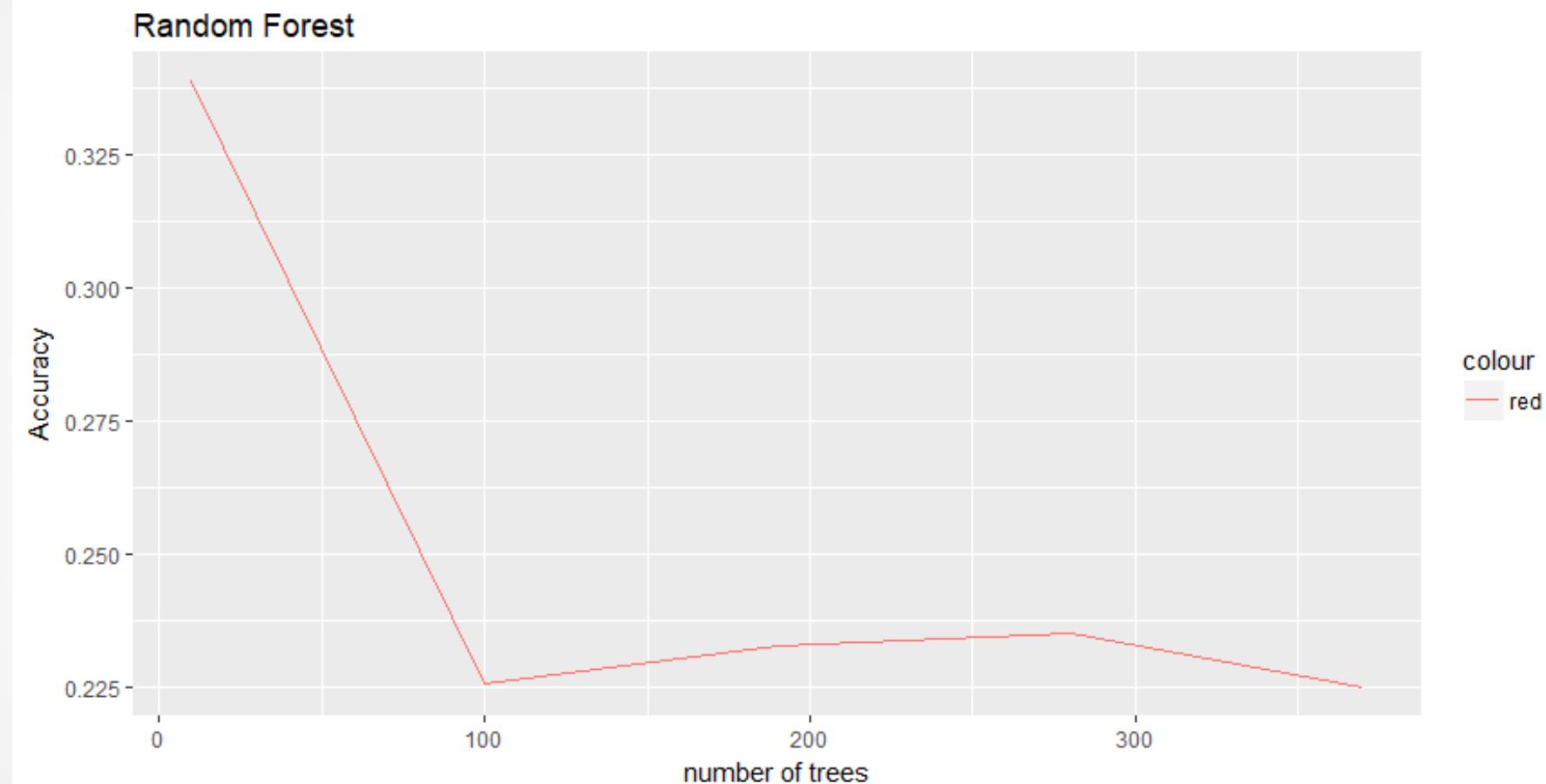
MODELS

Random Forest

Choose:

Number of trees:

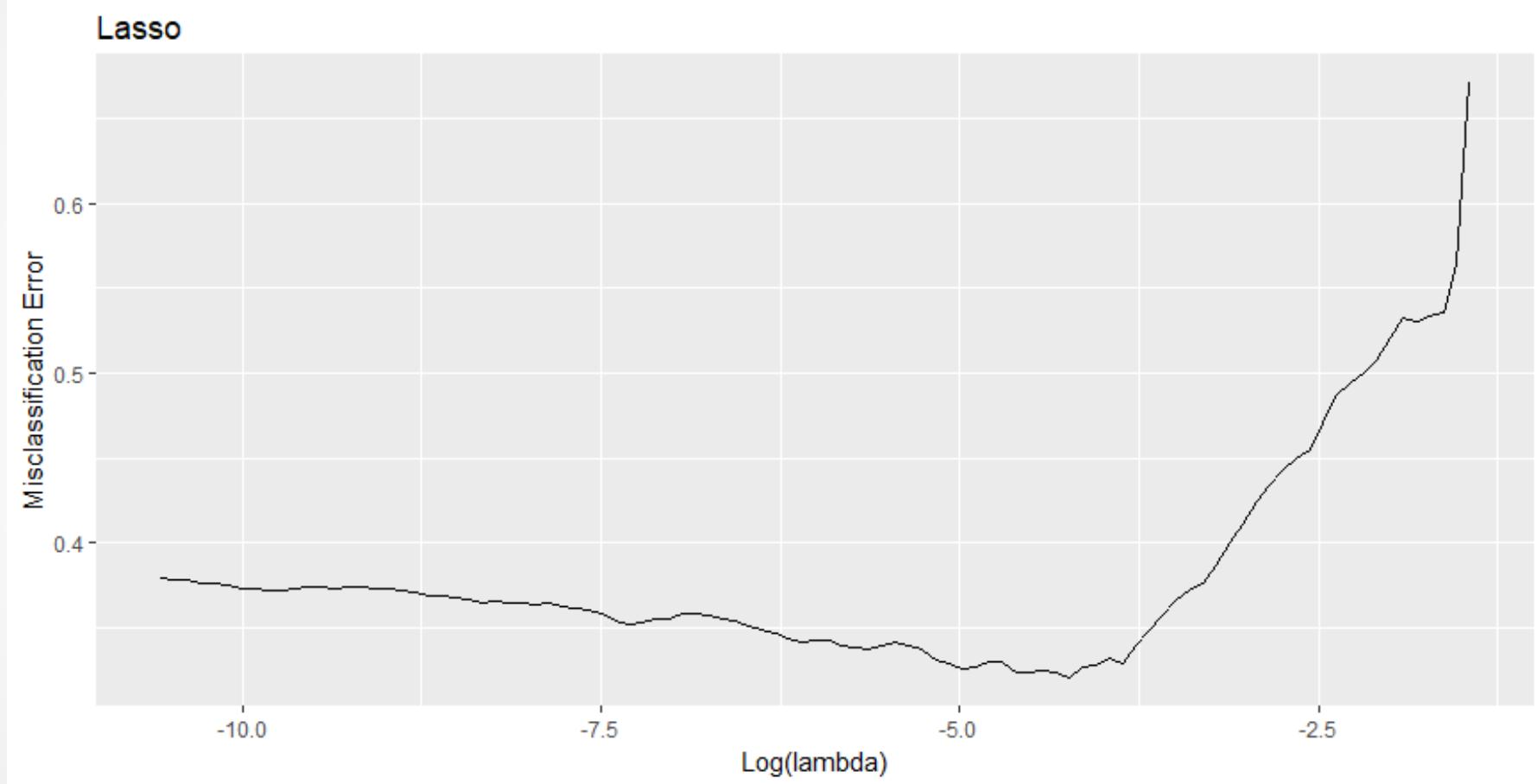
100



MODELS

Logistic with Lasso

Choose:
 $\text{Log}(\lambda) = -5$



FEATURES

Total 5763- dim feature:

1. 5000-dim SIFT feature provided
2. Extract 448-dim HOG(Histogram of Oriented Gradient) feature from raw images
3. Extract 59-dim LBP(Local Binary Patterns) feature from raw images
4. Transform images to black and white and extract 256-dim gray scale feature

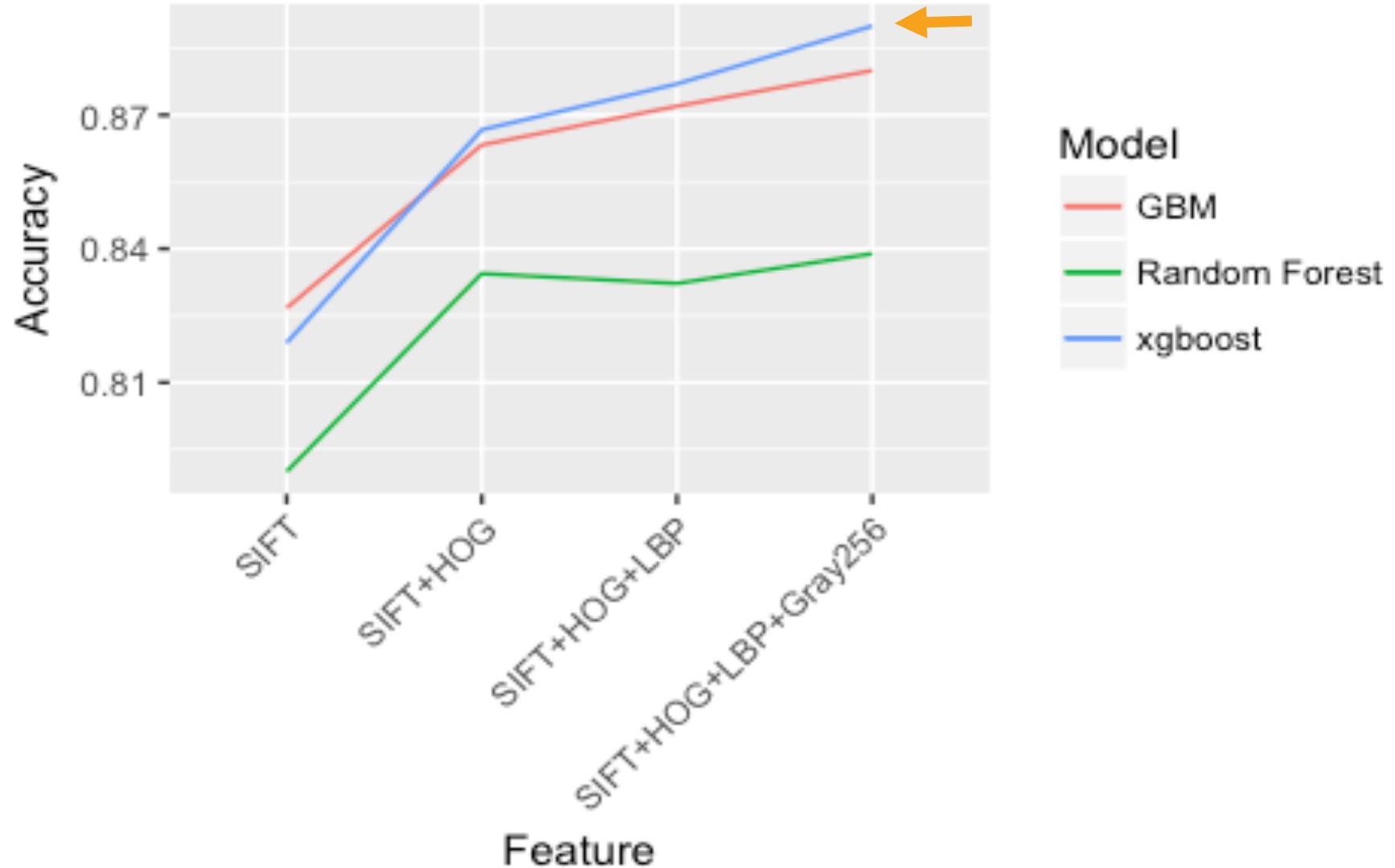
ANALYSIS

Predicting accuracy of different models with different features

	SIFT	SIFT+HOG	SIFT+HOG+LBP	SIFT+LBP+HOG +Gray256
GBM	0.800	0.863	0.872	0.880
xgboost	0.819	0.867	0.877	0.890
Random Forest	0.790	0.834	0.832	0.839
Logistic	0.694	0.813	0.844	
Logistic with Lasso	0.702	0.826	0.836	
Neural Network	0.610	0.700		

ANALYSIS

Different Model with different feature



COMPARISON

Proposed model:

Model: XGBoost

Feature: SIFT + HOG + LBP + Gray

	predicting accuracy	training time	predicting time	Size
baseline model (GBM+SIFT)	0.8	152.279	7.629	79MB
proposed model	0.89	193.722	0.392	184KB