

# 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

## 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

Result

# MODELS

Five candidate models:

GBM, XGBoost, Random Forest, 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

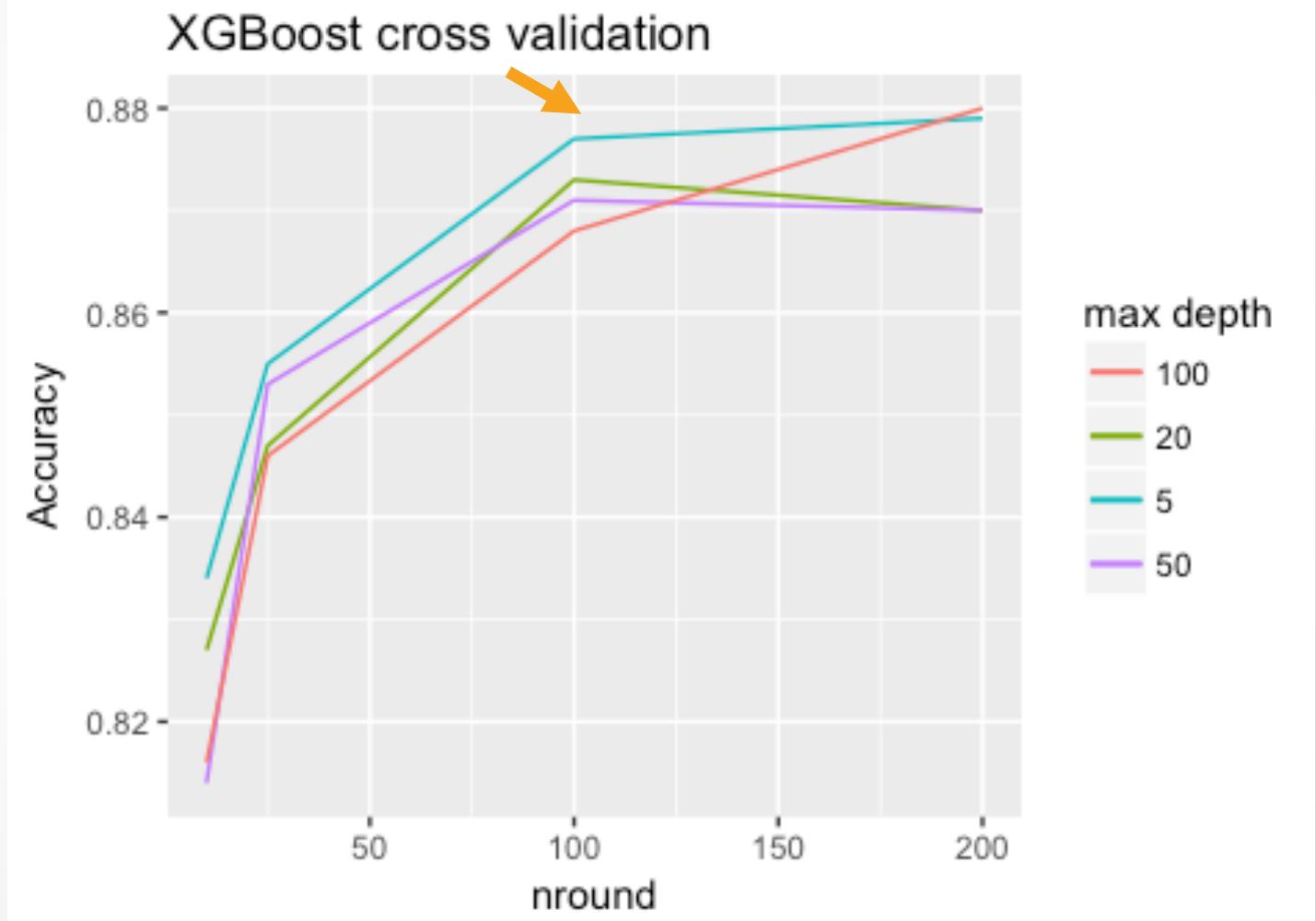
Shrinkage: 0.1



# MODELS

## XGBoost

Choose:  
Max depth = 5  
Nround = 100



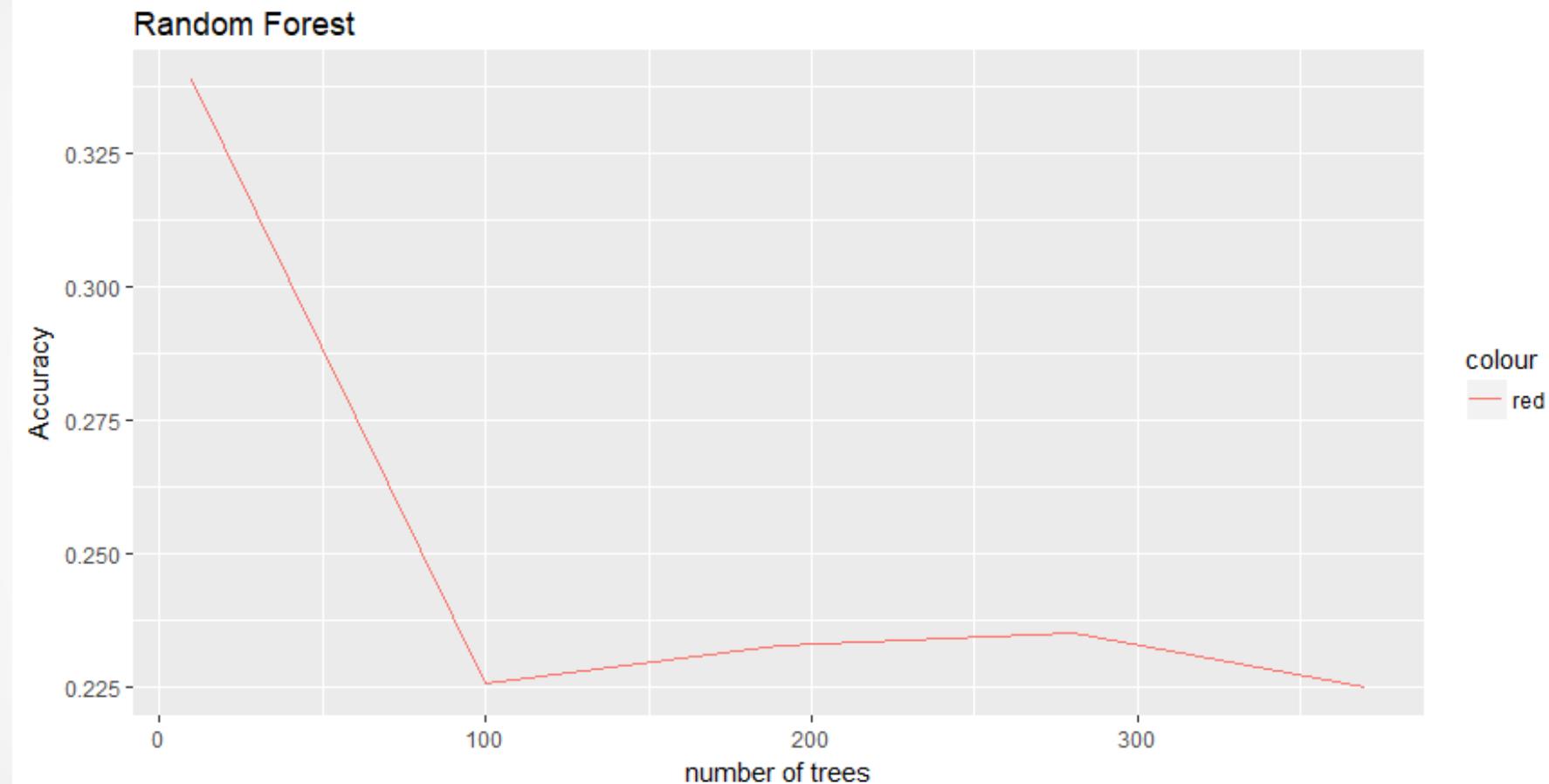
# MODELS

## Random Forest

Choose:

Number of trees:

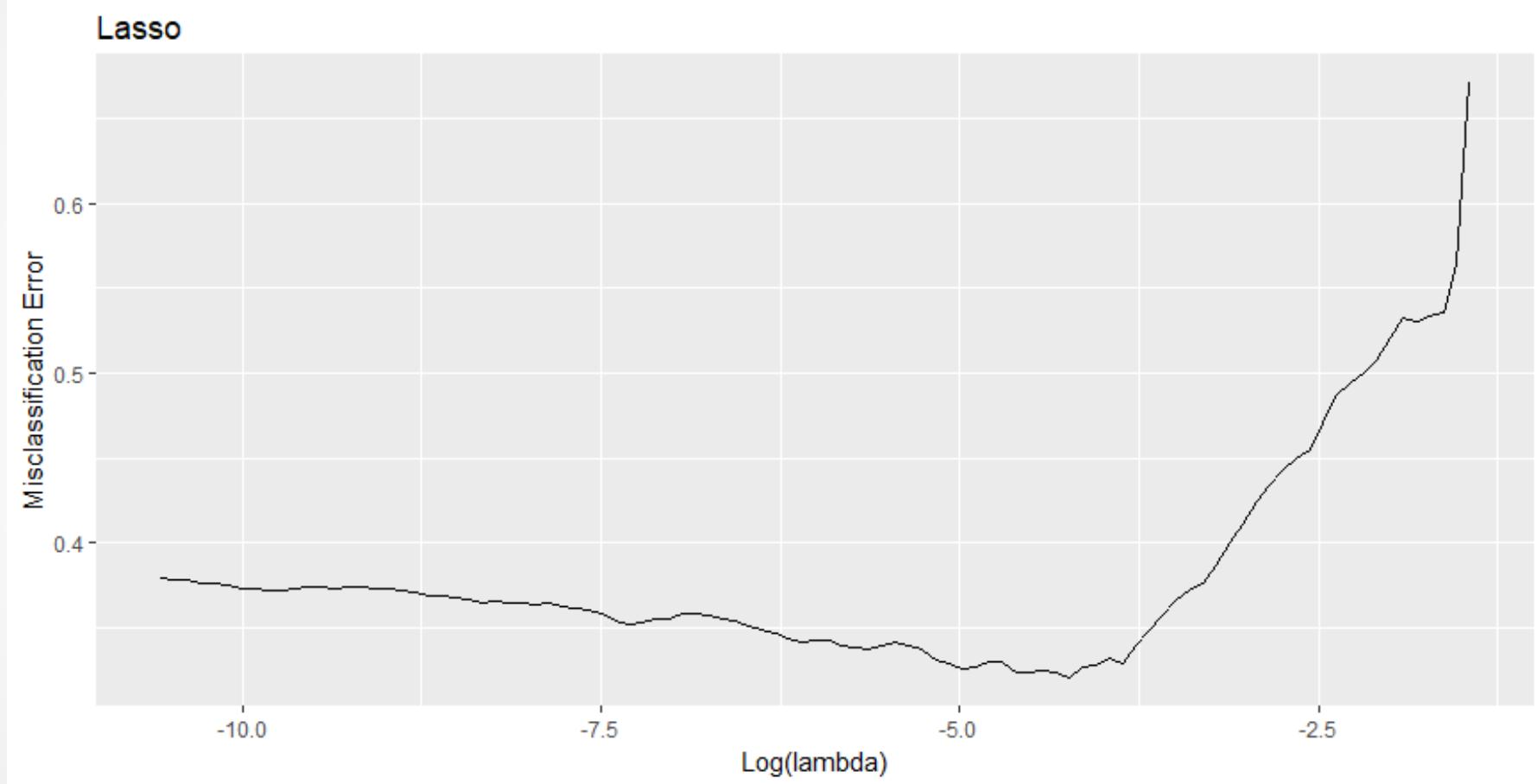
100



# 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

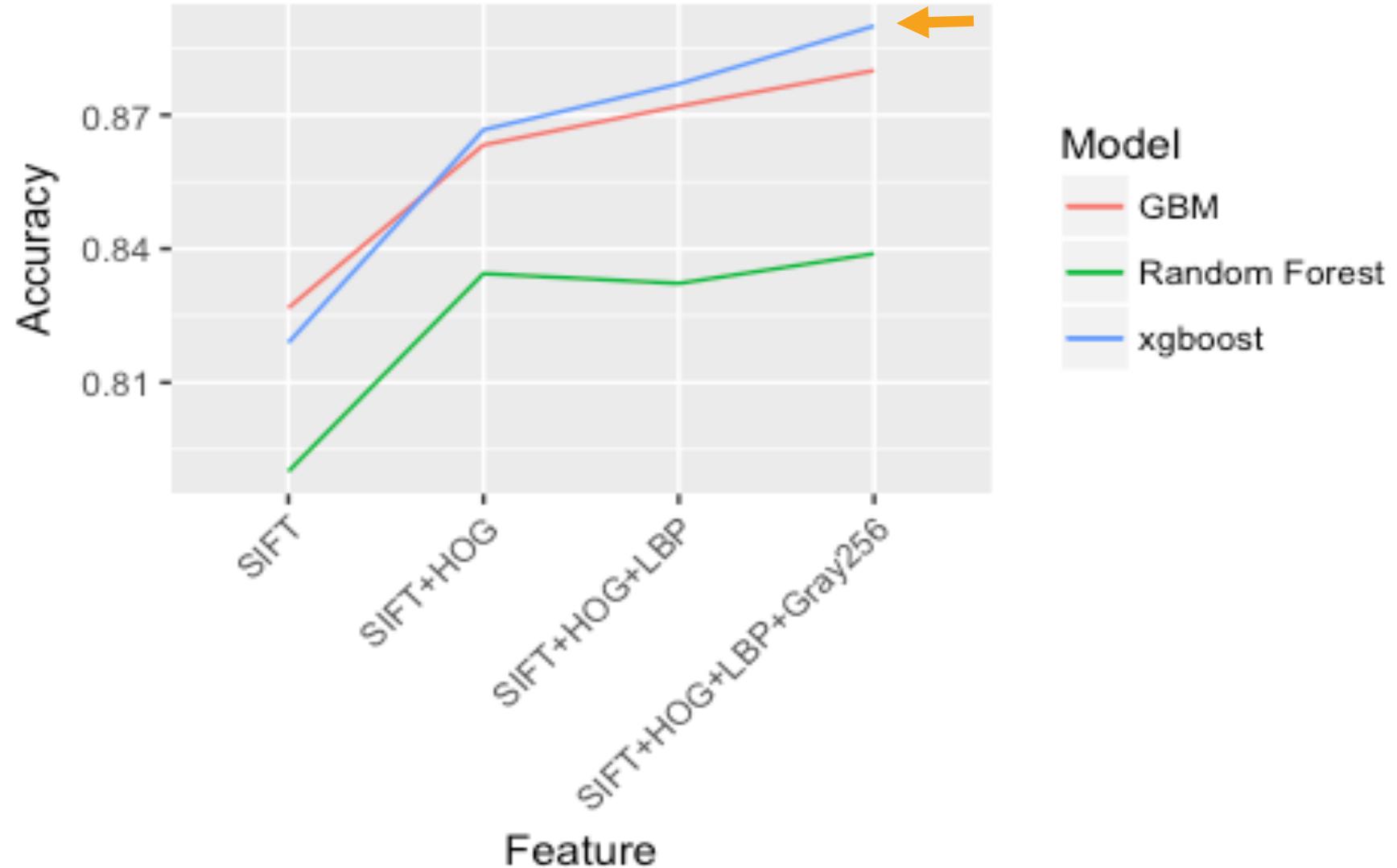
# ANALYSIS

Predicting accuracy of different models and 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	<b>0.890</b>
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



# RESULT

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 (XGBoost + new feature)	0.89	193.722	0.392	184KB