
How to Win ?

**Explore the impact of
behaviors in the game on
winning or losing**

112024502 黃品瑜

112024505 林峻瑋

112024509 吳振瑋

112024517 王品善

112024521 潘易承





Motivation

Why do we want to explore victory or defeat in League of Legends?

purpose

1. How to predict the outcome of a game within ten minutes of data (determining the best model).
2. How to quickly determine the outcome of a game (determining the most important variable).



Introduction of data

This dataset contains the first 10 minutes which come from the game "League of Legends (LoL)". Stats of approximately 10k ranked games from a high ELO (DIAMOND I to MASTER). There are 19 features per team (38 in total) collected after 10min in-game.

This includes kills, deaths, gold, experience, level, etc. The column blueWins is the value we are trying to predict. A value of 1 means the blue team has won. We want to predict which features are more correlated with winning.



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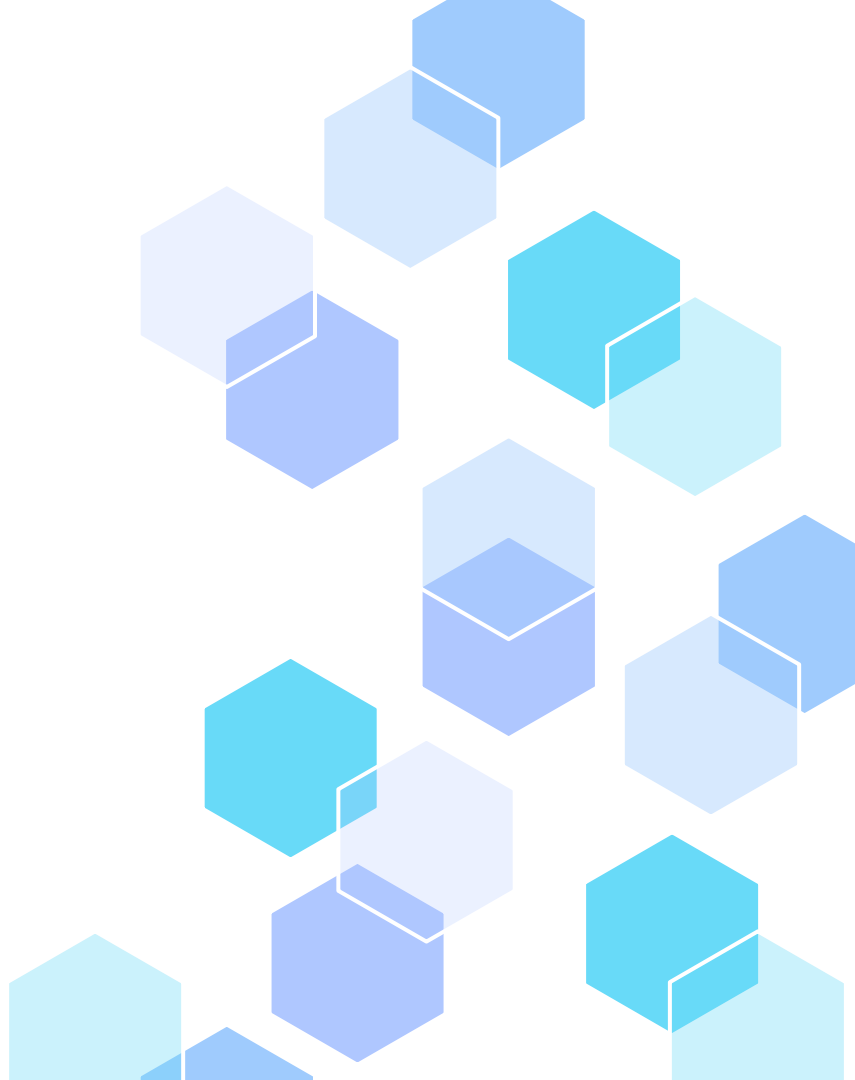
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01

Exploratory Data Analysis



Introduction of Variable

gameId (遊戲場次編號)

blueWins (藍方獲勝)

blue/redWardsPlaced (藍/紅方插眼數)

blue/redWardsDestroyed (藍/紅方拆眼數)

blue/redFirstBlood (藍/紅方首殺)

blue/redKills (藍/紅方擊殺數)

blue/redDeaths (藍/紅方死亡數)

blue/redAssists (藍/紅方助攻數)

blue/redEliteMonsters

(藍/紅方擊殺小龍和諭示者數)

blue/redDargons (藍/紅方擊殺小龍數)

blue/redHeralds (藍/紅方擊殺諭示者數)

blue/redTowerDestroyed (藍/紅方防禦塔破壞數)

blue/redTotalGold (藍/紅方總經濟)

blue/redAveLevel (藍/紅方平均等級)

blue/redTotalExperience (藍/紅方總經驗)

blue/redTotalMinionsKilled (藍/紅方總小兵擊殺數)

blue/redTotalJungleMinionsKilled (藍/紅方總野怪擊殺數)

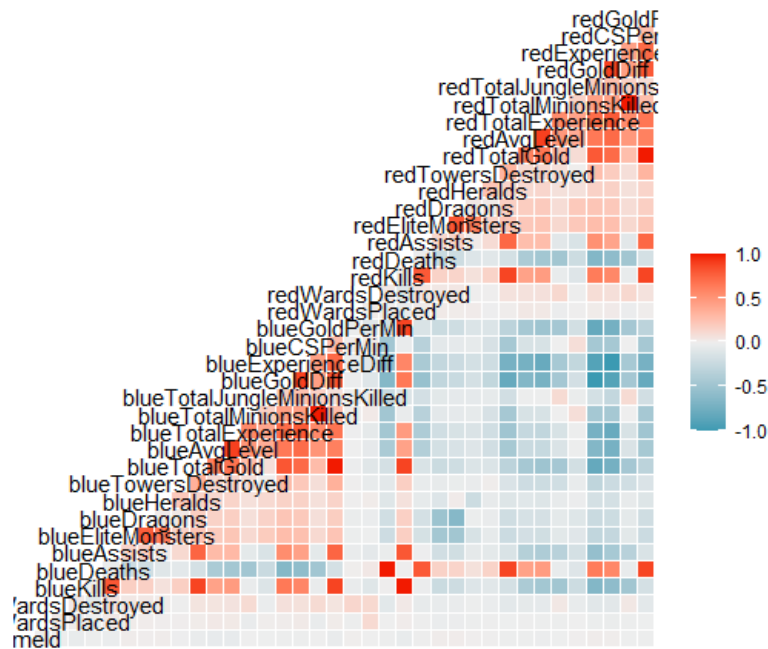
blue/redGoldDiff (藍/紅方經濟差)

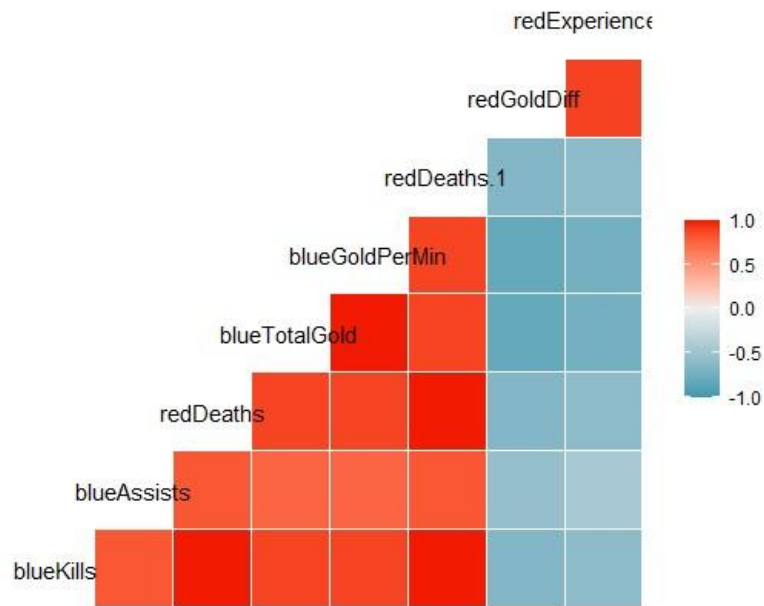
blue/redExperienceDiff (藍/紅方經驗差)

blue/redCSPerMin (藍/紅方每分鐘平均小兵擊殺數)

blue/redGoldPerMin (藍/紅方每分鐘平均經濟)

Exploratory Data Analysis

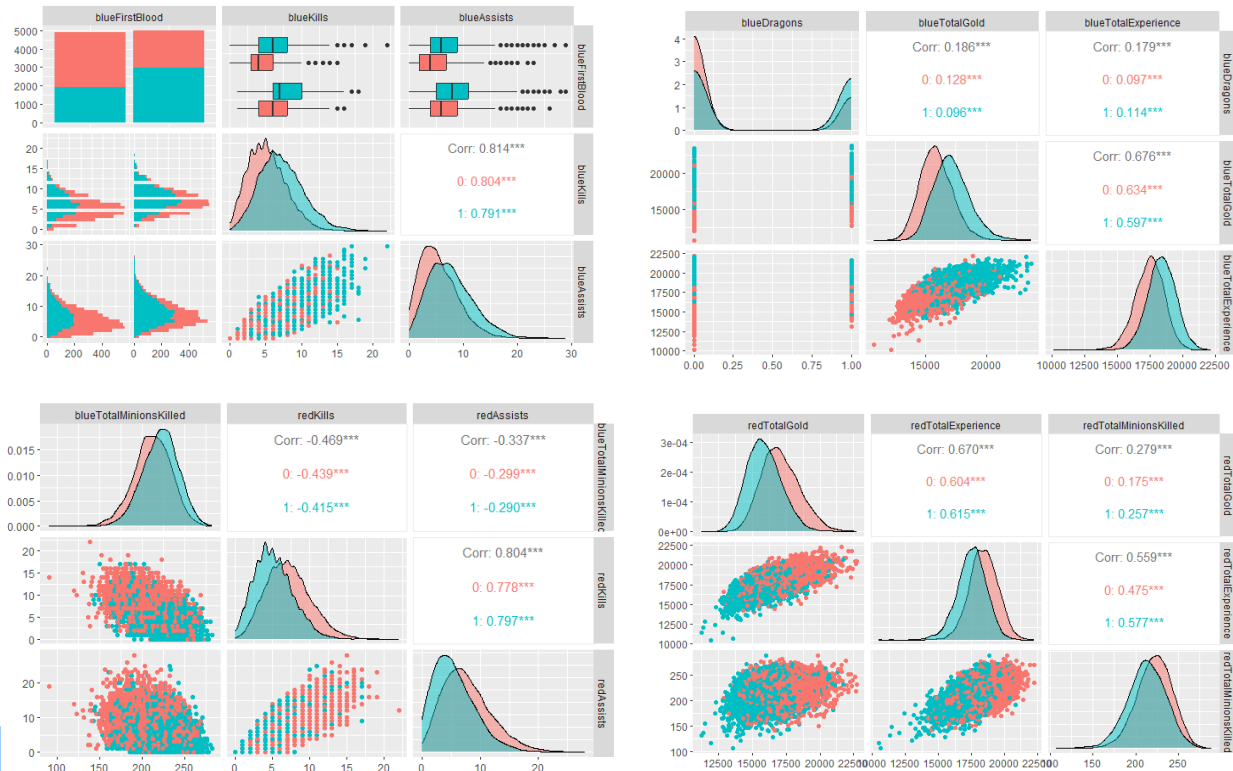




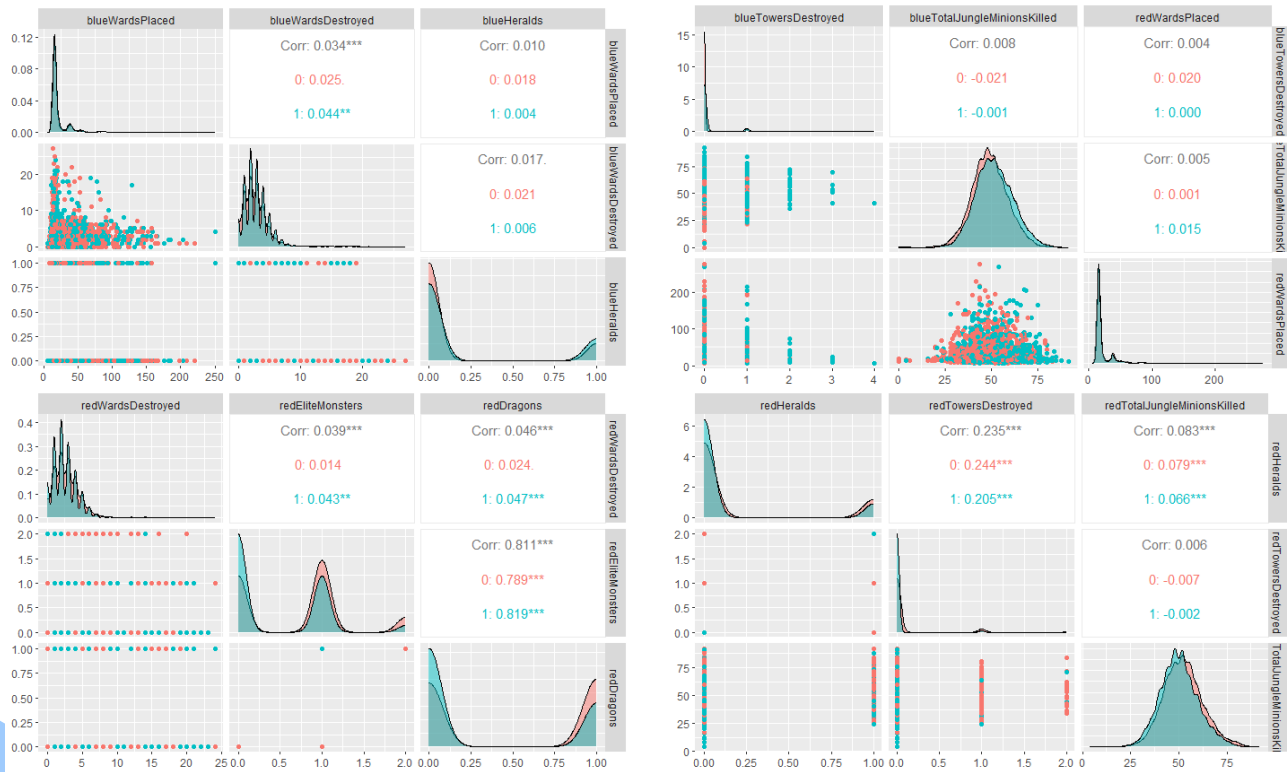
Variable Selection

blueKills	redKills
blueAssists	redAssists
blueDragon	redTotalGold
blueTotalGold	redTotalExperience
blueTotalExperience	redTotalMinionsKilled
blueTotalMinionsKilled	blueFirstBlood

Exploratory Data Analysis



Exploratory Data Analysis

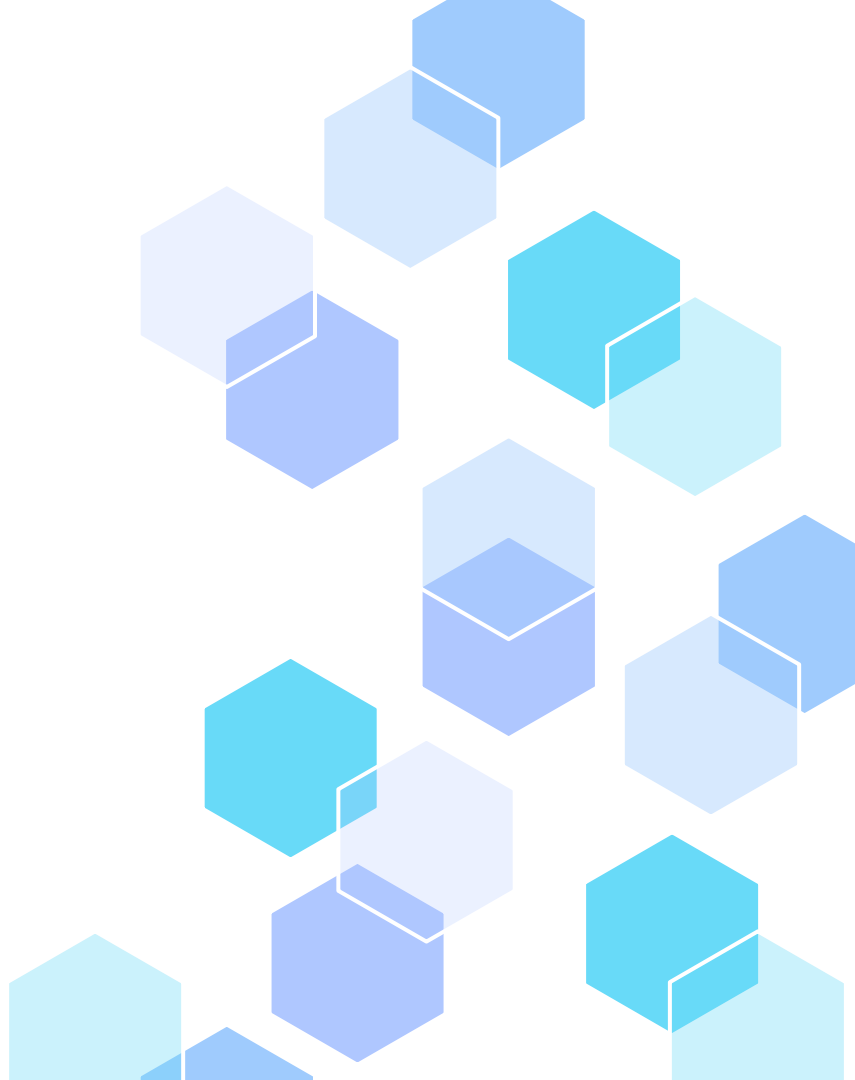


Model Selection (LASSO)

(Intercept)	-0.002186338
xbluekills	.
xblueAssists	-0.053897359
xblueDragons	0.275331303
xblueTotalGold	0.665907476
xblueTotalExperience	0.299188663
xblueTotalMinionsKilled	-0.052336086
xredkills	.
xredAssists	.
xredTotalGold	-0.582962011
xredTotalExperience	-0.321849353
xredTotalMinionsKilled	0.088450130
sel_train\$blueFirstBlood1	0.008555861

02

K Nearest Neighborhood

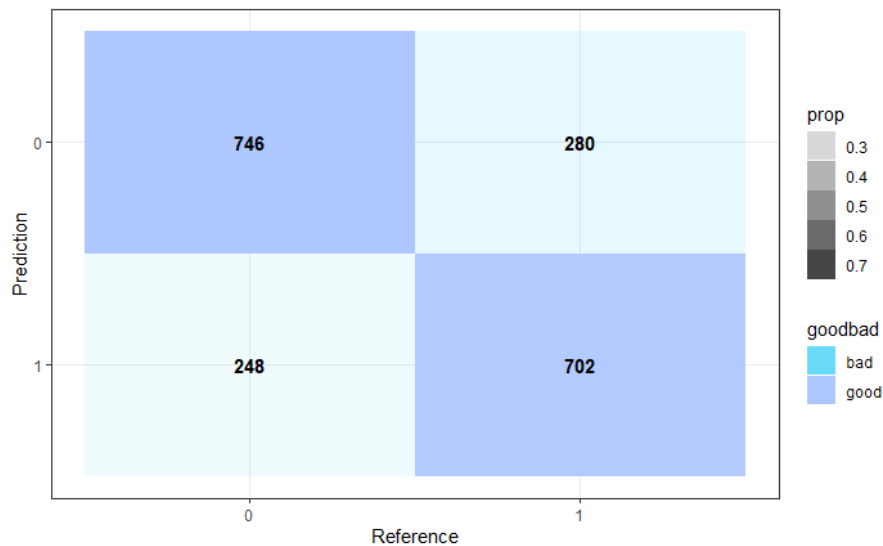


K Nearest Neighborhood

Accuracy : 0.7328

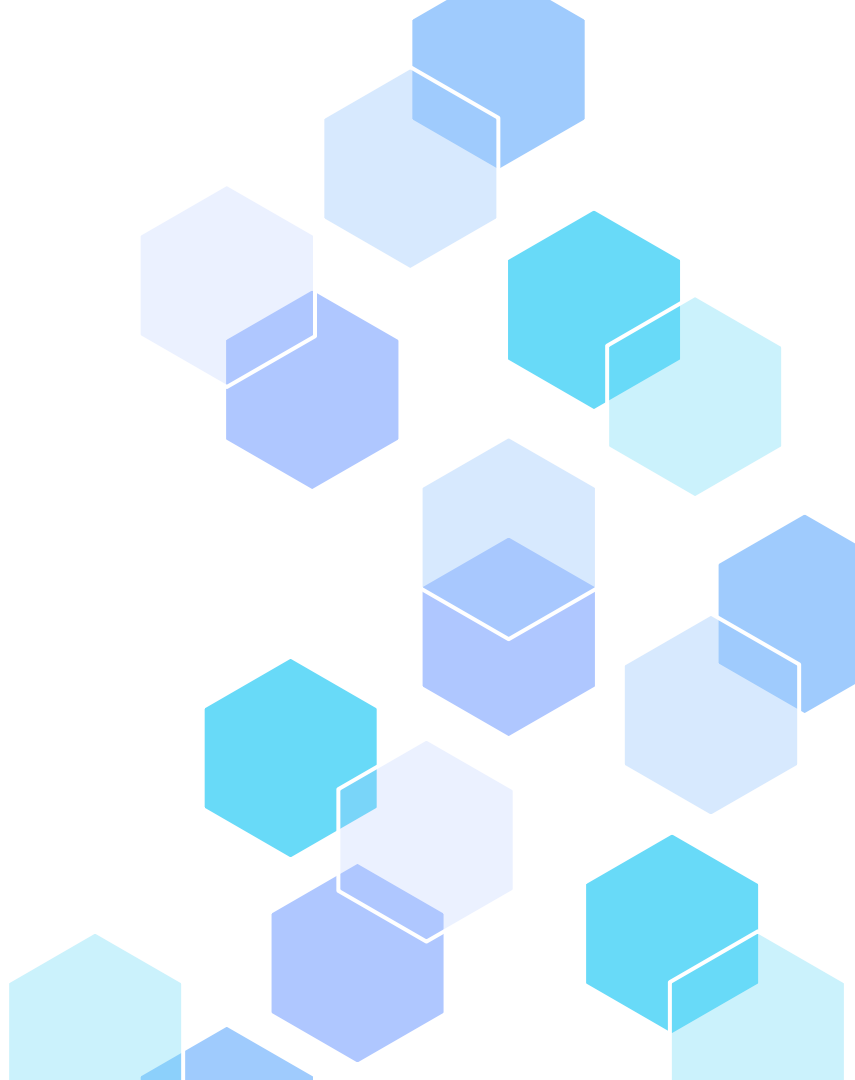
Sensitivity : 0.7505

Specificity : 0.7149



03

Logistic Regression

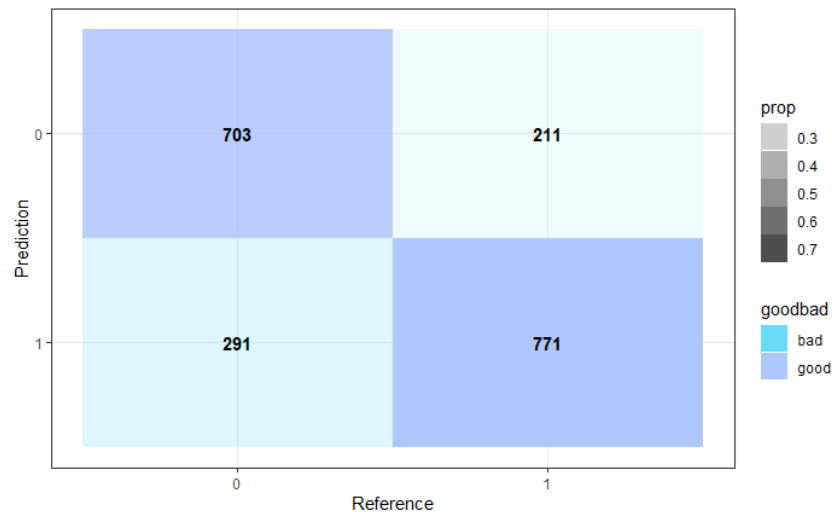
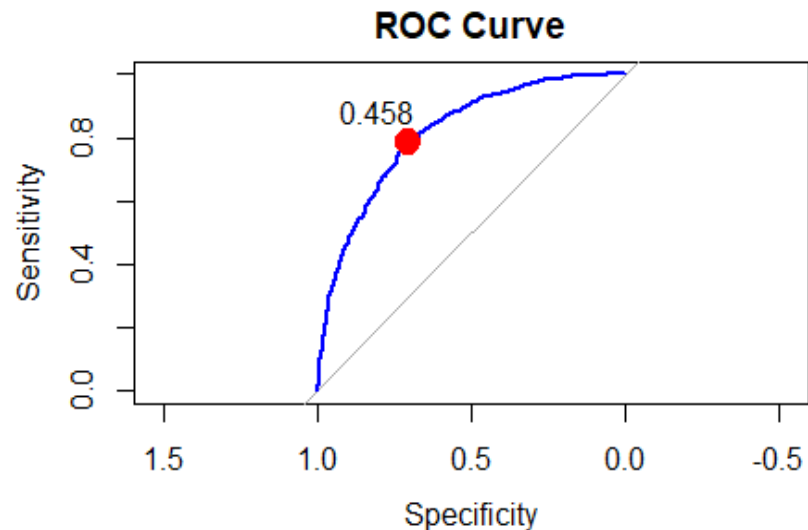


Logistic Regression

Accuracy : 0.746

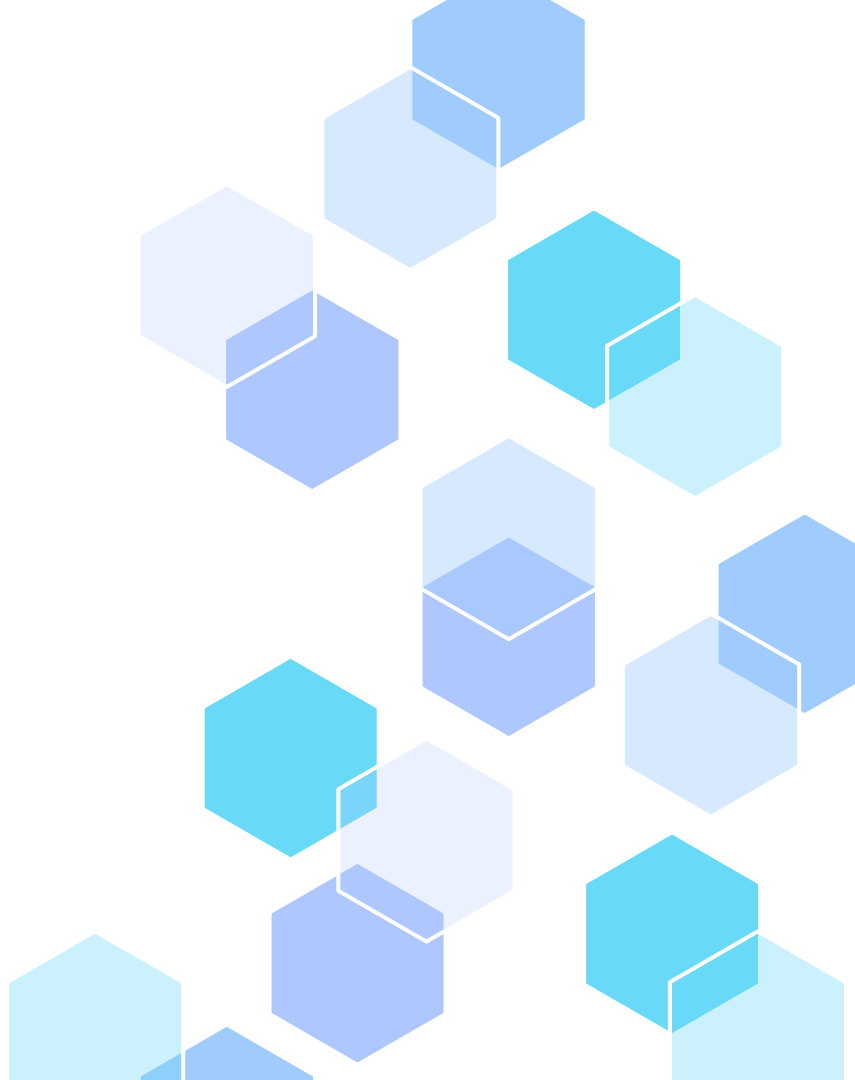
Sensitivity : 0.7072

Specificity : 0.7851

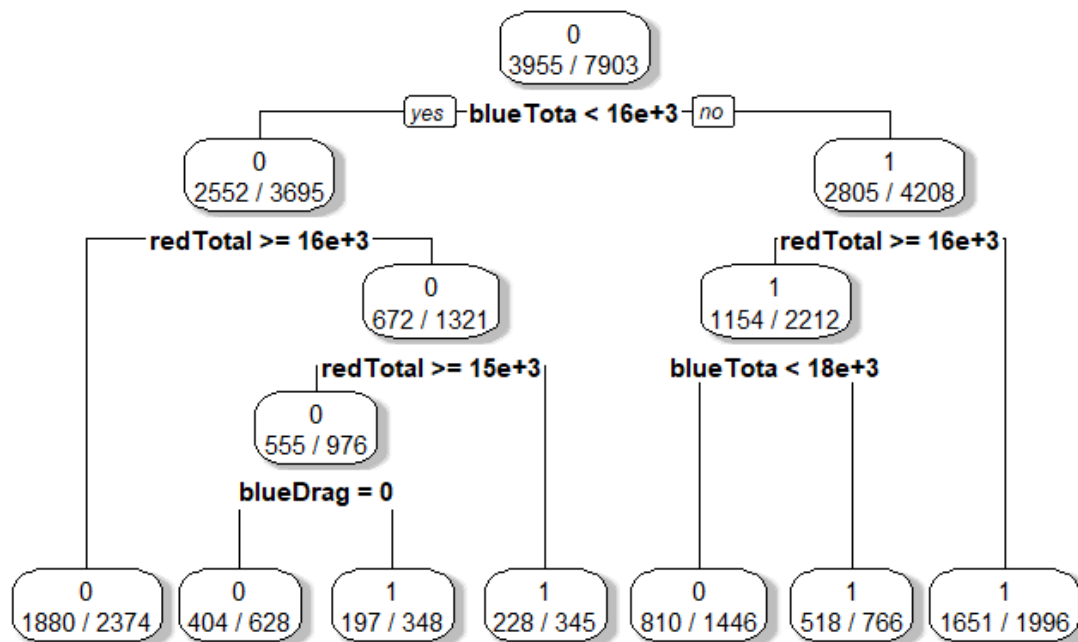


04

Decision Tree



Decision Tree (LASSO)

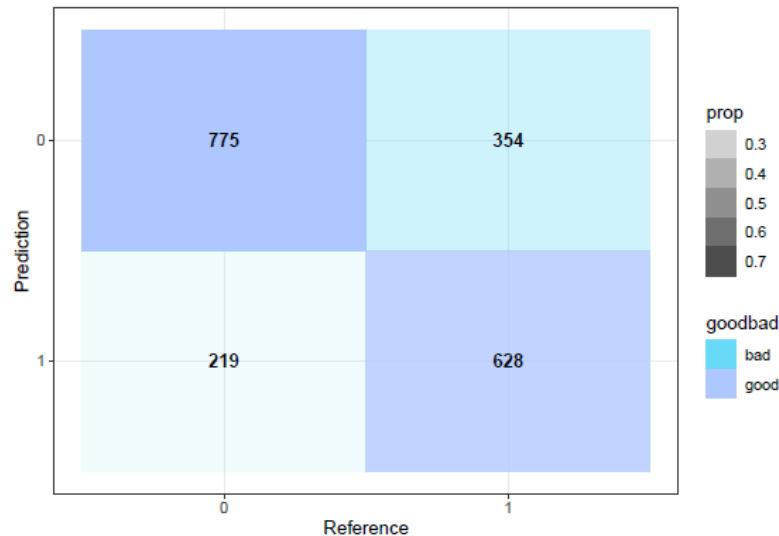
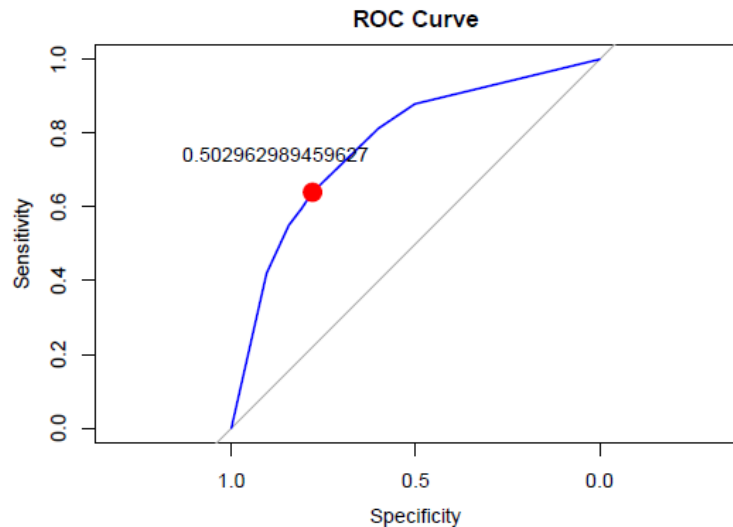


Decision Tree (LASSO)

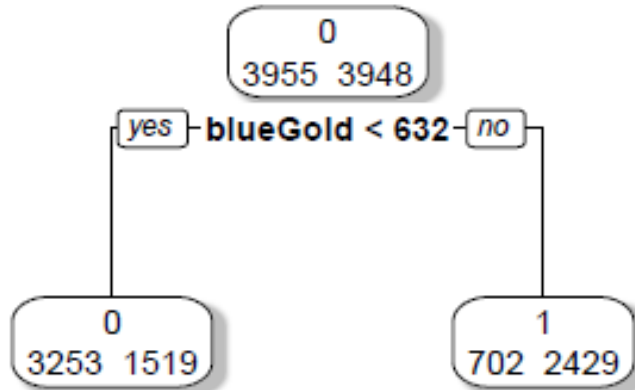
Accuracy : 0.71

Sensitivity : 0.7797

Specificity : 0.6395



Decision Tree(All Variable)

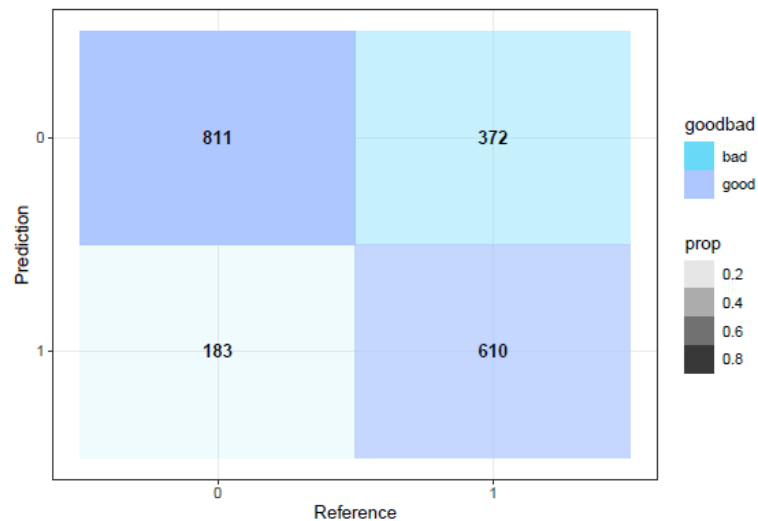
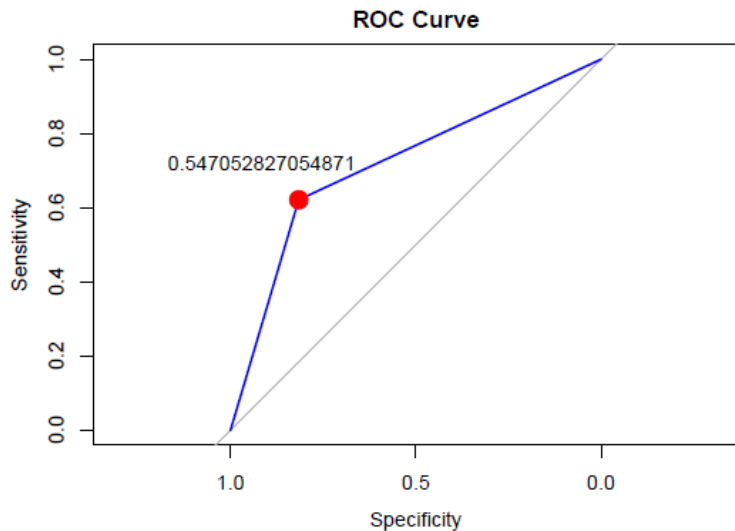


Decision Tree(All Variable)

Accuracy : 0.7191

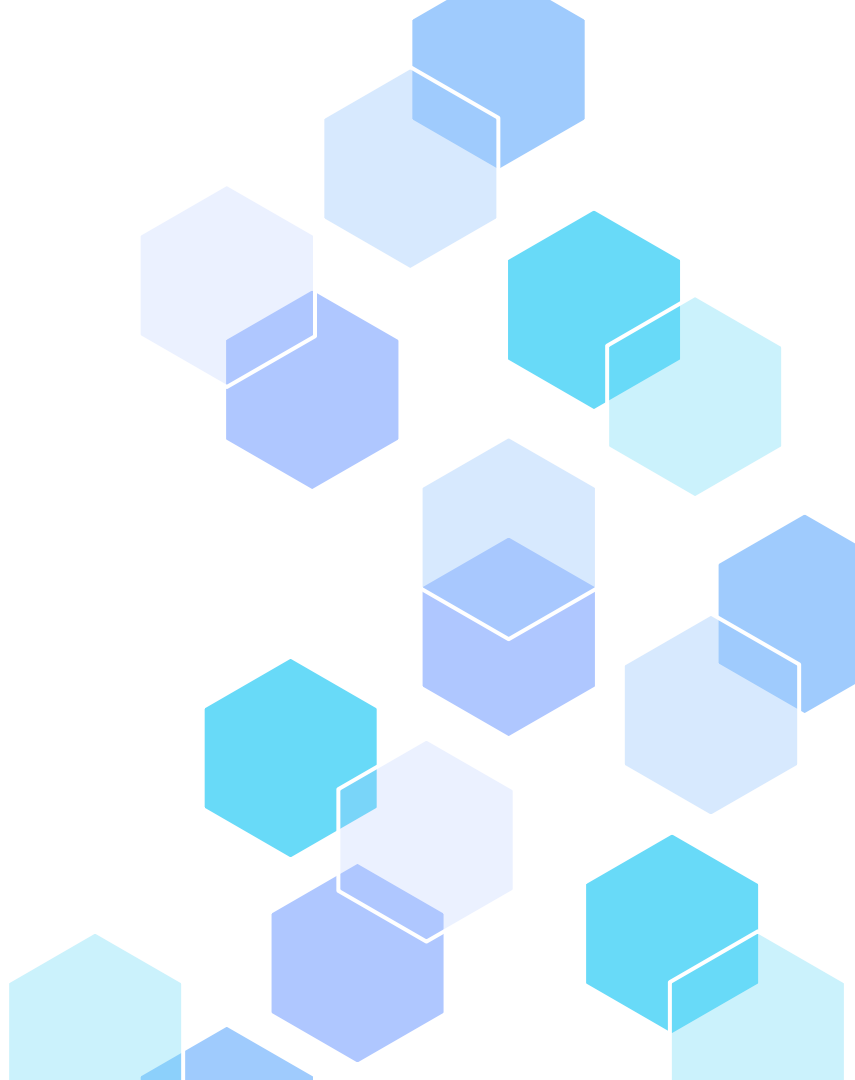
Sensitivity : 0.8159

Specificity : 0.6212



05

Random Forest



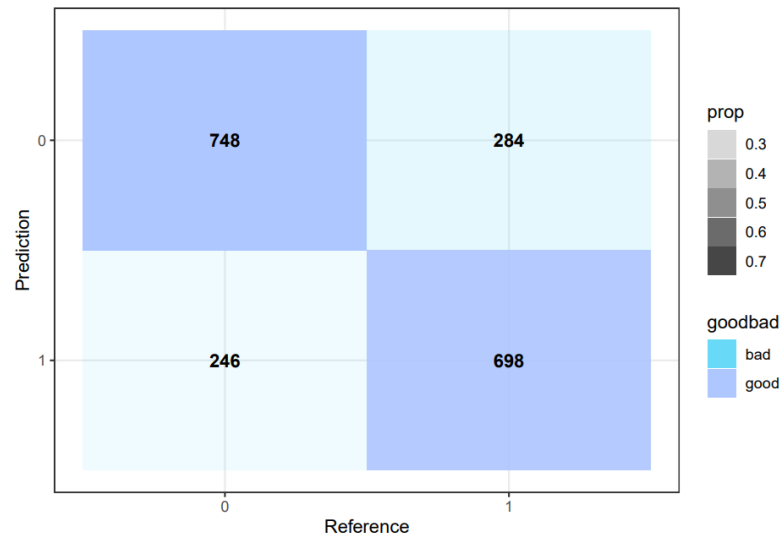
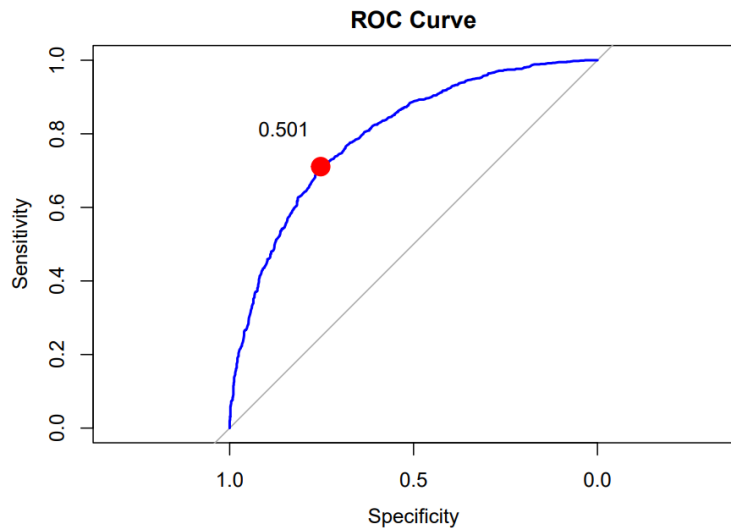
Random Forest(LASSO)

```
mtry ntree  
3 500
```

Accuracy : 0.7318

Sensitivity : 0.7525

Specificity : 0.7108



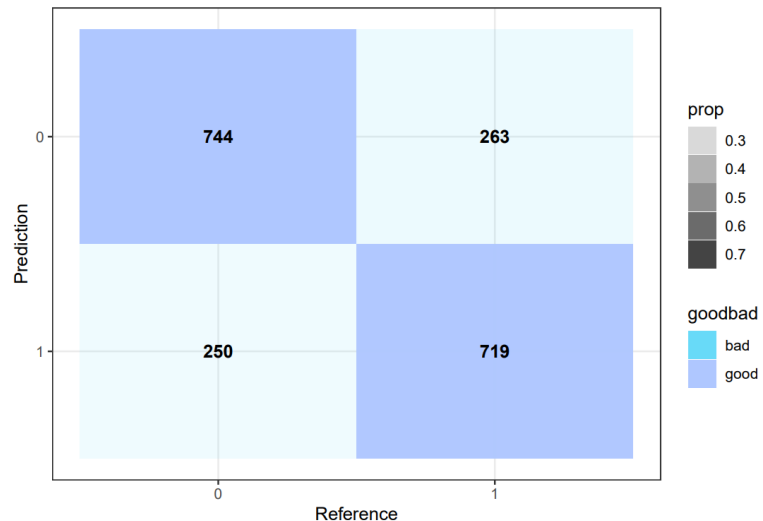
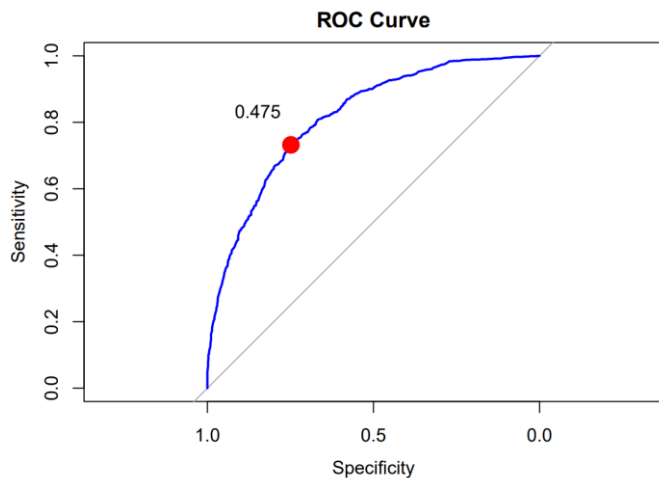
Random Forest(All Variable)

```
mtry ntree  
1 300
```

Accuracy : 0.7404

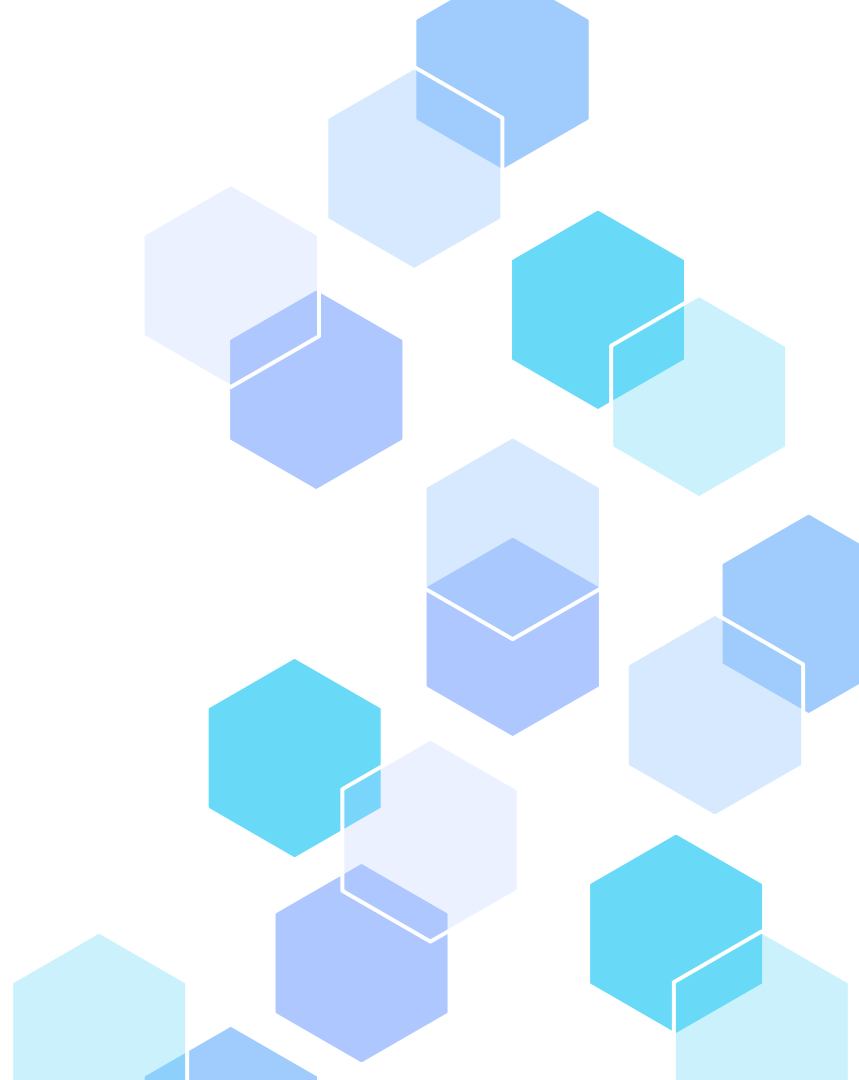
Sensitivity : 0.7485

Specificity : 0.7322



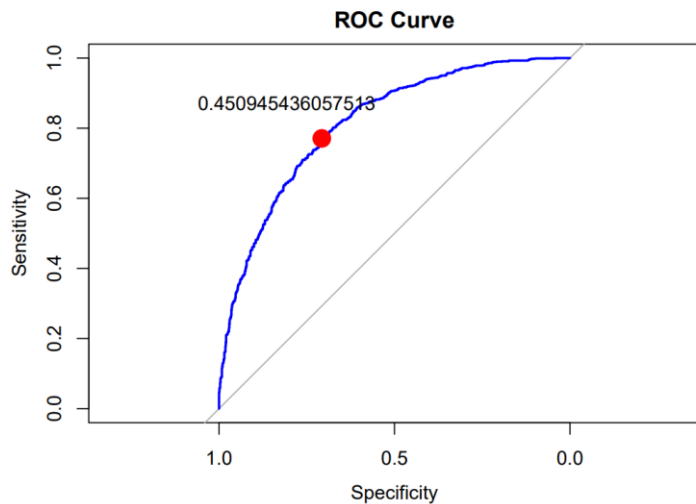
06

gboost



gboost(LASSO)

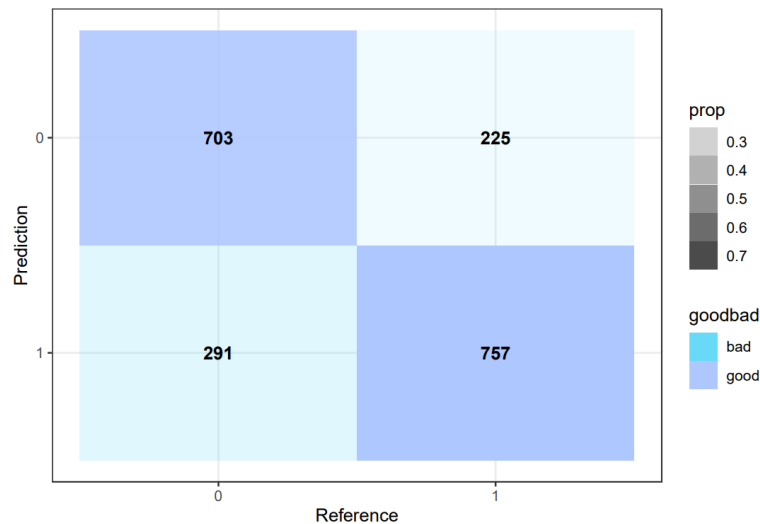
n.trees interaction.depth shrinkage n.minobsinnode
500 4 0.01 10



Accuracy : 0.7389

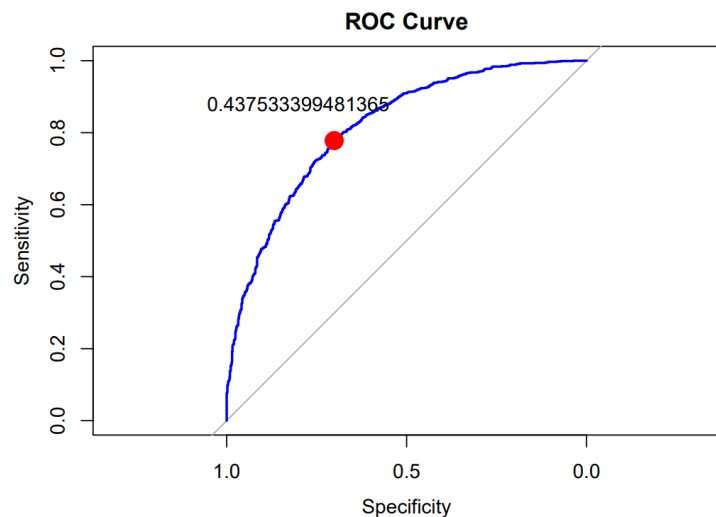
Sensitivity : 0.7072

Specificity : 0.7709

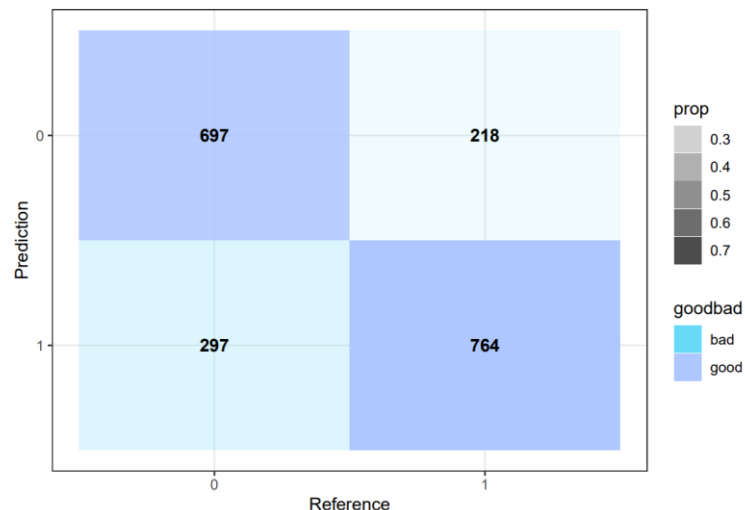


gboost(All Variable)

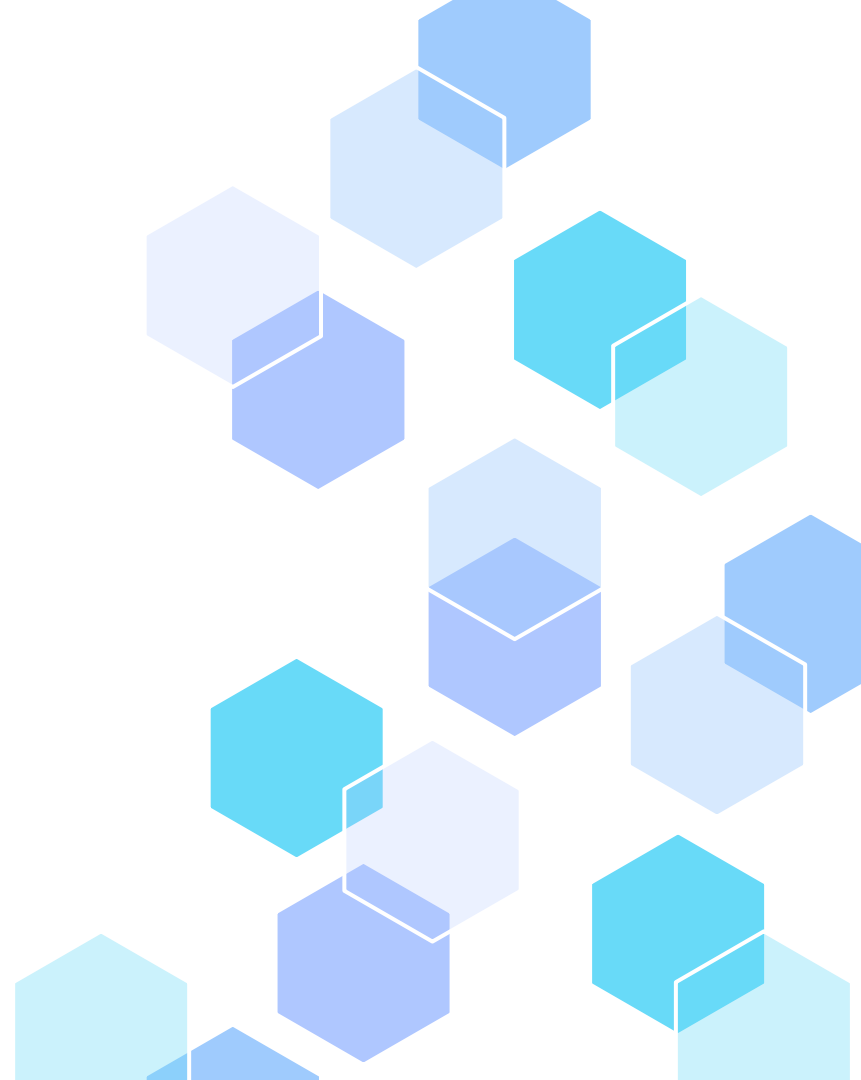
n.trees interaction.depth shrinkage n.minobsinnode
500 3 0.01 10



Accuracy : 0.7394
Sensitivity : 0.7012
Specificity : 0.7780



Conclusion



Conclusion

1. How to predict the outcome of a game within ten minutes of data (determining the best model).
2. How to quickly determine the outcome of a game (determining the most important variable).

	auc	sen	spe	most_important_variable
knn_sel	0.7328	0.7505	0.7149	NA
knn_all	0.5602	0.5704	0.5499	NA
logistic	0.7460	0.7072	0.7851	blueTotalGold, redTotalGold
tree_sel	0.7100	0.7797	0.6395	redTotalGold, blueTotalGold
tree_all	0.7191	0.8159	0.6212	blueGoldDiff, redGoldDiff
rf_sel	0.7318	0.7525	0.7108	redTotalGold, blueTotalGold
rf_all	0.7404	0.7485	0.7322	blueGoldDiff, redGoldDiff
gboost_sel	0.7389	0.7072	0.7709	redTotalGold, blueTotalGold
gboost_all	0.7373	0.7565	0.7179	redGoldDiff, blueGoldDiff

Reference

- <https://www.kaggle.com/code/xiyuewang/lol-how-to-win/input>
- <https://www.rdocumentation.org/packages/caret/versions/4.47/topics/train>

Thanks!

