documentation

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Things to check (Cross when done)

- Run regression on age and impute ages of missing values
- ~~Make a dummy for cabin no cabin~~
- Classify different cabin categories
- Classify "children" using age and parent/siblings variable
- Search for special titles in the name category and test impact on sirvival rate
- a "Countess" might be more likely to survive than Mr. Huber
- Test simple logit model
- Test random forest
- Test other machine learning models
- Investigate different variable selection | classify importance of variables for classification
- Compare different models

Data Documentation

Variable	Definition	Key
survival	Survival	0 = No, 1 = Yes
pclass	Ticket class	1 = 1st, 2 = 2nd, 3 = 3rd
sex	Sex	
Age	Age in years	
sibsp	# of siblings / spouses aboard the Titanic	
parch	# of parents / children aboard the Titanic	
ticket	Ticket number	
fare	Passenger fare	
cabin	Cabin number	
embarked	Port of Embarkation	C = Cherbourg, Q = Queenstown, S = Southampton

Variable Notes pclass: A proxy for socio-economic status (SES) 1st = Upper 2nd = Middle 3rd = Lower

age: Age is fractional if less than 1. If the age is estimated, is it in the form of xx.5

sibsp: The dataset defines family relations in this way... Sibling = brother, sister, stepbrother, stepsister Spouse = husband, wife (mistresses and fiancés were ignored)

parch: The dataset defines family relations in this way... Parent = mother, father Child = daughter, son, stepdaughter, stepson Some children travelled only with a nanny, therefore parch=0 for them.

Exploratory Data Analysis

Analyze here relationships of variables. z.B Plot of fare and pclass

```
glimpse(Train)
```

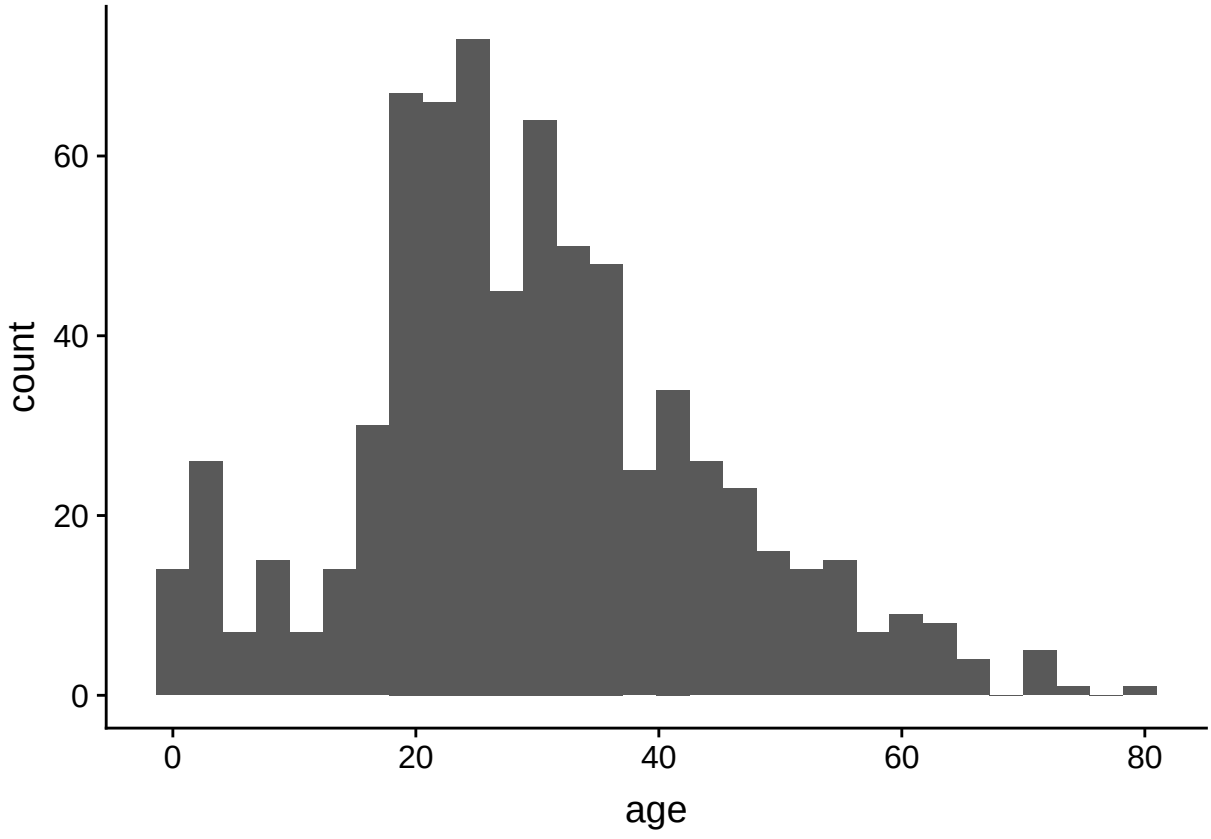
```
## Observations: 891
## Variables: 16
## $ passengerid <int> 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15,...
```

```
## $ survived    <fct> 0, 1, 1, 1, 0, 0, 0, 0, 1, 1, 1, 1, 0, 0, 0, 1, 0,...
## $ pclass      <int> 3, 1, 3, 1, 3, 3, 1, 3, 3, 2, 3, 1, 3, 3, 3, 2, 3,...
## $ name        <chr> "Braund, Mr. Owen Harris", "Cumings, Mrs. John Bra...
## $ sex         <chr> "male", "female", "female", "female", "male", "mal...
## $ age         <dbl> 22, 38, 26, 35, 35, NA, 54, 2, 27, 14, 4, 58, 20, ...
## $ sibsp       <int> 1, 1, 0, 1, 0, 0, 0, 3, 0, 1, 1, 0, 0, 1, 0, 0, 4,...
## $ parch       <int> 0, 0, 0, 0, 0, 0, 0, 1, 2, 0, 1, 0, 0, 5, 0, 0, 1,...
## $ ticket      <chr> "A/5 21171", "PC 17599", "STON/O2. 3101282", "1138...
## $ fare        <dbl> 7.2500, 71.2833, 7.9250, 53.1000, 8.0500, 8.4583, ...
## $ cabin       <chr> NA, "C85", NA, "C123", NA, NA, "E46", NA, NA, NA, ...
## $ embarked    <chr> "S", "C", "S", "S", "S", "Q", "S", "S", "S", "C", ...
## $ pclass1     <dbl> 0, 1, 0, 1, 0, 0, 1, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0,...
## $ pclass2     <dbl> 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0,...
## $ pclass3     <dbl> 1, 0, 1, 0, 1, 1, 0, 1, 1, 0, 1, 0, 1, 1, 1, 0, 1,...
## $ has.cabin   <dbl> 0, 1, 0, 1, 0, 0, 1, 0, 0, 0, 1, 1, 0, 0, 0, 0, 0,...
```

```
p1
```

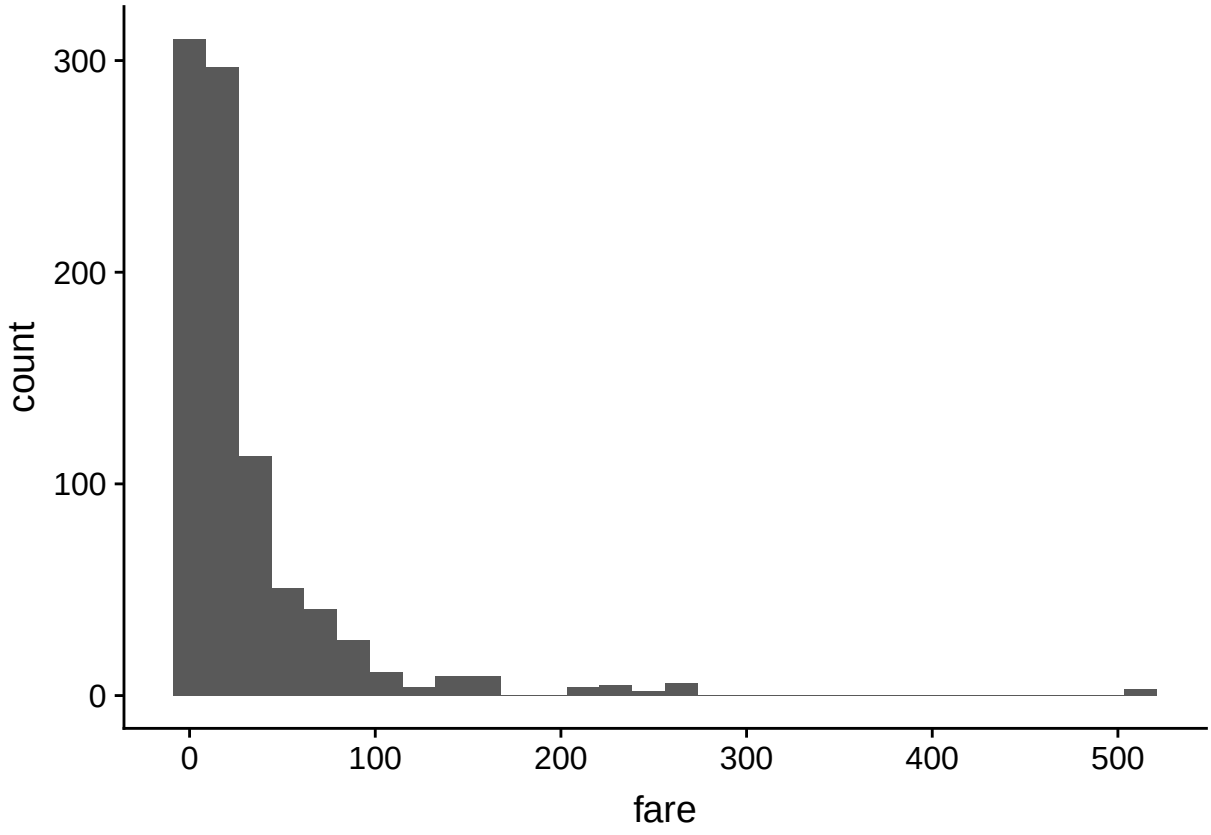
```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

```
## Warning: Removed 177 rows containing non-finite values (stat_bin).
```

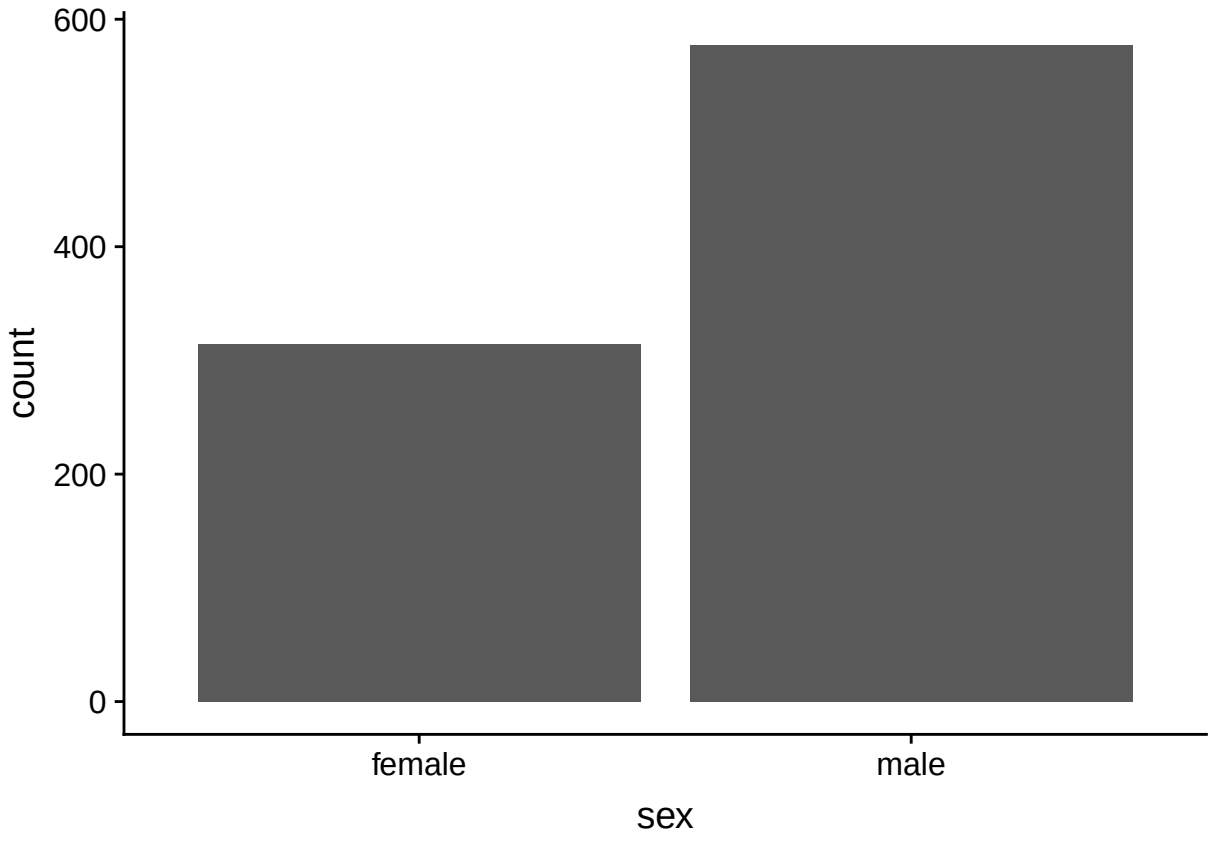



```
p2
```

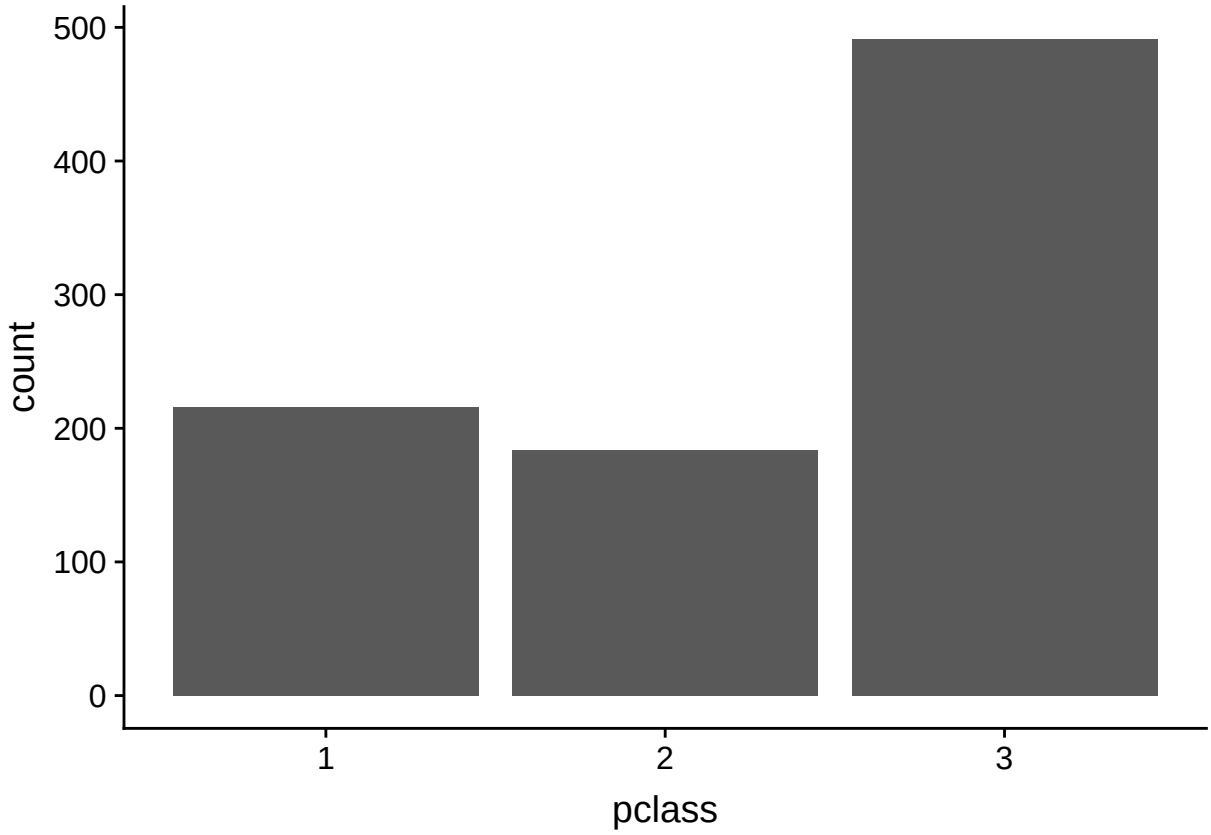
```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



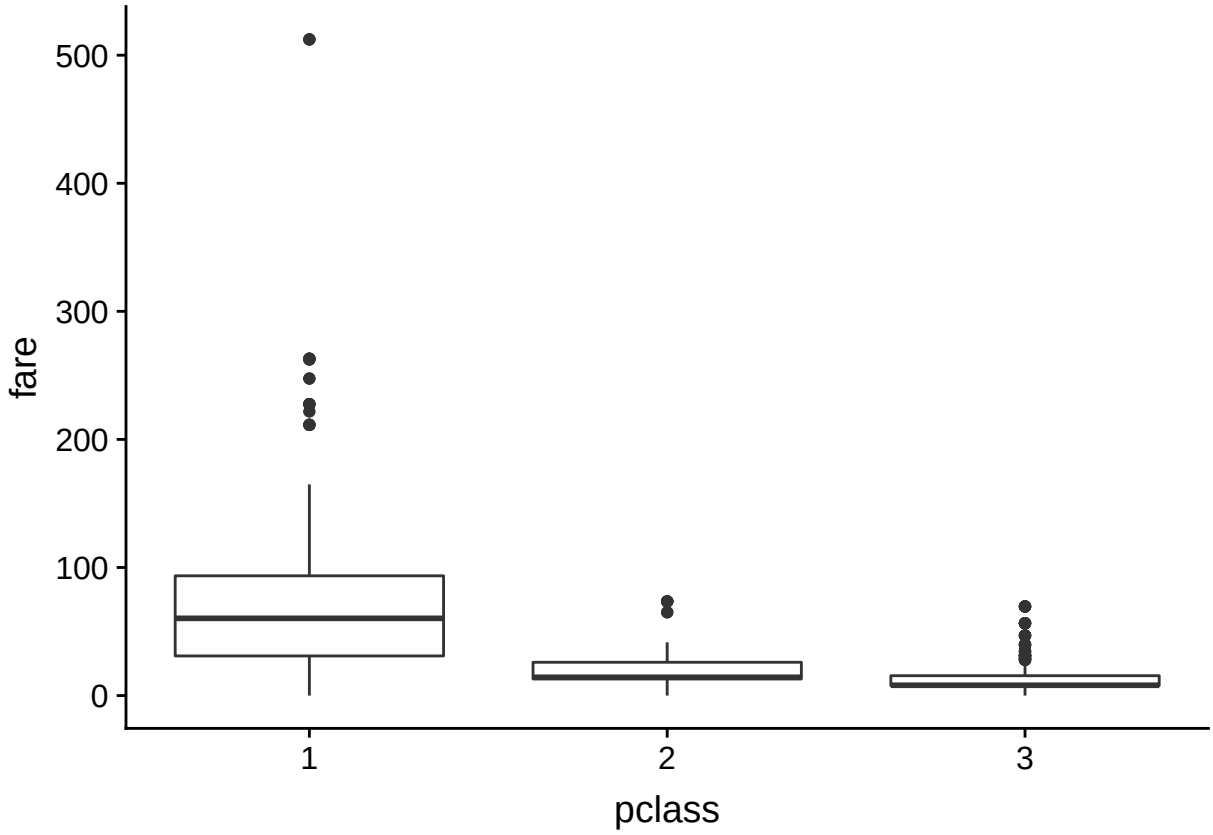

```
p3
```



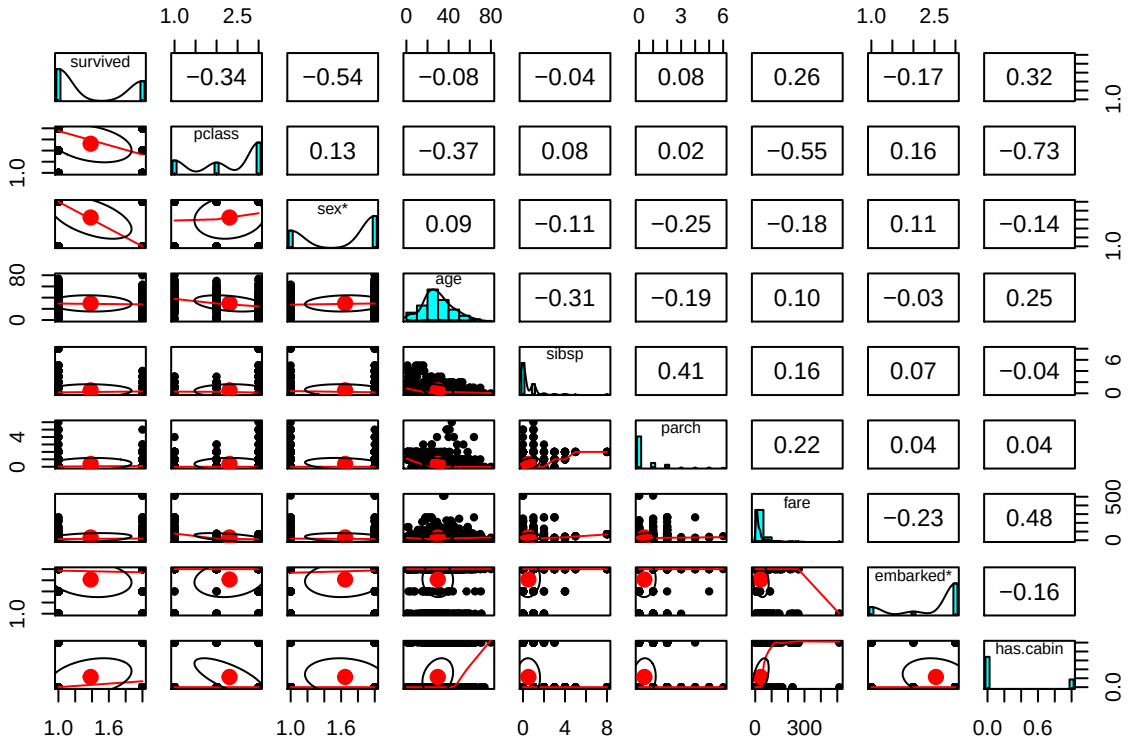

```
p4
```




```
p5
```




```
pairs.panels(TrainCorr) # corr matrix
```



Missing Data

Numbers of NAs per variable.

```
naFrame[,c(2:12)] %>% kable
```

survived	pclass	name	sex	age	sibsp	parch	ticket	fare	cabin	embarked
0	0	0	0	177	0	0	0	0	687	2

Embarked

```
emb.surv
```

```
##
##       0   1
##   C  75  93
##   Q  47  30
##   S 427 217
```

```
emb.surv.chisq
```

```
##
##  Pearson's Chi-squared test
##
## data:  Train$embarked and Train$survived
## X-squared = 26.489, df = 2, p-value = 1.77e-06
```

Peoplo who embarked in Southhampton have significantly higher likelihood of dying.

Age

Impute age with a regression or some ML algo -> add imputed age to classification -> more information

Training Models

Random forrest with 10-fold cv

```
print(Mod3)
```

```
## Random Forest
##
## 712 samples
##   6 predictor
##   2 classes: '0', '1'
##
## No pre-processing
## Resampling: Cross-Validated (10 fold, repeated 5 times)
## Summary of sample sizes: 511, 510, 510, 510, 510, 510, ...
## Resampling results across tuning parameters:
##
##   mtry  Accuracy   Kappa
##   2     0.7940768  0.5539540
##   3     0.7951906  0.5631721
##   4     0.7891630  0.5535475
##   5     0.7877344  0.5517294
##   7     0.7817753  0.5406628
##
## Accuracy was used to select the optimal model using the largest value.
## The final value used for the model was mtry = 3.
```

```
confusionMatrix(Mod3)
```

```
## Cross-Validated (10 fold, repeated 5 times) Confusion Matrix
##
## (entries are percentual average cell counts across resamples)
##
##           Reference
## Prediction    0    1
##          0 52.4 12.8
##          1  7.7 27.1
##
##  Accuracy (average) : 0.7951
```

Best model so far Mod3 with accuracy of 0.83.