Osnove statističkog programiranja

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Neki naslov

Dokumentacija

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Sadržaj

1. Prediktivni modeli primjenom strojnog učenja

Kako bismo bolje razumjeli što film čini uspješnim ili neuspješnim, provele smo analizu dobivenog skupa podataka primjenom strojnog učenja. Cilj nam je bio razviti model koji može čim točnije predviđati uspjeh filma na temelju njegovih karakteristika.

1.1 Priprema podataka

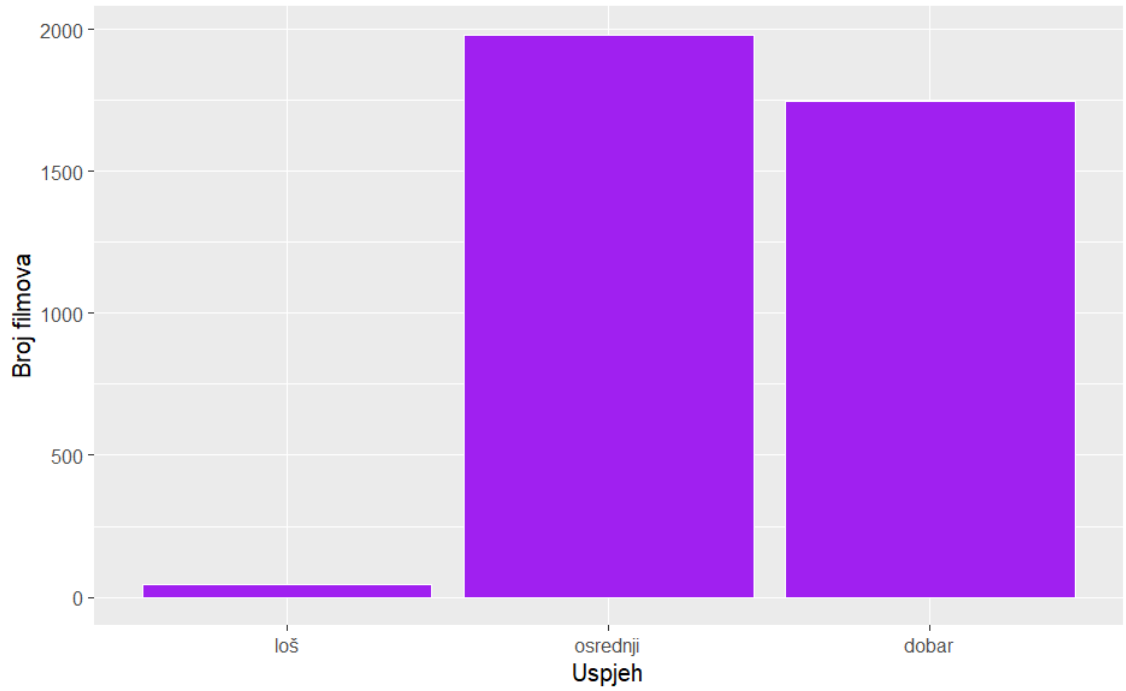
Iz dobivenih podataka izbacile smo retke kojima su nedostajali neki podaci. Takvih je redaka bilo 1261. Također, uklonile smo stupce koji su sadržavali jedinstvene ili skoro jedinstvene vrijednosti (*movie_title*, *movie_imdb_link*, *plot_keywords*, *genres*). Još smo izbacile tekstualne stupce koji su bili prekorelirani s nekim numeričkim stupcem. Na primjer, *actor_1_name* je prekoreliran s *actor_1_facebook_likes*.

```
columns <- c('duration', 'director_facebook_likes', 'actor_1_facebook_
    likes','actor_2_facebook_likes', 'actor_3_facebook_likes', 'num_user_
    for_reviews', 'num_critic_for_reviews', 'num_voted_users', 'cast_
    total_facebook_likes', 'movie_facebook_likes', 'facenumber_in_poster'
    , 'color', 'title_year', 'language', 'country', 'content_rating', '
    aspect_ratio', 'gross', 'budget', 'imdb_score')

mldata <- data[,columns]

mldata <- na.omit(mldata)
```

Preostale nenumeričke stupce pretvorile smo u tip integer.

```
label_encode <- function(column) {
  as.integer(factor(column, levels = unique(column)))
}
```

Značajka koju predviđamo je *imdb_score*. To broj zaokružen na jednu decimalu, pa smo za bolje rezultate uspjeh filma podijelile u tri skupine: loš, osrednji i dobar,



Slika 1.1: Podjela filmova po uspjehu

a stupac imdb_score smo zbog prekoreliranosti uklonile.

```
mldata$score <- ifelse(mldata$imdb_score < 3.33, "los", ifelse(mldata$
    imdb_score < 6.66, "osrednji", "dobar"))
```

Graf 1.1 prikazuje omjer broja filmova po uspjehu. Filmova koji su ocijenjeni kao loši znatno je manje od ostalih. Točnije, loših je filmova 43, osrednjih 1981, a dobrih 1746.

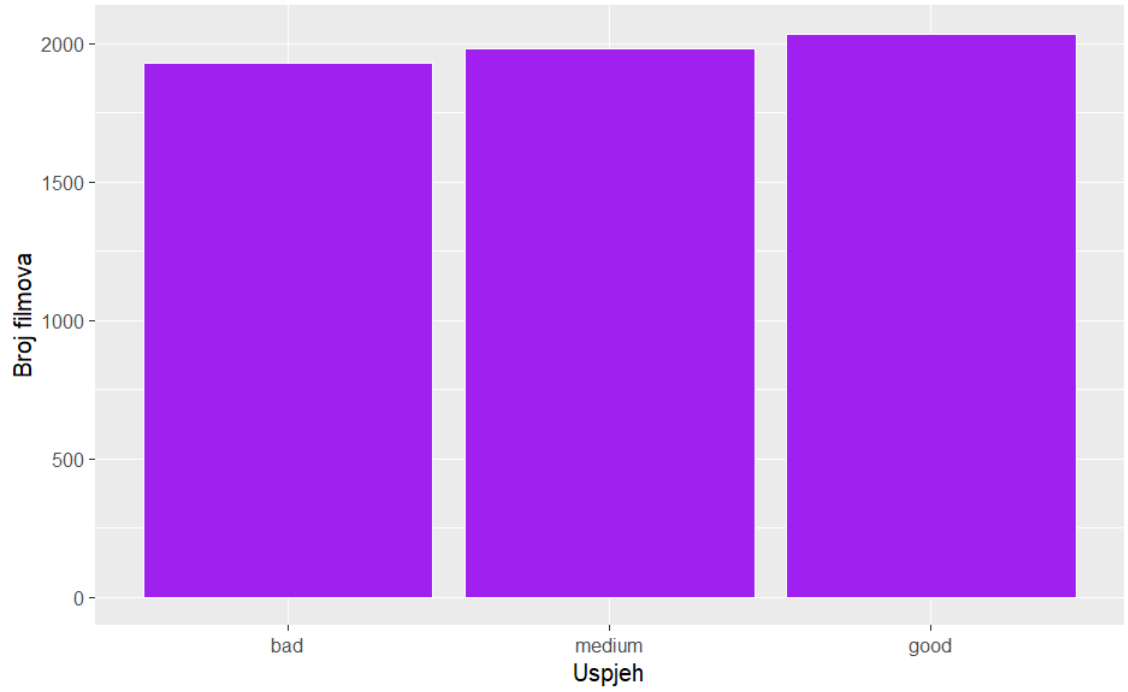
```
Model <- train(score ~ ., data = training_set,
               method = "svmPoly",
               na.action = na.omit,
               preProcess=c("scale","center"),
               trControl= trainControl(method="none"),
               tuneGrid = data.frame(degree=1,scale=1,C=1)
)
```

```
Confusion Matrix and Statistics

          Reference
Prediction loš osrednji dobar
  loš        0        0     0
  osrednji   8      339   141
  dobar      0       54   205

Overall Statistics

               Accuracy : 0.7282
                 95% CI : (0.6948, 0.7599)
    No Information Rate : 0.5261
    P-Value [Acc > NIR] : < 2.2e-16

                  Kappa : 0.4518

 Mcnemar's Test P-Value : NA

Statistics by Class:

                     Class: loš Class: osrednji Class: dobar
Sensitivity             0.00000          0.8626       0.5925
Specificity             1.00000          0.5791       0.8653
Pos Pred Value              NaN          0.6947       0.7915
Neg Pred Value          0.98929          0.7915       0.7111
Prevalence              0.01071          0.5261       0.4632
Detection Rate          0.00000          0.4538       0.2744
Detection Prevalence    0.00000          0.6533       0.3467
Balanced Accuracy       0.50000          0.7208       0.7289
```

```r
Model_rf <- randomForest(score ~ ., data = training_set, ntree = 500,
    importance = TRUE)
```

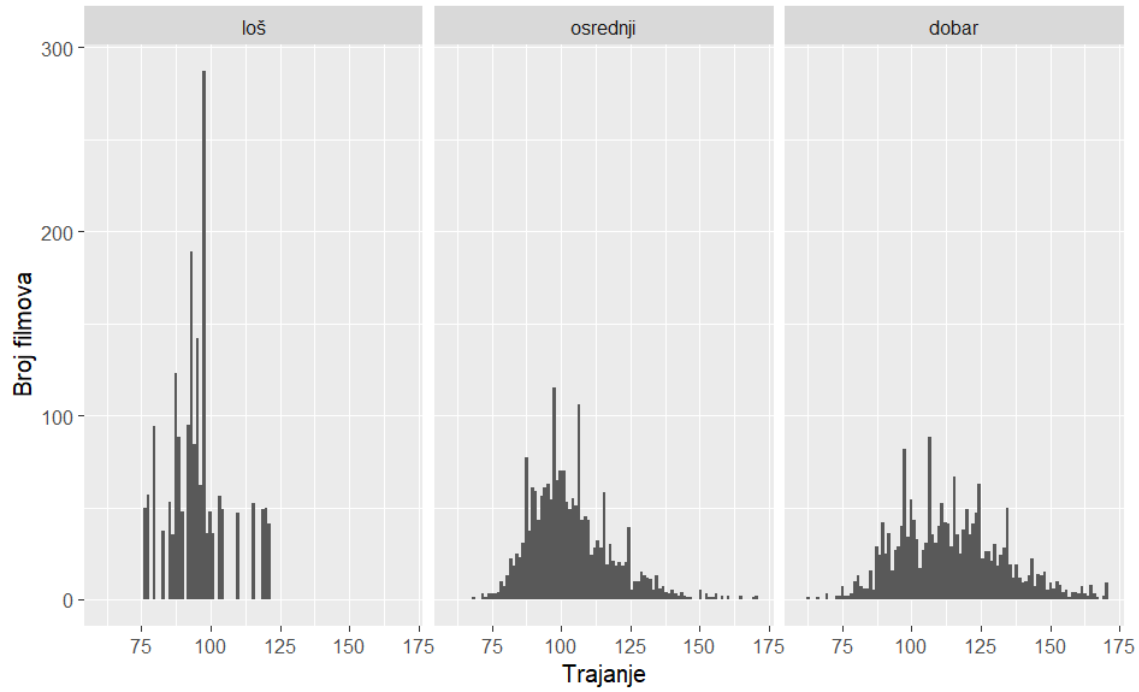
```
Confusion Matrix and Statistics

          Reference
Prediction loš osrednji dobar
  loš        0        0     0
  osrednji   7      325    86
  dobar      1       68   260

Overall Statistics

               Accuracy : 0.7831
                 95% CI : (0.7518, 0.8122)
    No Information Rate : 0.5261
    P-Value [Acc > NIR] : <2e-16

                  Kappa : 0.5677

 Mcnemar's Test P-Value : 0.0177

Statistics by Class:

                     Class: loš Class: osrednji Class: dobar
Sensitivity             0.00000          0.8270       0.7514
Specificity             1.00000          0.7373       0.8279
Pos Pred Value              NaN          0.7775       0.7903
Neg Pred Value          0.98929          0.7933       0.7943
Prevalence              0.01071          0.5261       0.4632
Detection Rate          0.00000          0.4351       0.3481
Detection Prevalence    0.00000          0.5596       0.4404
Balanced Accuracy       0.50000          0.7821       0.7897
```

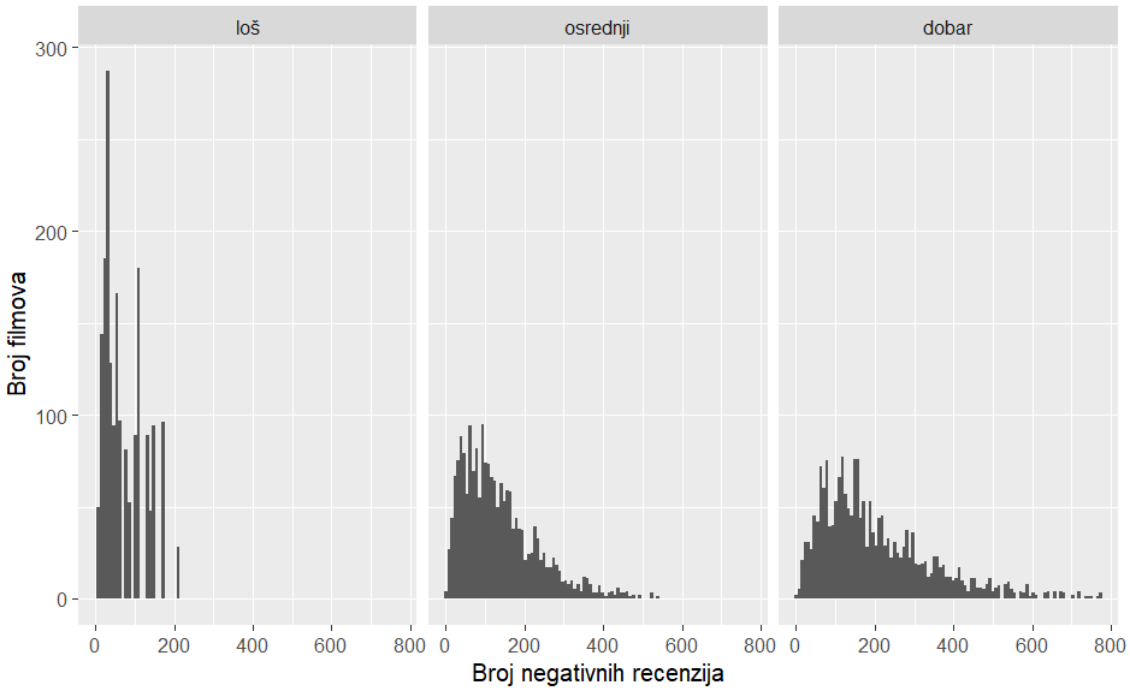
```r
oversample <- ovun.sample(score~., data = over, method = "both", N =
    3932)$data
```



```
Confusion Matrix and Statistics

          Reference
Prediction loš osrednji dobar
  loš      374       69    34
  osrednji   7      256   109
  dobar      0       68   261

Overall Statistics

               Accuracy : 0.7564
                 95% CI : (0.7308, 0.7806)
    No Information Rate : 0.343
    P-Value [Acc > NIR] : < 2.2e-16

                  Kappa : 0.6352

 Mcnemar's Test P-Value : < 2.2e-16

Statistics by Class:

                     Class: loš Class: osrednji Class: dobar
Sensitivity              0.9816          0.6514       0.6460
Specificity              0.8708          0.8522       0.9121
Pos Pred Value           0.7841          0.6882       0.7933
Neg Pred Value           0.9900          0.8300       0.8316
Prevalence               0.3234          0.3336       0.3430
Detection Rate           0.3175          0.2173       0.2216
Detection Prevalence     0.4049          0.3158       0.2793
Balanced Accuracy        0.9262          0.7518       0.7791
```

```
Confusion Matrix and Statistics

          Reference
Prediction loš osrednji dobar
  loš      381        0     0
  osrednji   0      330    44
  dobar      0       63   360

Overall Statistics

               Accuracy : 0.9092
                 95% CI : (0.8913, 0.925)
    No Information Rate : 0.343
    P-Value [Acc > NIR] : < 2.2e-16

                  Kappa : 0.8637

 Mcnemar's Test P-Value : NA

Statistics by Class:

                     Class: loš Class: osrednji Class: dobar
Sensitivity              1.0000          0.8397       0.8911
Specificity              1.0000          0.9439       0.9186
Pos Pred Value           1.0000          0.8824       0.8511
Neg Pred Value           1.0000          0.9216       0.9417
Prevalence               0.3234          0.3336       0.3430
Detection Rate           0.3234          0.2801       0.3056
Detection Prevalence     0.3234          0.3175       0.3591
Balanced Accuracy        1.0000          0.8918       0.9048
```




loš
osrednji
dobar
Broj filmova
300
200
100
0
0
200
400
600
800
Broj negativnih recenzija

Indeks slika i dijagrama