1 model development

Variable selection using ElasticNet with stratified cross-validation for hyper-parameter tuning

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Introduction

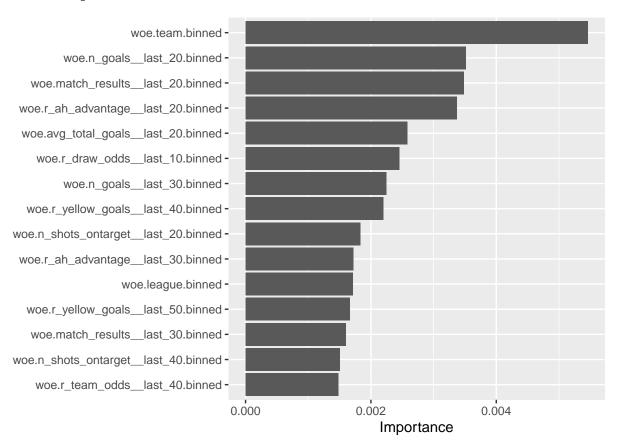
woeBinning helped to preliminary select potential variables. After applying elastic net, further elimination will help to narrow down potential variables to cca. 7-10 for final model.

Especially interesting, for this exercise, is to use standardized user interface provided in the package tidymodels.

```
library(vip)
library(tidymodels)
library(stringr)
library(tidyverse)
library(recipes)
# ---- Specify Output Path ----
proj_path <- "C:/Users/Peter/Desktop/ds_projects/betting_data_science"</pre>
folder_path <- "6 glm models/1 model development/preliminary_data"</pre>
file_path <- "1a variable selection - binning.RData"</pre>
out_file_path <- "1b elastic net modelling.RData"</pre>
input_path <- paste(proj_path, "/", folder_path, "/", file_path, sep = "")</pre>
# ---- Upload Image ----
load(input_path)
# - set output folder
output_path <- paste(proj_path, "/", folder_path, "/", out_file_path, sep = "")</pre>
rm(proj_path)
rm(folder path)
rm(file_path)
rm(out_file_path)
# ---- Upsampled Data for Modelling ----
train_data_glm <-
  recipe(n_goals_cat ~ .,
         data = master_data %>%
           filter(data_type %in% "Train") %>%
           select(data_type, binned_data) %>%
           unnest(c(binned_data)) %>%
           as.data.frame() %>%
           select(-data_type, -is_home, -created_at, -match_id, -n_goals) %>%
```

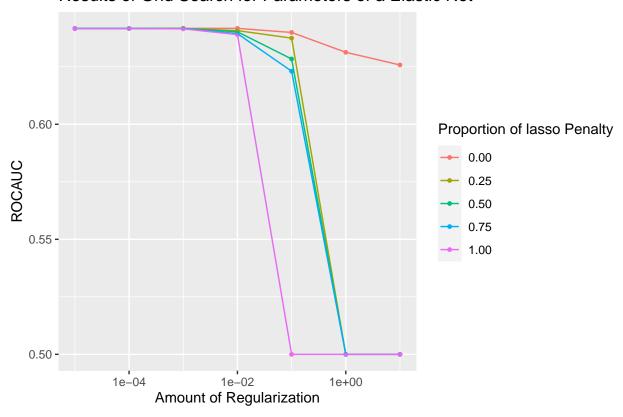
```
mutate_if(is.character, as.factor)) %>%
  themis::step_upsample(n_goals_cat) %>%
  prep() %>%
  juice() %>%
  as.data.frame()
# ---- Model Structure ----
ml model str <-
  # - parameters for tuning (similar to lambda and alpha from glmnet package)
  logistic_reg(penalty = tune(),
               mixture = tune()) %>%
  # - qlmnet, i.e. elastic net engine
  set_engine("glmnet") %>%
  set_mode("classification")
# ---- Stratified Sampling ----
cv_splits <- vfold_cv(train_data_glm, strata = n_goals_cat)</pre>
# ---- Create Workflow -----
ml_workflow <-
 workflow() %>%
 add_model(ml_model_str) %>%
 add_formula(n_goals_cat ~ .)
# ---- Set Parameters ----
glmn_set <- parameters(penalty(range = c(-5, 1), trans = log10_trans()),</pre>
                       mixture(range = c(0, 1)))
# ---- Create Grid ----
glmn_grid <- grid_regular(glmn_set, levels = c(7, 5))</pre>
ctrl <- control_grid(save_pred = TRUE, verbose = TRUE)</pre>
# ---- Tune Model ----
glmn_tune <-
 tune_grid(ml_workflow,
           resamples = cv_splits,
            grid = glmn_grid,
            metrics = metric_set(roc_auc),
            control = ctrl)
# ---- Create Final Model ----
ml model fit <-
 ml workflow %>%
 finalize_workflow(select_best(glmn_tune, metric = "roc_auc")) %>%
 fit(., data = train_data_glm)
# ---- Variable Importance ----
var_importance <-</pre>
 ml_model_fit %>%
 pull_workflow_fit() %>%
 vip(num_features = 15)
```

Variable Importance



Grid Search Results

Results of Grid Search for Parameters of a Elastic Net



```
rm(ctrl)
rm(cv_splits)
rm(glmn_grid)
rm(glmn_set)
rm(glmn_tune)
save.image(output_path)
```