

Sanity Check Typhoon Melor: Adjusted Causal Model, Unadjusted Causal Model, and associational model

```
# clear the working space
rm(list = ls())

library(here)
library(stats) # need this to calculate Mahalanobis Distance
library(parallel) # parallelize
library(dplyr)
library(FNN)
library(cluster)
library(ggplot2)
library(rpart)
library(caret)
```

Inputs

Data and cleaning (inc data cleaning functions)

```
base_data_regions <- read.csv(here("data", "base_data_regions.csv"))

nrow(base_data_regions)
```

```
## [1] 25843
```

```
# renaming columns
source(here("R", "col_rename.R"))
base_data_regions <- col_rename(base_data_regions)
```

```
source(here("R", "filter_by_tc.R"))
typhoon_melor_2015 <- filter_by_tc(df = base_data_regions, tc = "melor2015")
```

```
## number of missing municipalities: 685
```

```
nrow(typhoon_melor_2015)
```

```
## [1] 905
```

Adjusted Causal Model

Importing trained models

```
# Import trained BASE models
# From folder: adjusted SCM/new base models

adj_base_models_list <- list()

# base models file path
adj_base_file_path <- here("adjusted SCM/new base models")
adj_base_wind_model <- readRDS(file.path(adj_base_file_path,
                                         "dec_base_wind_model_tuned.rds"))

adj_base_class_full_model <- readRDS(file.path(adj_base_file_path,
                                              "damage_fit_class_full.rds"))
adj_base_reg_model <- readRDS(file.path(adj_base_file_path,
                                       "base_reg_model.rds"))

adj_base_models_list <- list("base_wind_model" = adj_base_wind_model,
                             "base_class_full_model" = adj_base_class_full_model,
                             "base_reg_model" = adj_base_reg_model)
```

```
# Import trained Truncated models
# From folder: adjusted SCM/new trunc models

# empty list
adj_trunc_models_list <- list()

adj_trunc_file_path <- here("adjusted SCM/new trunc models")

adj_trunc_wind_model <- readRDS(file.path(adj_trunc_file_path,
                                         "trunc_wind_model_tuned.rds"))

adj_trunc_reg_model <- readRDS(file.path(adj_trunc_file_path,
                                       "trunc_reg_model.rds"))

adj_trunc_models_list <- list("trunc_wind_model" = adj_trunc_wind_model,
                             "trunc_reg_model" = adj_trunc_reg_model)
```

Predictions

```
# calling hurdle function
source(here("R", "adj_hurdle_function.R"))

adj_M15_preds <- adj_hurdle_function(df = typhoon_melor_2015,
                                    scm_models_base = adj_base_models_list,
```

```
scm_models_high = adj_trunc_models_list,
threshold = 0.3 # threshold in train/test models is 0.35
)
```

Unadjusted Causal Counterfactual predictions

Importing trained models

```
# Import trained BASE models
# From folder: adjusted SCM/new base models

unadj_base_models_list <- list()

# base models file path
unadj_base_file_path <- here("unadjusted SCM/new base models")
unadj_base_wind_model <- readRDS(file.path(unadj_base_file_path,
                                           "dec_base_wind_model_tuned.rds"))

unadj_base_class_full_model <- readRDS(file.path(unadj_base_file_path,
                                                  "damage_fit_class_full.rds"))
unadj_base_reg_model <- readRDS(file.path(unadj_base_file_path,
                                           "base_reg_model.rds"))

unadj_base_models_list <- list("base_wind_model" = unadj_base_wind_model,
                              "base_class_full_model" = unadj_base_class_full_model,
                              "base_reg_model" = unadj_base_reg_model)
```

```
# Import trained Truncated models
# From folder: adjusted SCM/new trunc models

# empty list
unadj_trunc_models_list <- list()

unadj_trunc_file_path <- here("unadjusted SCM/new trunc models")

unadj_trunc_wind_model <- readRDS(file.path(unadj_trunc_file_path,
                                           "trunc_wind_model_tuned.rds"))

unadj_trunc_reg_model <- readRDS(file.path(unadj_trunc_file_path,
                                           "trunc_damage_fit_reg.rds"))

unadj_trunc_models_list <- list("trunc_wind_model" = unadj_trunc_wind_model,
                              "trunc_reg_model" = unadj_trunc_reg_model)
```

```
names(unadj_trunc_models_list)
```

```
## [1] "trunc_wind_model" "trunc_reg_model"
```

```
names(unadj_base_models_list)
```

```
## [1] "base_wind_model"          "base_class_full_model" "base_reg_model"
```

```
# setting threshold for classification step
```

```
threshold = 0.30
```

```
source(here("R", "unadj_hurdle_function.R"))
```

```
unadj_M15_preds <- unadj_hurdle_function(df = typhoon_melor_2015,  
                                         scm_models_base = unadj_base_models_list,  
                                         scm_models_high = unadj_trunc_models_list,  
                                         threshold = threshold # threshold in train/test models i  
                                         )
```

Associational Model Counterfactuals

Importing trained models

```
# Read the .rds models
```

```
base_reg <- readRDS(here("associational XGBOOST", "damage_fit_reg_base.rds"))
```

```
trunc_reg <- readRDS(here("associational XGBOOST", "trunc_damage_fit_reg.rds"))
```

```
clas_model <- readRDS(here("associational XGBOOST", "ass_XGBOOST_class.rds"))
```

Counterfactual predictions

```
source(here("R", "ass_hurdle_function.R"))
```

```
# setting threshold for classification step
```

```
threshold = 0.30
```

```
ass_M15_preds <- ass_hurdle_function(df = typhoon_melor_2015, ass_clas_model = clas_model,  
                                     ass_base_model = base_reg, ass_trunc_model = trunc_reg, threshold = threshold)
```

Output

```
# output dataframe with counterfactual predictions
```

```
melor_2015_preds <- typhoon_melor_2015 %>%
```

```
  mutate(adj_M15_preds = adj_M15_preds,  
         unadj_M15_preds = unadj_M15_preds,  
         ass_M15_preds = ass_M15_preds)
```

```
# write to file
```

```
write.csv(melor_2015_preds, here("hurdle comparisons", "melor_2015_preds.csv"))
```