Counterfactual Unadjusted Causal Model

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```
# 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)
```

Counterfactual Data Input

```
# we need the renaming function for cleaning
melor_2015 <- read.csv(here("data", "clustered_M15_CF_data2.csv"))
```

Counterfactual predictions

Importing trained models

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

base_models_list <- list()

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

base_rain_model <- readRDS(here("unadjusted SCM/new base models",
                                "dec_base_rain_model_tuned.rds"))


base_class_full_model <- readRDS(file.path(base_file_path,
                                     "damage_fit_class_full.rds"))
```

```
base_reg_model <- readRDS(file.path(base_file_path,
                                    "base_reg_model.rds"))

base_models_list <- list("base_wind_model" = base_wind_model,
                         "base_rain_model" = base_rain_model,
                         "base_class_full_model" = base_class_full_model,
                         "base_reg_model" = base_reg_model)
```

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

# empty list
trunc_models_list <- list()

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

trunc_wind_model <- readRDS(file.path(trunc_file_path,
                                      "trunc_wind_model_tuned.rds"))
trunc_rain_model <- readRDS(here("unadjusted SCM/new trunc models",
                                 "dec_trunc_rain_model_tuned.rds"))

trunc_reg_model <- readRDS(file.path(trunc_file_path,
                                     "trunc_damage_fit_reg.rds"))

trunc_models_list <- list("trunc_wind_model" = trunc_wind_model,
                          "trunc_rain_model" = trunc_rain_model,
                          "trunc_reg_model" = trunc_reg_model)
```

```
names(trunc_models_list)
```

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

```
names(base_models_list)
```

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

```
# setting threshold for classification step
threshold = 0.30

source(here("R", "unadj_hurdle_function.R"))
unadj_counterfactual_hurdle_preds  <- unadj_hurdle_function(df = melor_2015,
                                                            scm_models_base = base_models_list,
                                                            scm_models_high = trunc_models_list,
                                                            threshold = threshold # threshold in train/test models i
                                                            )
```

```
# append the results to the counterfactual dataset
melor_2015  <- melor_2015 %>%
    mutate(damage_preds = unadj_counterfactual_hurdle_preds)
```

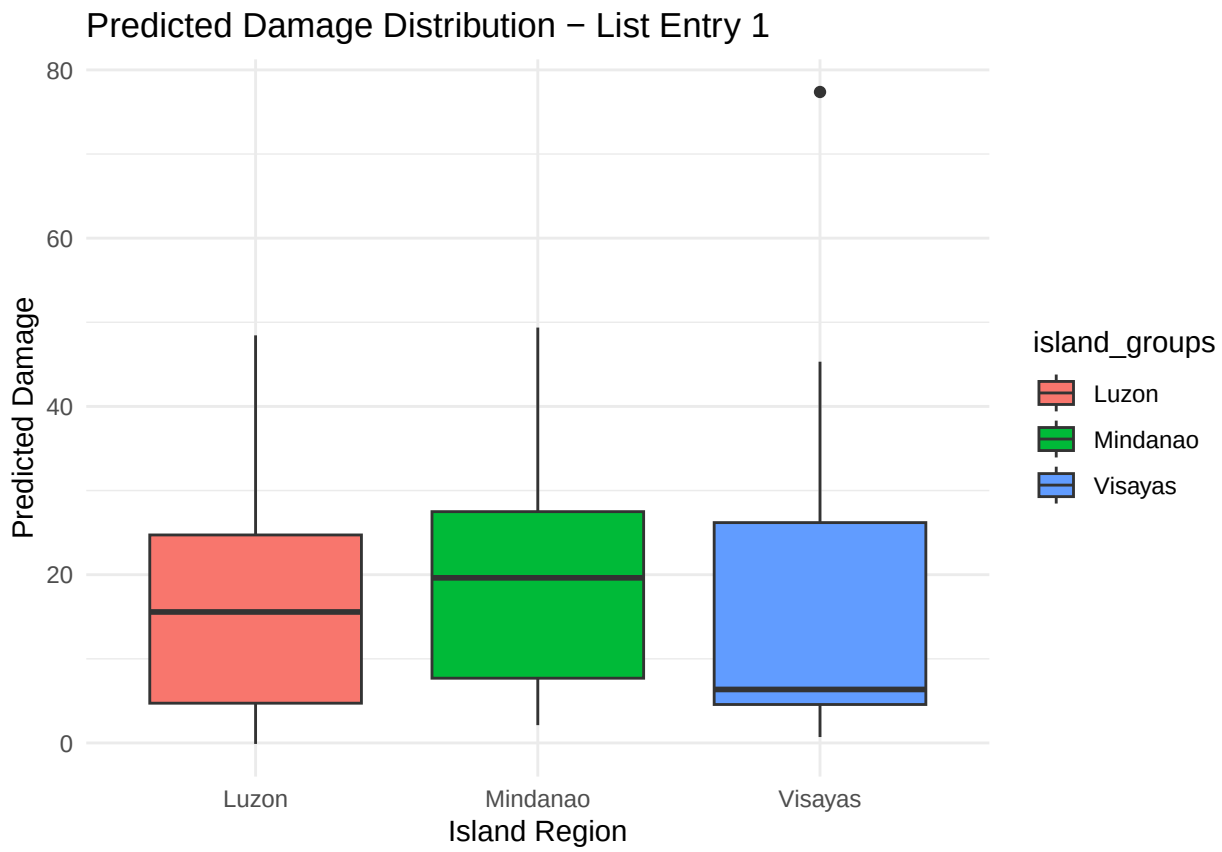
Counteractual results

```
# convert the Cluster column to factor
melor_2015$Cluster <- as.factor(melor_2015$Cluster)

# extract cluster_levels
cluster_levels <- levels(melor_2015$Cluster)

# Source function: counterfactual_results
source(here("R", "counterfactual_results.R"))


cf_results <- counterfactual_results(cf_data = melor_2015,
                                     cluster_levels = cluster_levels)
```

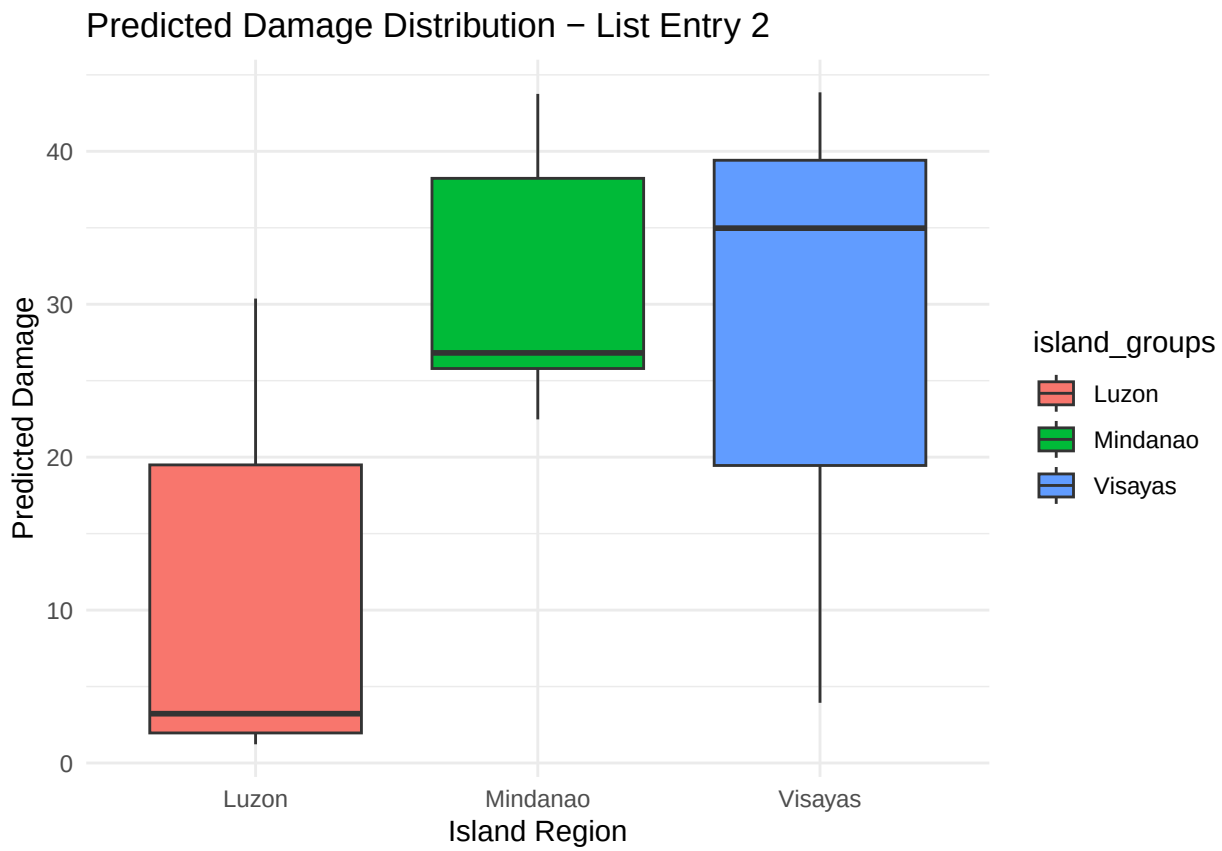
```
## currently evaluating cluster: 1currently evaluating cluster: 2currently evaluating cluster: 3current
```

```
# Check the list to confirm plots are stored
print(cf_results$plots)
```

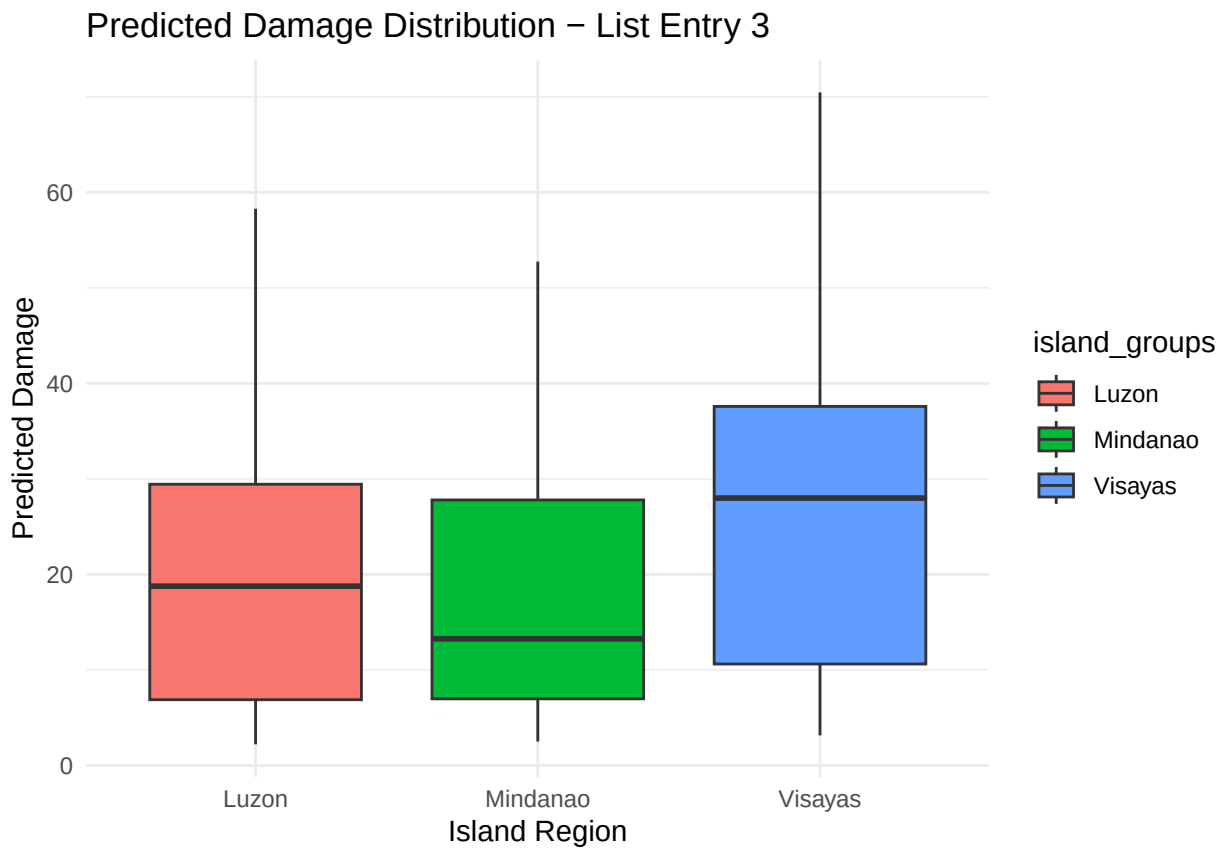
```
## [[1]]
```



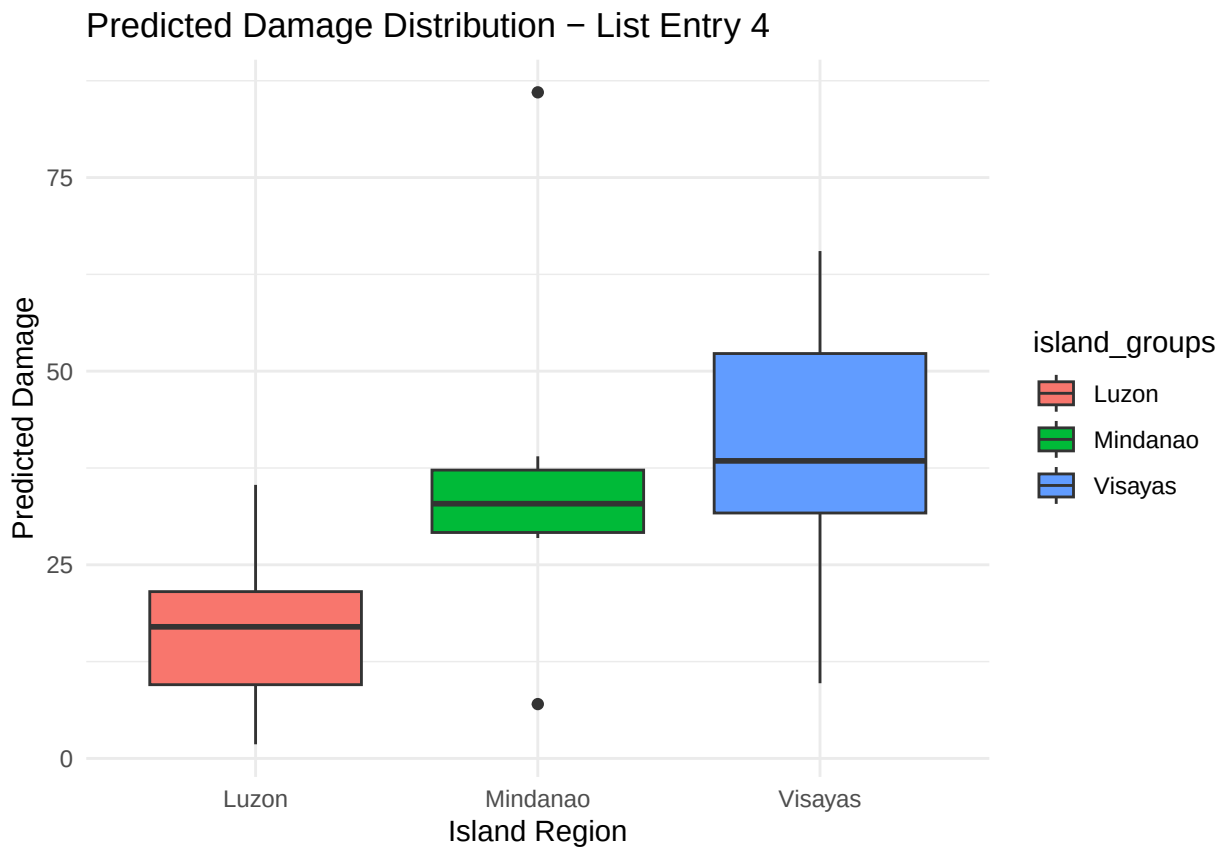

```
##
## [[2]]
```


Predicted Damage Distribution − List Entry 2
Predicted Damage
40
30
20
10
0
Luzon
Mindanao
Visayas
Island Region
island_groups
Luzon
Mindanao
Visayas

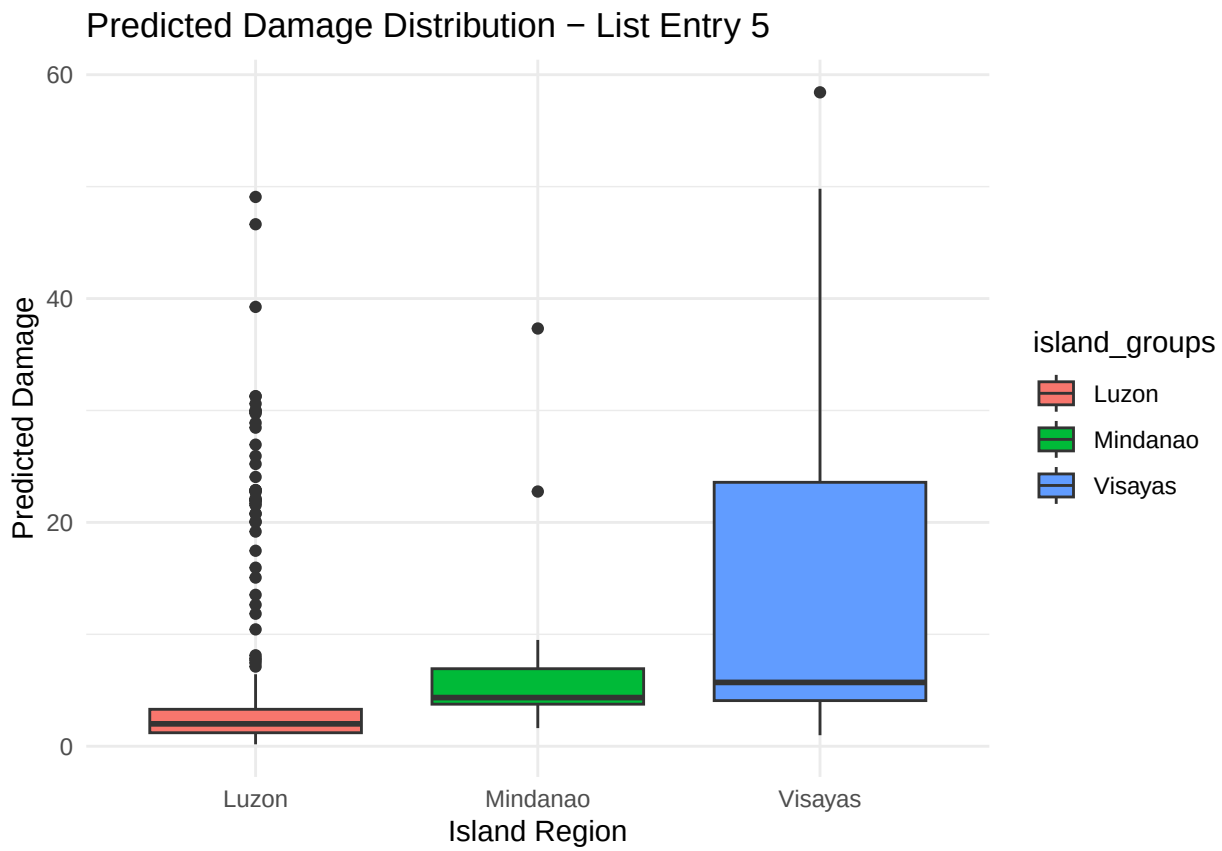
```
##
## [[3]]
```


Predicted Damage Distribution − List Entry 3
Predicted Damage
60
40
20
0
Luzon
Mindanao
Visayas
Island Region
island_groups
Luzon
Mindanao
Visayas

```
##
## [[4]]
```


Predicted Damage Distribution − List Entry 4
Predicted Damage
75
50
25
0
Luzon
Mindanao
Visayas
Island Region
island_groups
Luzon
Mindanao
Visayas

```
##
## [[5]]
```




```
print(cf_results$median)
```

```
## [[1]]
## # A tibble: 3 x 2
##   island_groups median_damage
##   <chr>                 <dbl>
## 1 Luzon                 15.6
## 2 Mindanao              19.6
## 3 Visayas                6.36
##
## [[2]]
## # A tibble: 3 x 2
##   island_groups median_damage
##   <chr>                 <dbl>
## 1 Luzon                  3.22
## 2 Mindanao              26.8
## 3 Visayas               35.0
##
## [[3]]
## # A tibble: 3 x 2
##   island_groups median_damage
##   <chr>                 <dbl>
## 1 Luzon                  18.8
## 2 Mindanao               13.3
## 3 Visayas                28.0
```

```
##
## [[4]]
## # A tibble: 3 x 2
##   island_groups median_damage
##   <chr>                 <dbl>
## 1 Luzon                  17.0
## 2 Mindanao               32.9
## 3 Visayas                38.4
##
## [[5]]
## # A tibble: 3 x 2
##   island_groups median_damage
##   <chr>                 <dbl>
## 1 Luzon                  2.00
## 2 Mindanao               4.35
## 3 Visayas                5.70
```

OLD CODE