Tutorial 6: Refactoring R Code

Introduction

In this tutorial, you will refactor the code into separate scripts corresponding to each section. The dataset we will use comes from the `palmerpenguins` package, which contains measurements of penguins from three species.

Load Libraries and Data

~~~
```{r}
library(tidyverse)
```
~~~

```
-- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
v dplyr     1.1.4     v readr     2.1.5
v forcats   1.0.0     v stringr   1.5.1
v ggplot2   3.5.1     v tibble    3.2.1
v lubridate 1.9.4     v tidyr     1.3.1
v purrr     1.0.4
-- Conflicts ------------------------------------------ tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()    masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to becom
```

~~~
```{r}
library(palmerpenguins)
library(tidymodels)
```
~~~

```
-- Attaching packages -------------------------------------- tidymodels 1.3.0 --
v broom        1.0.7     v rsample      1.2.1
v dials        1.4.0     v tune         1.3.0
v infer        1.0.7     v workflows    1.2.0
v modeldata    1.4.0     v workflowsets 1.1.0
v parsnip      1.3.0     v yardstick    1.3.2
v recipes      1.1.1
-- Conflicts ----------------------------------------- tidymodels_conflicts() --
x scales::discard() masks purrr::discard()
x dplyr::filter()   masks stats::filter()
x recipes::fixed()  masks stringr::fixed()
x dplyr::lag()      masks stats::lag()
x yardstick::spec() masks readr::spec()
x recipes::step()   masks stats::step()
```

~~~~
```{r}
data <- penguins

# Initial cleaning: Remove missing values
data <- data %>% drop_na()
```
~~~~

Methods

In this section, we perform exploratory data analysis (EDA) and prepare the data for modeling.

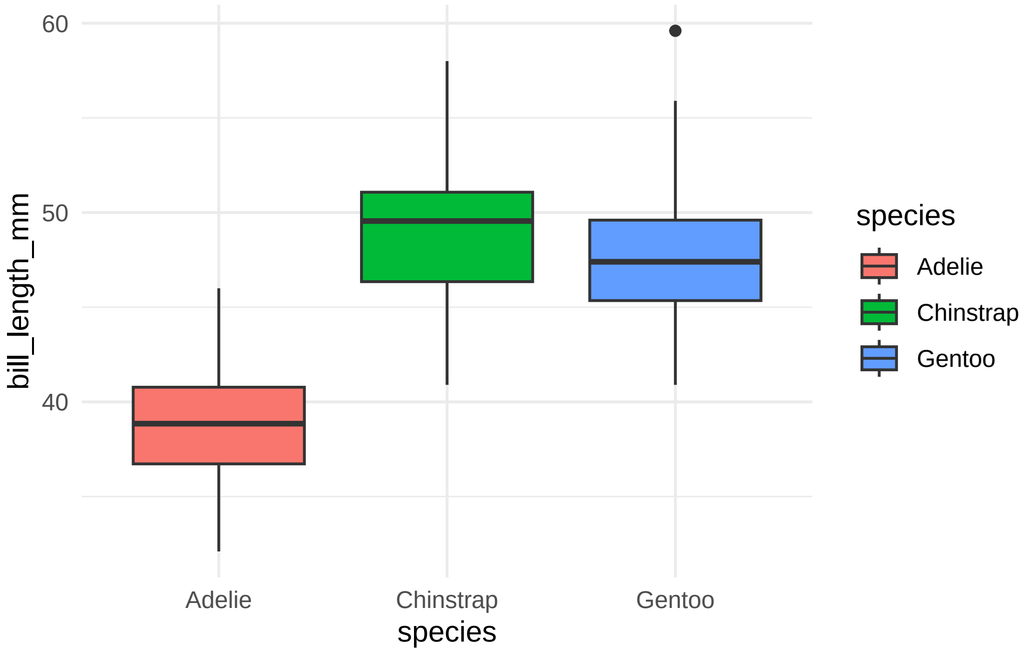
```
# Summary statistics
glimpse(data)
```

```
Rows: 333
Columns: 7
$ species           <fct> Adelie, Adelie, Adelie, Adelie, Adelie, Adelie, Adel~
$ island            <fct> Torgersen, Torgersen, Torgersen, Torgersen, Torgerse~
$ bill_length_mm    <dbl> 39.1, 39.5, 40.3, 36.7, 39.3, 38.9, 39.2, 41.1, 38.6~
$ bill_depth_mm     <dbl> 18.7, 17.4, 18.0, 19.3, 20.6, 17.8, 19.6, 17.6, 21.2~
$ flipper_length_mm <int> 181, 186, 195, 193, 190, 181, 195, 182, 191, 198, 18~
$ body_mass_g       <int> 3750, 3800, 3250, 3450, 3650, 3625, 4675, 3200, 3800~
$ sex               <fct> male, female, female, female, male, female, male, fe~
```

```
summarise(data, mean_bill_length = mean(bill_length_mm), mean_bill_depth = mean(bill_depth_m
```

```
# A tibble: 1 x 2
  mean_bill_length mean_bill_depth
             <dbl>           <dbl>
1             44.0            17.2
```

```
# Visualizations
ggplot(data, aes(x = species, y = bill_length_mm, fill = species)) +
  geom_boxplot() +
  theme_minimal()
```



```
# Prepare data for modeling
data <- data %>%
  select(species, bill_length_mm, bill_depth_mm, flipper_length_mm, body_mass_g) %>%
  mutate(species = as.factor(species))
```

Model

We will fit a classification model using `tidymodels` to predict the species of a penguin based on its physical characteristics.

```
# Split data
set.seed(123)
data_split <- initial_split(data, strata = species)
train_data <- training(data_split)
test_data <- testing(data_split)

# Define model
penguin_model <- nearest_neighbor(mode = "classification", neighbors = 5) %>%
  set_engine("kknn")

# Create workflow
penguin_workflow <- workflow() %>%
  add_model(penguin_model) %>%
  add_formula(species ~ .)

# Fit model
penguin_fit <- penguin_workflow %>%
  fit(data = train_data)
```

Results

We evaluate the performance of the model using the test dataset.

```
# Predict on test data
predictions <- predict(penguin_fit, test_data, type = "class") %>%
  bind_cols(test_data)

# Confusion matrix
conf_mat <- conf_mat(predictions, truth = species, estimate = .pred_class)
conf_mat
```

```
           Truth
Prediction  Adelie Chinstrap Gentoo
  Adelie        36         0      0
  Chinstrap      1        17      0
  Gentoo         0         0     30
```

Conclusion

In this tutorial, we:

- Loaded and cleaned the `palmerpenguins` dataset.
- Performed exploratory data analysis.
- Built a k-Nearest Neighbors classification model using `tidymodels`.
- Evaluated the model's performance.