120 Years of Olympic History

Bayesian Statistics W19 Final Group Project

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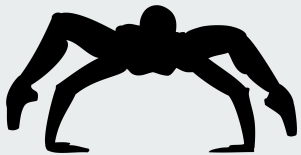


Background

Historical dataset on Summer and Winter Olympic Games (Athens 1896 to Rio 2016)

How does a US Olympian's age, sex, height, & weight affect their chances of winning a medal?

Dataset

1051

120 years of Olympic history: athletes and results

basic bio data on athletes and medal results from Athens 1896 to Rio 2016

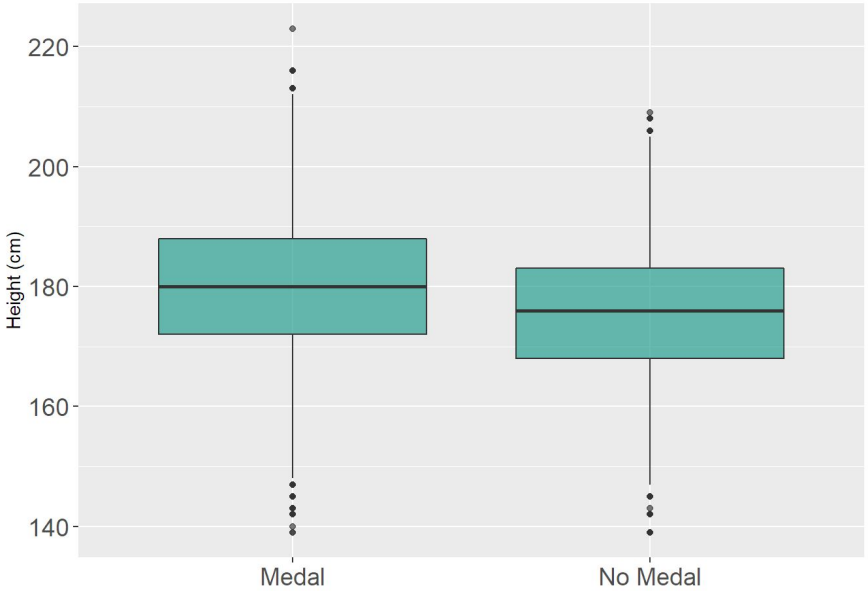
rgriffin • updated 2 years ago (Version 2)

Data | Tasks (1) | Kernels (154) | Discussion (6) | Activity | Metadata | Download (40 MB) | New Notebook

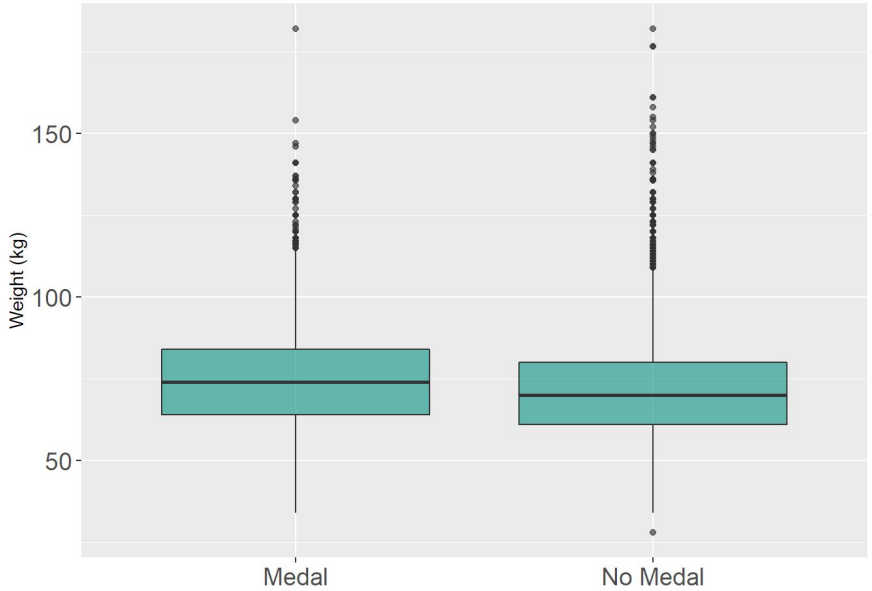
ID	Name	**Age *(yr)***
Sex *(M/F)*	**Height *(cm)***	**Weight *(kg)***
Team	NOC *(Country Code)*	Games *(Summer/Winter)*
Year	Season	City
Sport	Event	**Medal**

Exploratory Data Analysis

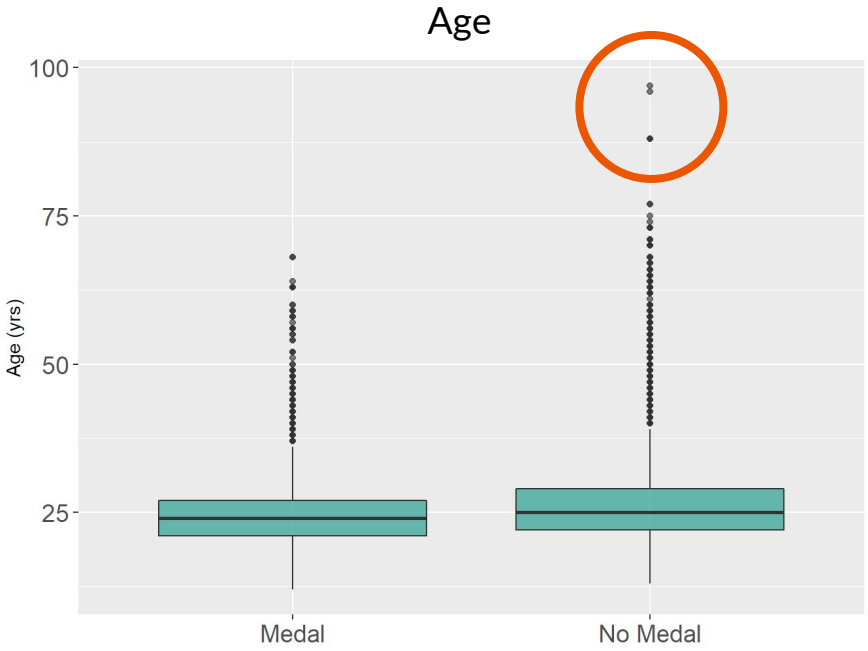
Height

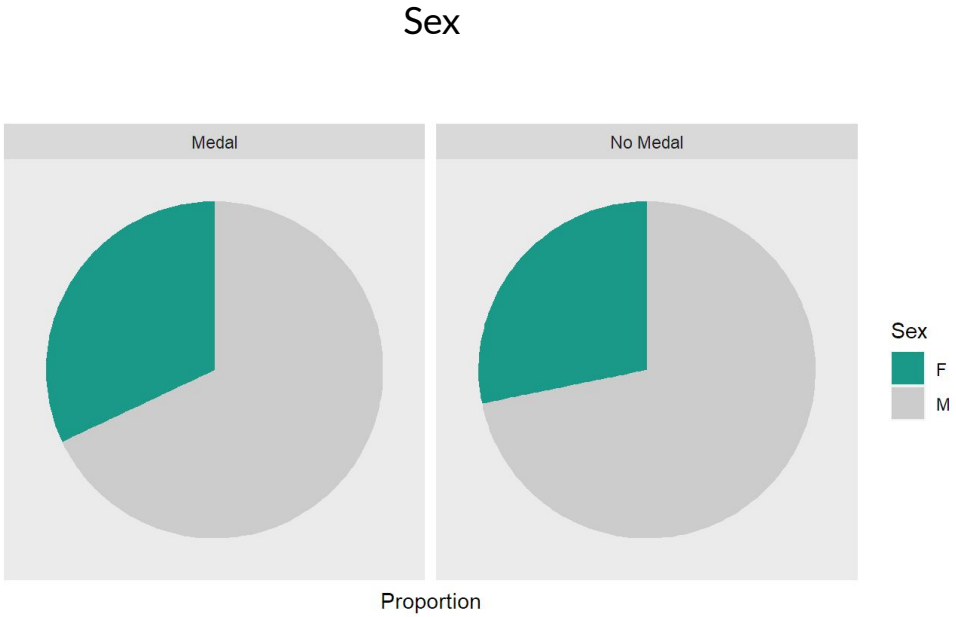


Weight



Exploratory Data Analysis





Wait... A 90-Year-Old Olympian?

```
USA %>%
    filter(Age > 90) %>%
    select(Name, Age, Year, Sport)
```

```
## # A tibble: 2 x 4
##   Name                    Age  Year Sport
##   <chr>                 <dbl> <dbl> <chr>
## 1 Winslow Homer            96  1932 Art Competitions
## 2 John Quincy Adams Ward   97  1928 Art Competitions
```

Fitting the Logistic Regression Model

$$\log(\frac{Y}{1-Y}) = \beta_0 + \beta_1 * Age + \beta_2 * I(Sex = M) + \beta_3 * Height + \beta_4 * Weight$$

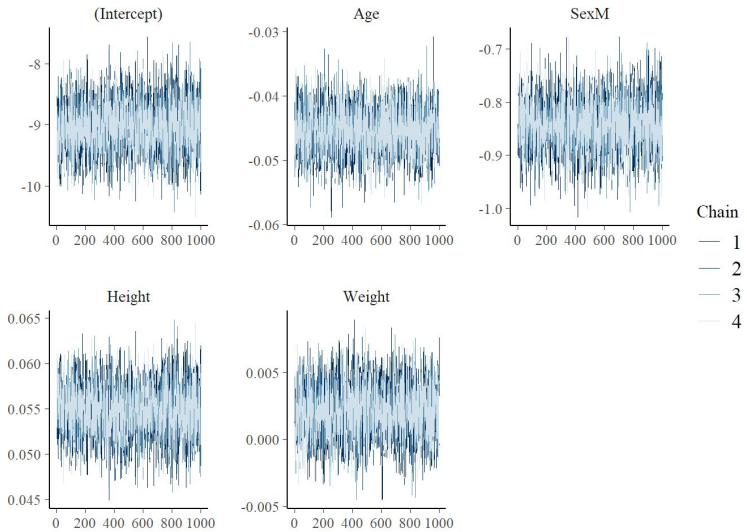
```r
normalize ← function(vec)
    (vec - mean(vec, na.rm = T)) / sd(vec, na.rm = T)

USA_normalized ← USA %>%
    mutate(Age    = normalize(Age),
           Height = normalize(Height),
           Weight = normalize(Weight))
```

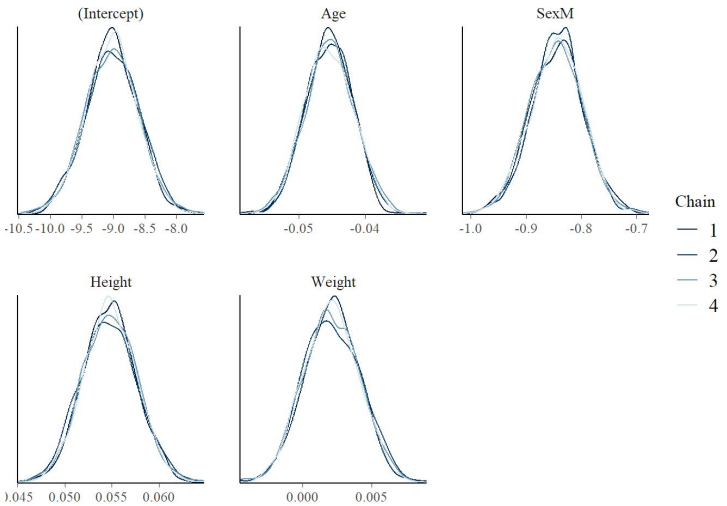
```r
model ← stan_glm(
    Won_Medal ~ Age + Sex + Height + Weight,
    data = USA,
    family = binomial(link = "logit")
)

model_normalized ← stan_glm(
    Won_Medal ~ Age + Sex + Height + Weight,
    data = USA_normalized,
    family = binomial(link = "logit")
)
```

```r
coef(model)
```

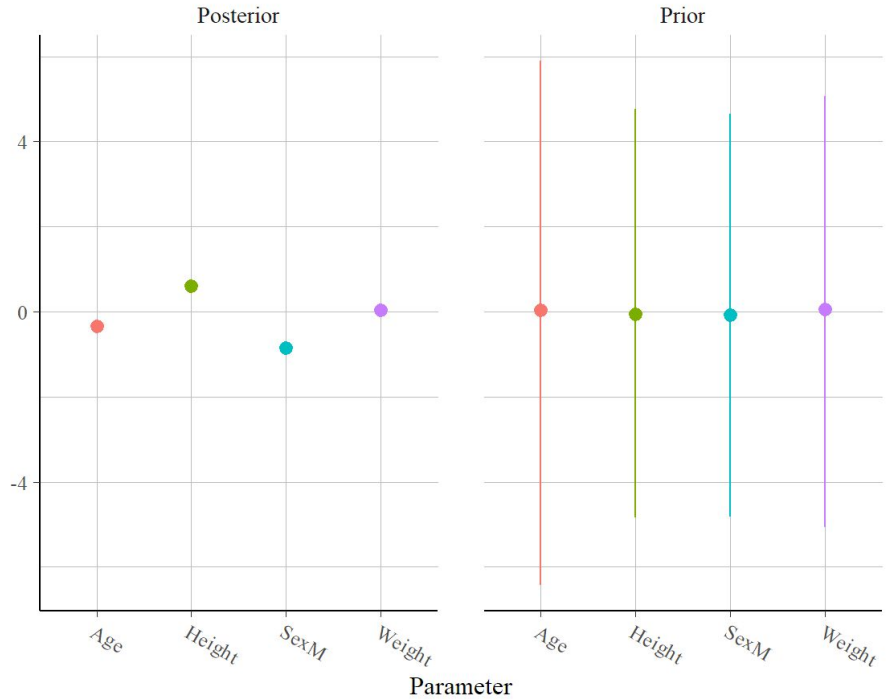
```
##  (Intercept)          Age         SexM       Height       Weight
## -9.024852149 -0.045428742 -0.845416285  0.054764970  0.002027598
```

Parameter Approximations





Parameter Distribution Intervals



Could We Win a 🏅 Too?

```
pred ← function(Age, Sex, Height, Weight)
{
    y_dist ← posterior_predict(model, newdata = data.frame(Age, Sex, Height, Weight))

    mean(y_dist) ⩾ 0.5
}
```

Thank You!