

T4 — Gustavo Hernández

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01 November 2025

Contents

Generación de datos simulados y aplicación de los métodos de selección de subconjuntos.

1. Usa una función en R para generar una variable predictora \mathbf{X} de longitud 100, así como un vector de ruido ϵ de longitud 100.
2. Genera un vector de respuesta \mathbf{Y} de longitud 100, de acuerdo al modelo

$$Y = \beta_0 + \beta_1 X + \beta_2 X^2 + \beta_3 X^3 + \epsilon$$

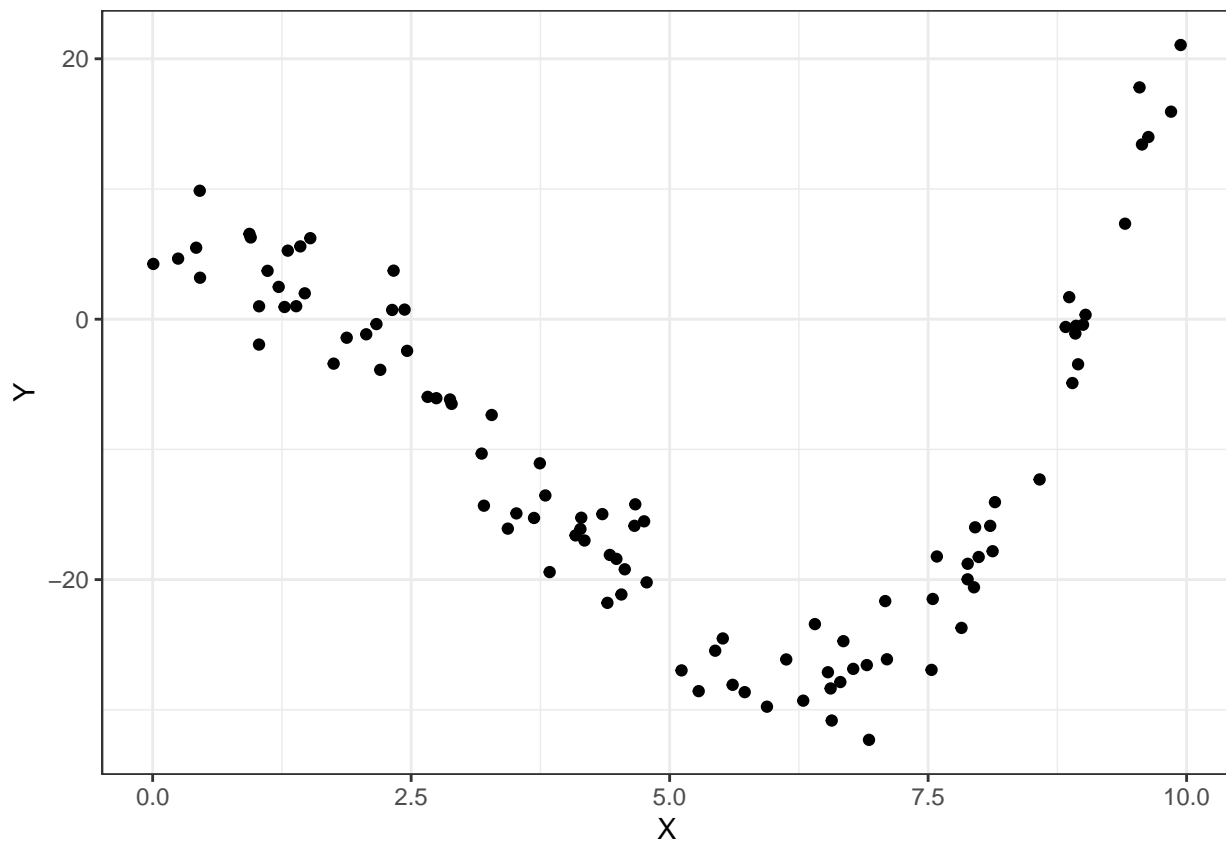
3. Utiliza la función `regsubsets()` para realizar la selección de subconjuntos con el fin de elegir el mejor modelo que contenga los predictores \mathbf{X} , \mathbf{X}^2 , ..., \mathbf{X}^{10} . ¿Qué modelo se selecciona como el mejor según el AIC, BIC y el R^2 ajustado? Muestra algunas gráficas que proporcionen evidencia de tu respuesta y reporta los coeficientes de mejor modelo obtenido.
4. Repite (c) usando la selección forward stepwise y backward stepwise. ¿Cómo se compara tu respuesta con los resultados obtenidos en (c)?

Solución

```
set.seed(123) # Para reproducibilidad
n <- 100
X <- runif(n, min=0, max=10) # Variable predictora
epsilon <- rnorm(n, mean = 0, sd = 3) # Vector de ruido
```

```
beta_0 <- 5
beta_1 <- 2
beta_2 <- -3
beta_3 <- 0.3
Y <- beta_0 + beta_1 * X + beta_2 * X^2 + beta_3 * X^3 + epsilon
```

```
#scatterplot
library(ggplot2)
ggplot() +
  geom_point(mapping=aes(x=X,y=Y)) +
  theme_bw()
```



```
data <- data.frame(Y = Y)
for (i in 1:10) {
  data[[paste0("X", i)]] <- X^i
}
```

```
library(leaps)
```

```
options(max.print=10000)
```

```
regfit.full <- regsubsets(Y ~ ., data = data, nbest=252, really.big=T, nvmax=10)
reg.summary <- summary(regfit.full)
print(reg.summary)
```

```
## Subset selection object
## Call: regsubsets.formula(Y ~ ., data = data, nbest = 252, really.big = T,
##      nvmax = 10)
## 10 Variables (and intercept)
##      Forced in Forced out
## X1      FALSE      FALSE
## X2      FALSE      FALSE
## X3      FALSE      FALSE
## X4      FALSE      FALSE
## X5      FALSE      FALSE
## X6      FALSE      FALSE
## X7      FALSE      FALSE
## X8      FALSE      FALSE
## X9      FALSE      FALSE
## X10     FALSE      FALSE
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[illegible]

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## 8 ( 21 ) "*" " " " " "*" "*" "*" "*" "*" "*" " " "
## 8 ( 22 ) "*" "*" "*" "*" "*" "*" "*" " " " " "*" " "
## 8 ( 23 ) "*" "*" "*" "*" "*" "*" "*" " " " " "*" " "
## 8 ( 24 ) "*" "*" "*" "*" "*" "*" "*" " " " " "*" " "
## 8 ( 25 ) "*" "*" "*" "*" "*" "*" "*" " " " " "*" " "
## 8 ( 26 ) "*" "*" "*" "*" "*" "*" "*" "*" " " " " "
## 8 ( 27 ) "*" "*" "*" "*" "*" "*" " " " " "*" "*" " "
## 8 ( 28 ) "*" "*" "*" "*" "*" " " " " " "*" " " " " "*"
## 8 ( 29 ) "*" "*" "*" "*" " " " " "*" "*" "*" "*" " "
## 8 ( 30 ) "*" "*" "*" "*" "*" " " " " "*" " " " " "*"
## 8 ( 31 ) "*" "*" "*" "*" " " " " "*" "*" "*" " " " "*"
## 8 ( 32 ) "*" "*" "*" " " " " " "*" "*" "*" "*" " " "
## 8 ( 33 ) "*" "*" "*" "*" "*" " " " " " "*" "*" "*"
## [ reached 'max' / getOption("max.print") -- omitted 23 rows ]
```

```
# Mejor subset segun bic
bics = reg.summary$bic
idx_menor = which.min(bics)
cat(paste("Numero de variables: ", sum(reg.summary$which[idx_menor,]), "\n"))
```

```
## Numero de variables: 4
```

```
reg.summary$which[idx_menor,]
```

## (Intercept)	X1	X2	X3	X4	X5
## TRUE	FALSE	TRUE	FALSE	FALSE	TRUE
## X6	X7	X8	X9	X10	
## FALSE	TRUE	FALSE	FALSE	FALSE	

```
# Mejor subset segun adjr2
adjr2s = reg.summary$adjr2
idx_menor = which.min(adjr2s)
reg.summary$which[idx_menor,]
```

## (Intercept)	X1	X2	X3	X4	X5
## TRUE	FALSE	TRUE	FALSE	FALSE	FALSE
## X6	X7	X8	X9	X10	
## FALSE	FALSE	FALSE	FALSE	FALSE	

```
plot(regfit.full, scale='adjr2')
```

