Lab 8: Model fitting

Not graded, just practice

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2023-10-24

1 Model fitting

1. True or false, gradient descent and orinary least squares are both iterative optimization algorithms.

- (A) True
- (B) False

2. What cost function have we been using to perform our gradient descent?

- (A) standard deviation
- (B) bootstrapping
- (C) sum of squared error
- (D) absolute error

3. True or false, when performing gradient descent on the model given by the equation $y = w_0 + w_1x_1 + w_2x_2$, we might arrive at a local minimum and miss the global one.

- (A) True
- (B) False

4. Which of the following would work to estimate the free parameters of a **nonlinear** model?

- (A) gradient descent

- (B) ordinary least squares solution
- (C) both work

5. True or false, in gradient descent, we search through all possible parameters in the parameter space.

- (A) True
- (B) False

2 Model fitting in R

Questions 6-9 refer to the code and output below, performing gradient descent with `optimg`:

```
optimg(data = data, par = c(0,0), fn=SSE, method = "STGD")


$par
[1] 3.37930046 0.06683237

$value
[1] 959.4293

$counts
[1] 6

$convergence
[1] 0
```

6. How many steps did the gradient descent algorithm take? _____
7. What was the sum of squared error of the optimal paramters? _____
8. What coefficients does the algorithm converge on?

- (A) 3.37930046, 0.06683237
- (B) 0, 0
- (C) 959.4293
- (D) 6, 0

- (E) all of the above

9. What parameters were used to initialized the algorithm?

- (A) 3.37930046, 0.06683237
- (B) 0, 0
- (C) 959.4293
- (D) 6, 0

Questions 10-12 refer to the output below from `lm()`:

```
Call:
lm(formula = y ~ x, data = data)

Coefficients:
(Intercept)            x
    3.37822      0.06688
```

10. Use R notation to write the model specification.

```
y ~ x  # this works (implicit intercept)

y ~ 1 + x # this also works (explicit intercept)
```

11. Given the model is specified by the equation $y = w_0 + w_1 x_1$, what is the parameter estimate for $w_0 =$ _____ and $w_1 =$ _____.

12. True or false, for this model, `optimg()` with gradient descent would converge on the same parameter estimates?

- (A) True
- (B) False