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4. Gradient Descent
Gradient Descent

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Gradient Descent: Geometrically Revisited

2/2 points (graded)
Assume $\theta \in \mathbb{R}$. Our goal is to find θ that minimizes

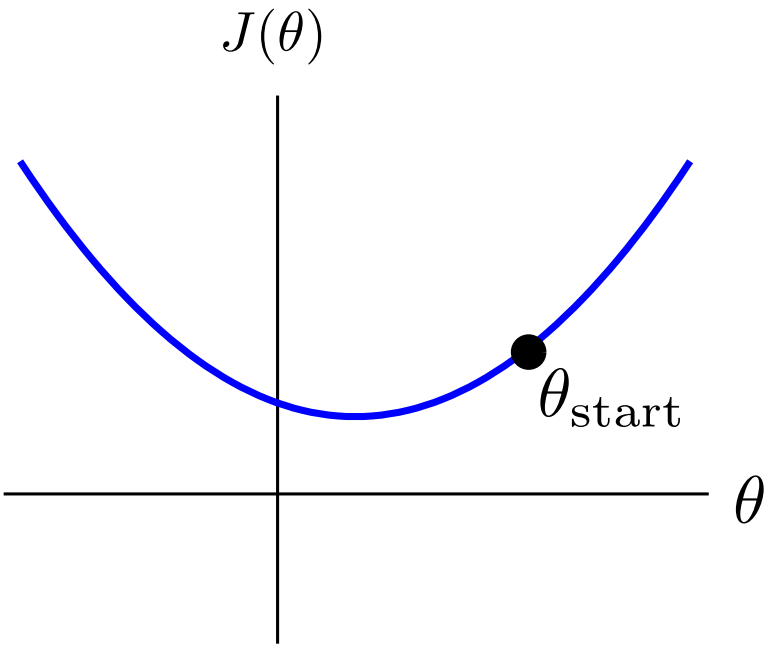
$$J\left(\theta, \theta_0\right) = \frac{1}{n} \sum_{i=1}^{n} \text{Loss}_h \left(y^{(i)} \left(\theta \cdot x^{(i)} + \theta_0\right)\right) + \frac{\lambda}{2} \mid\mid \theta \mid\mid^2$$

through gradient descent. In other words, we will

1. Start θ at an arbitrary location: $\theta \leftarrow \theta_{start}$
2. Update θ repeatedly with $\theta \leftarrow \theta - \eta \frac{\partial J(\theta, \theta_0)}{\partial \theta}$ until θ does not change significantly

In the 2 dimensional space below, we start our gradient descent at θ_{start}. What is

the direction θ moves to in its first update?



- away from the origin
- towards the origin
- upwards
- downwards

✔

What happens if we increase the stepsize η?

- the magnitude of change in each update gets larger
- the magnitude of change in each update gets smaller

Solution:

Gradient descent makes θ move to opposite direction of the gradient. Thus it will move towards the origin at θ_{start}. Also, increasing the stepsize makes the update happen in greater magnitude.

Submit You have used 1 of 3 attempts

Answers are displayed within the problem

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- Theta_0 not included. Why? 3
- The graph in the question 3
- Parameter theta_0 2
  The parameter theta_0 is not taken into account in the task.

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