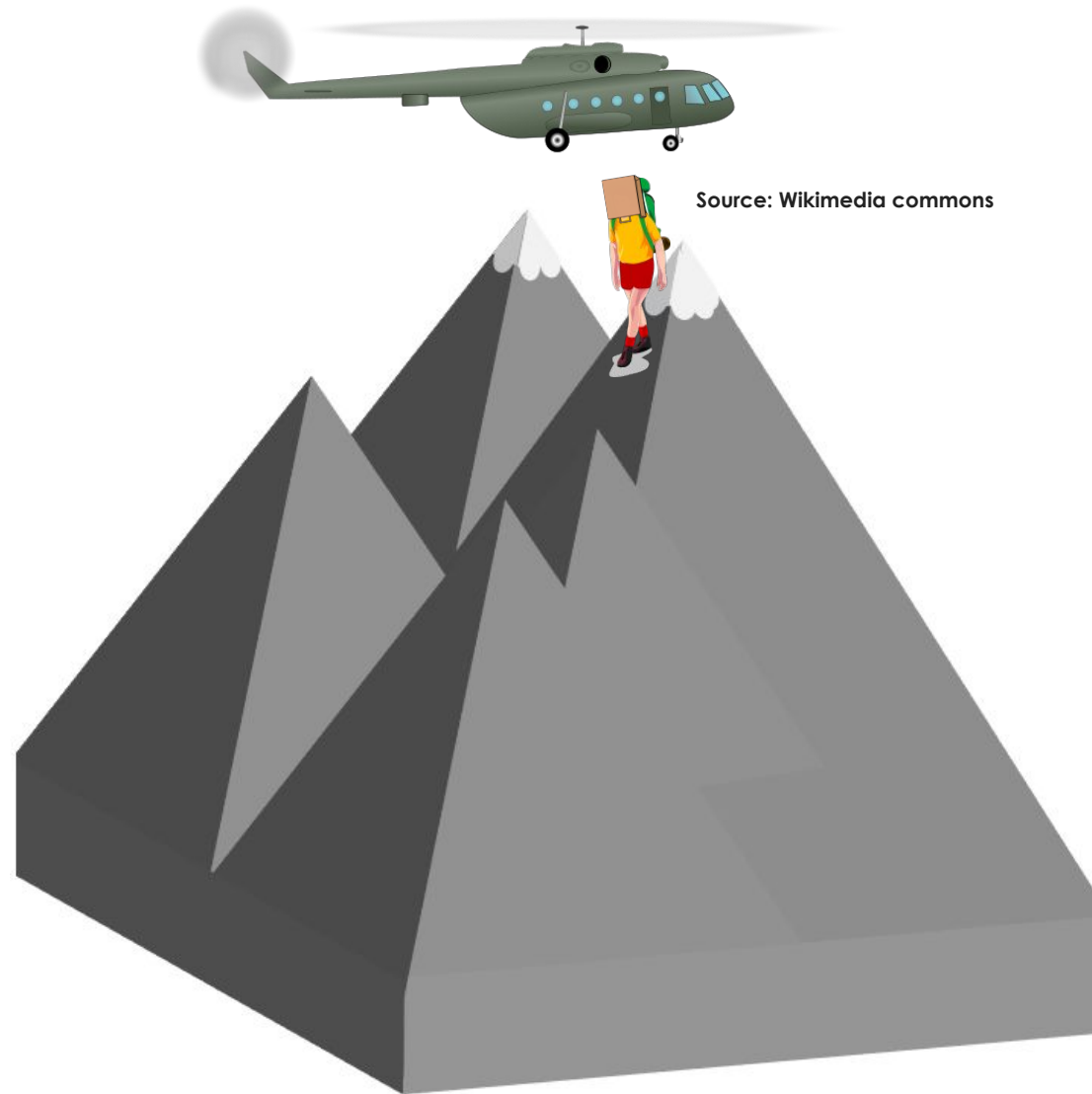




# Introduction to Gradient Descent

Deep Learning Pre-Work

# Introduction

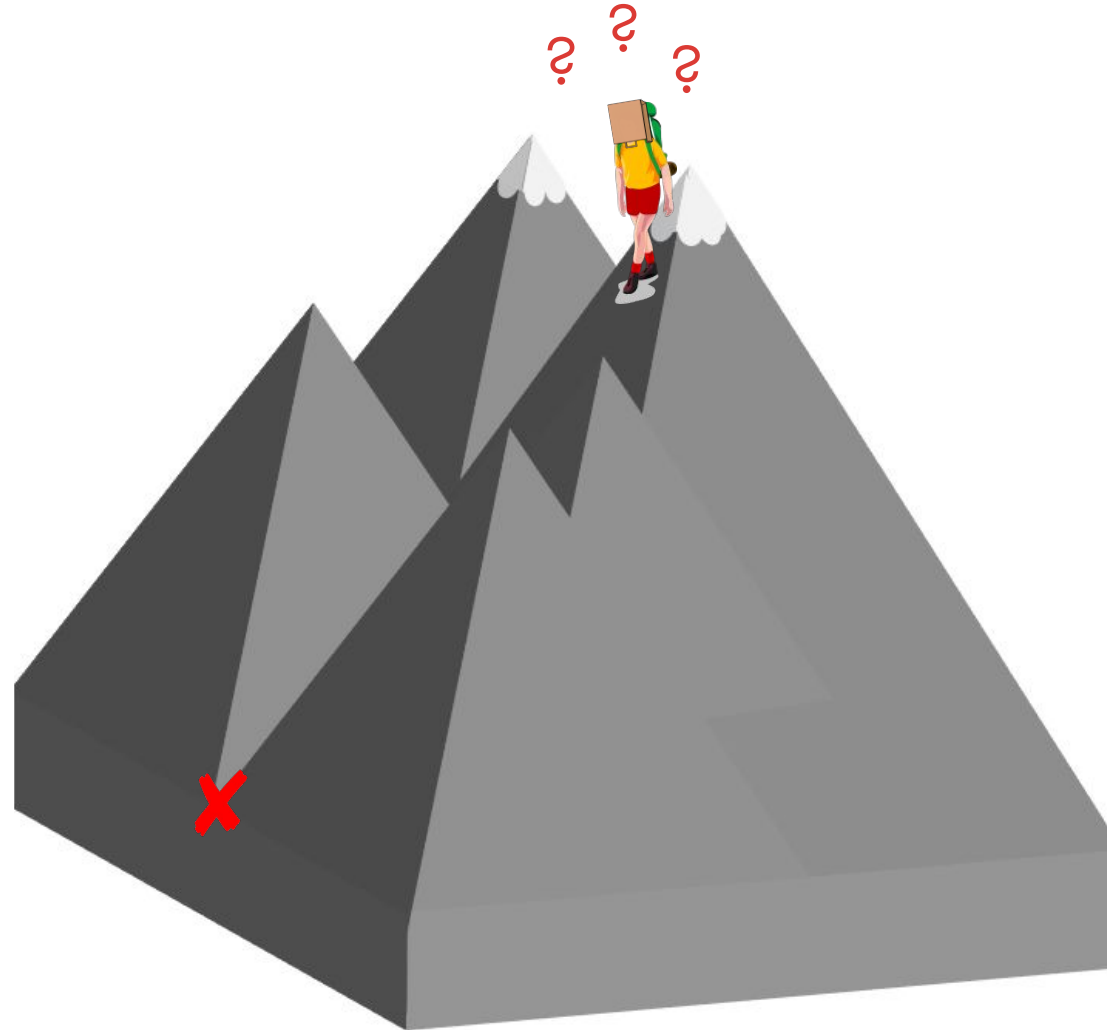


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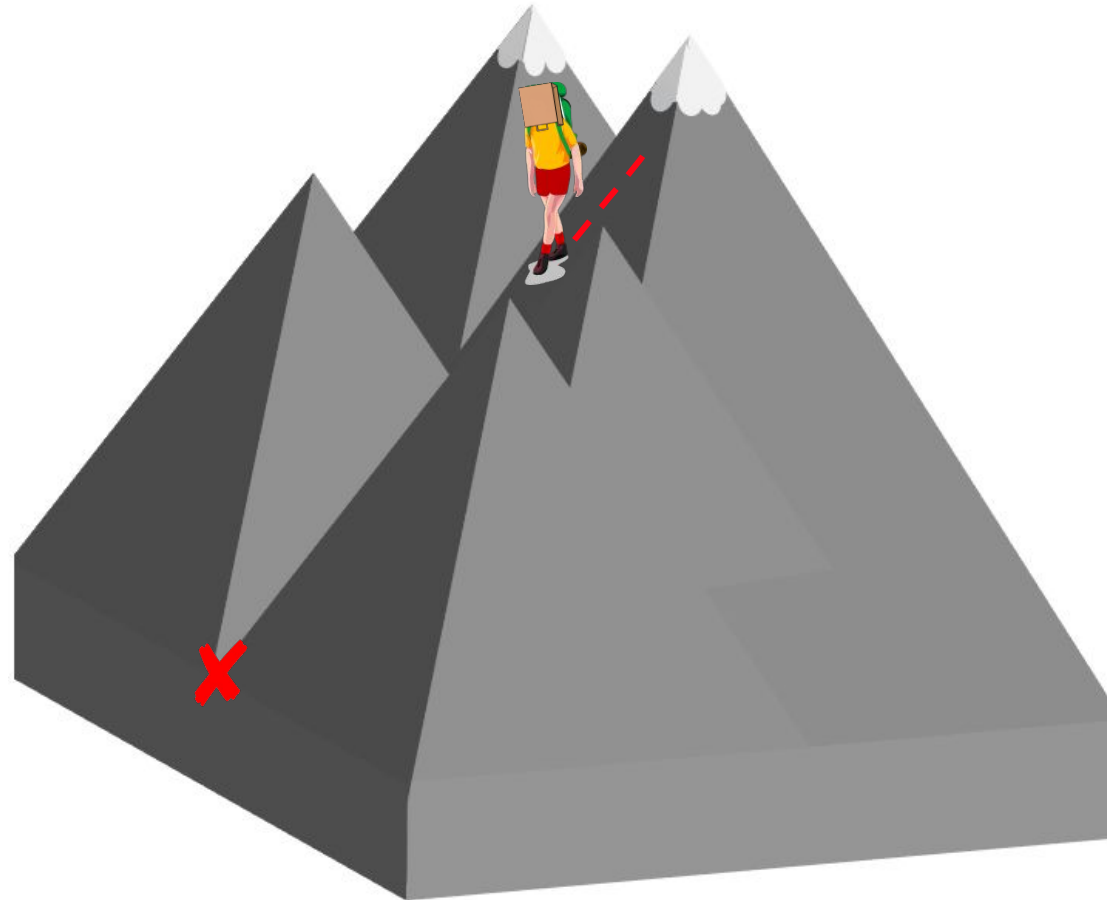
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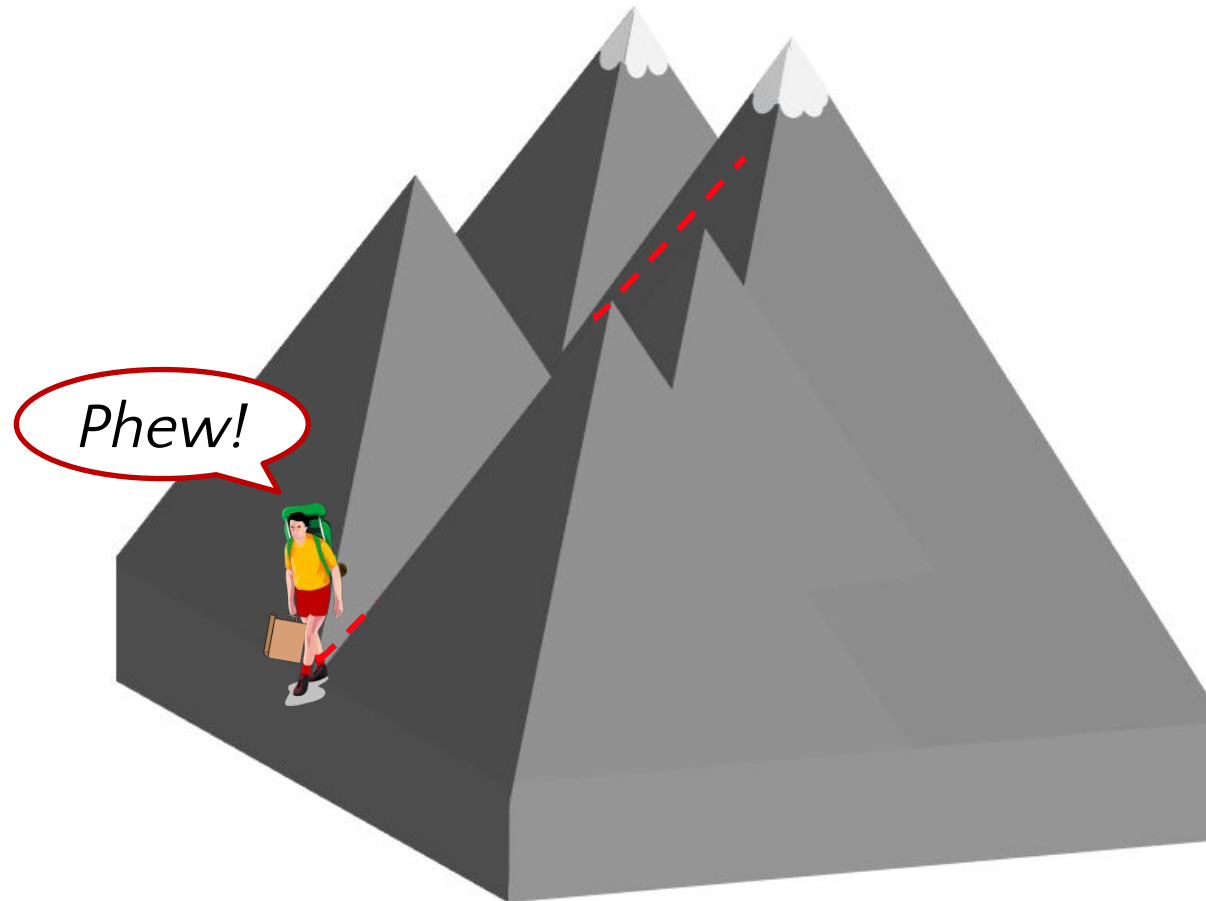
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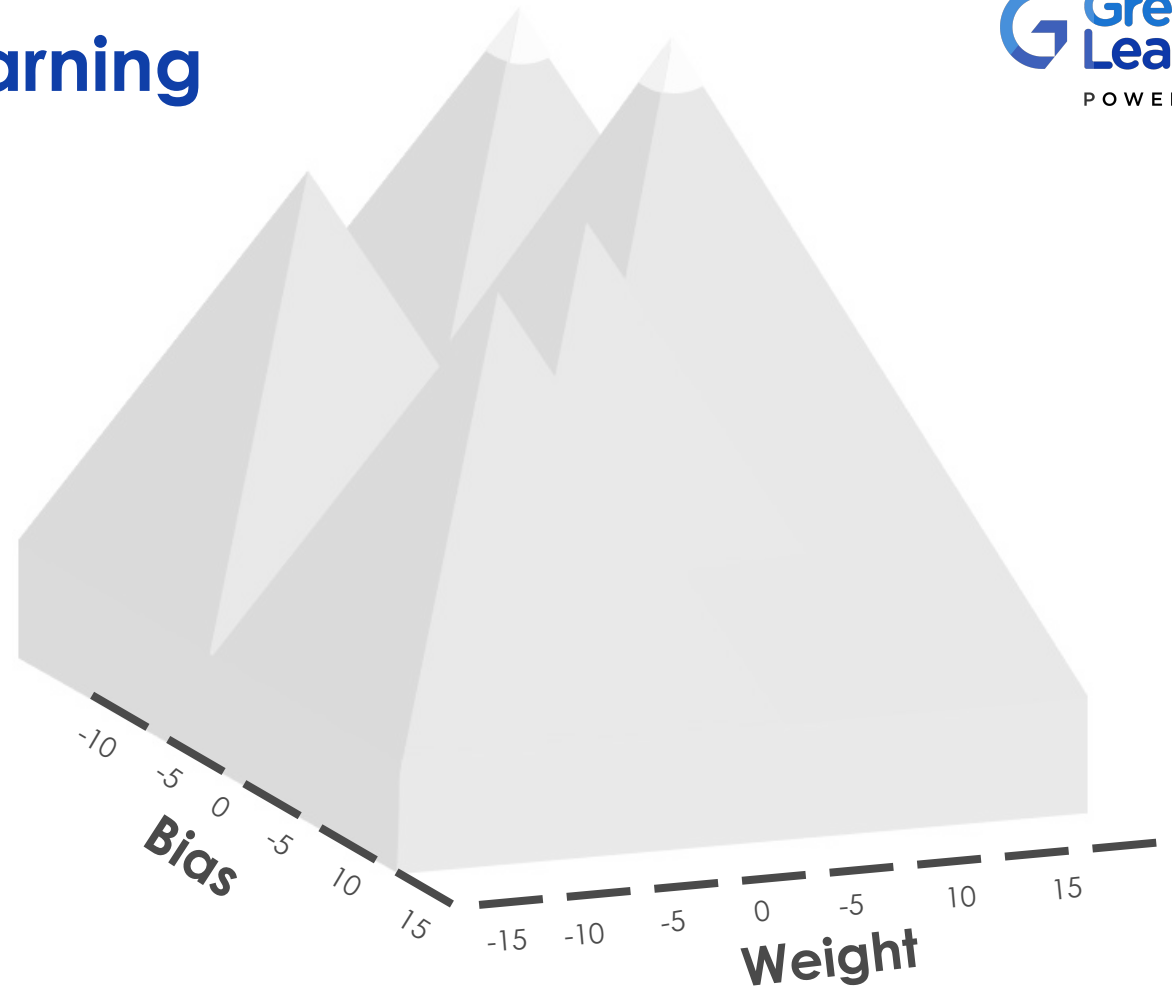
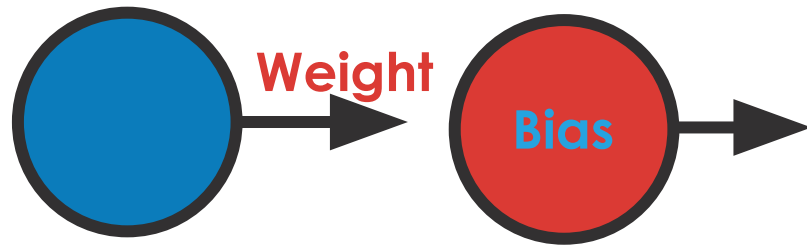
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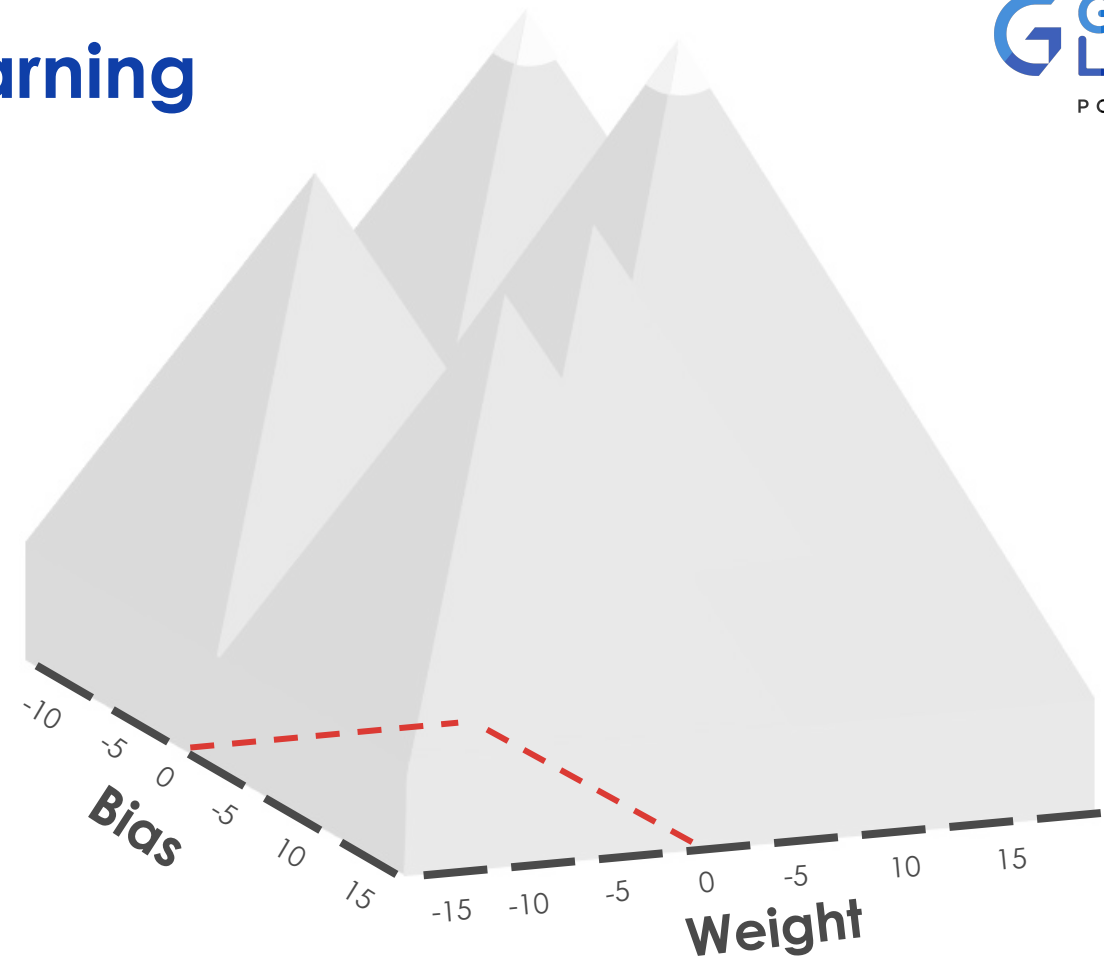
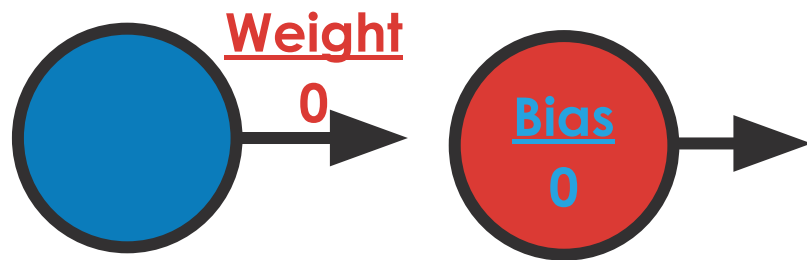
# Gradient Descent in Deep Learning



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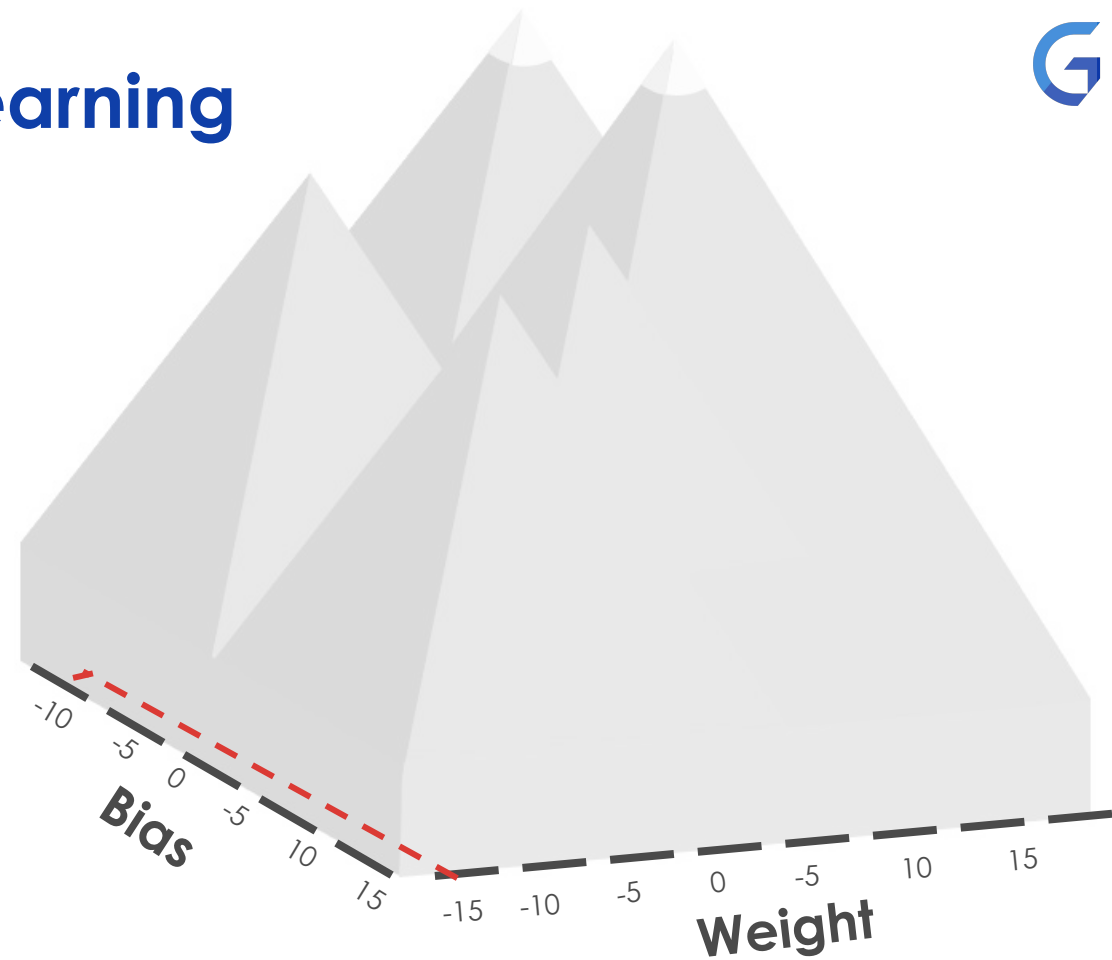
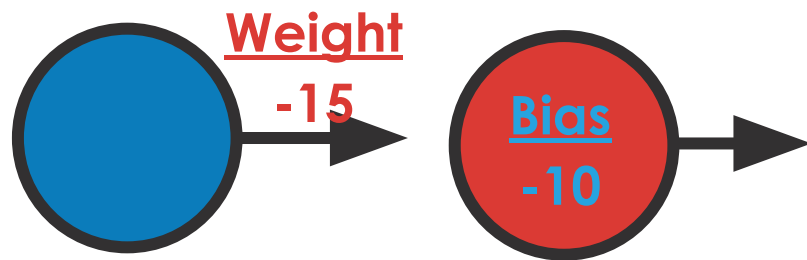
# Gradient Descent in Deep Learning



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# Gradient Descent in Deep Learning

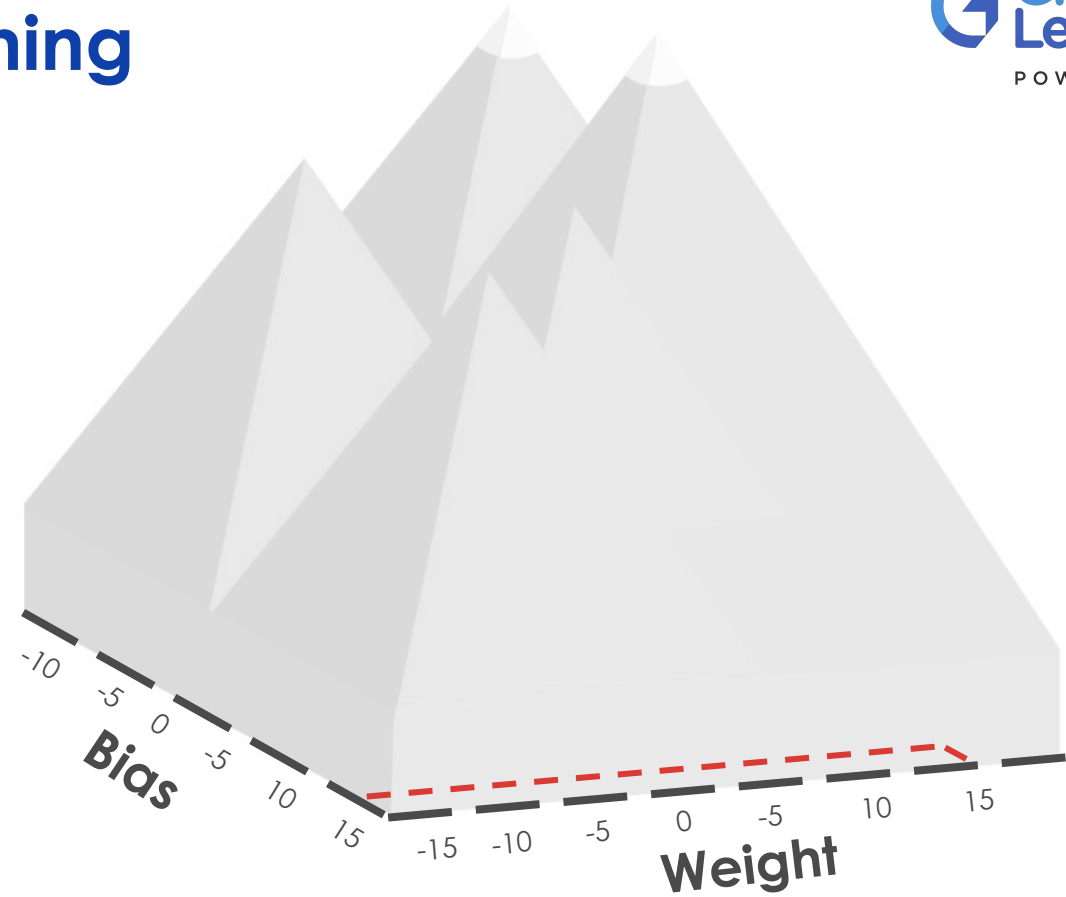
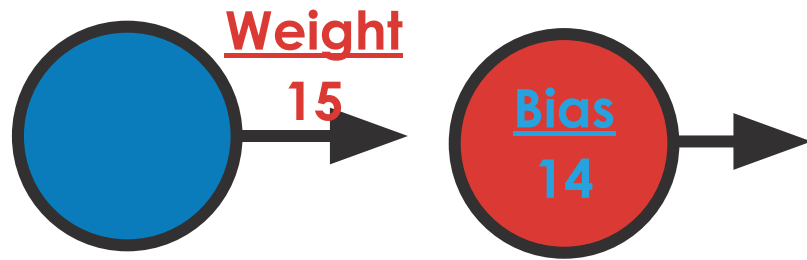


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# Gradient Descent in Deep Learning

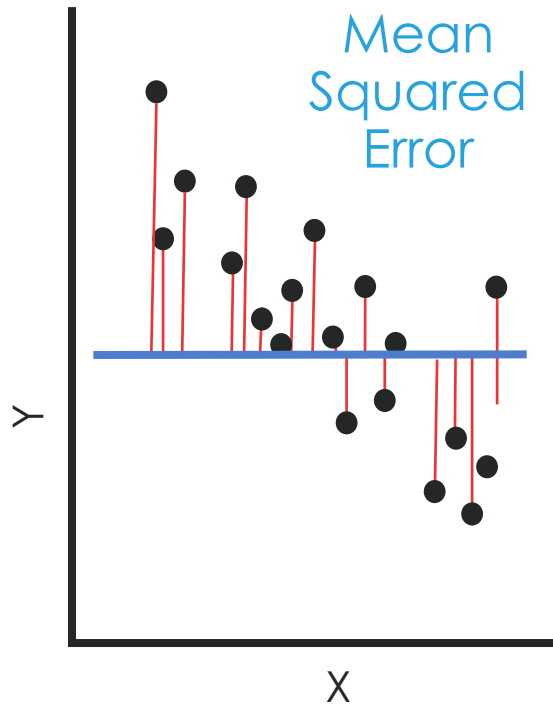


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# Loss

## Regression

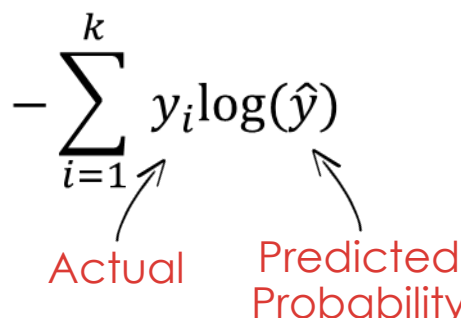


## Classification

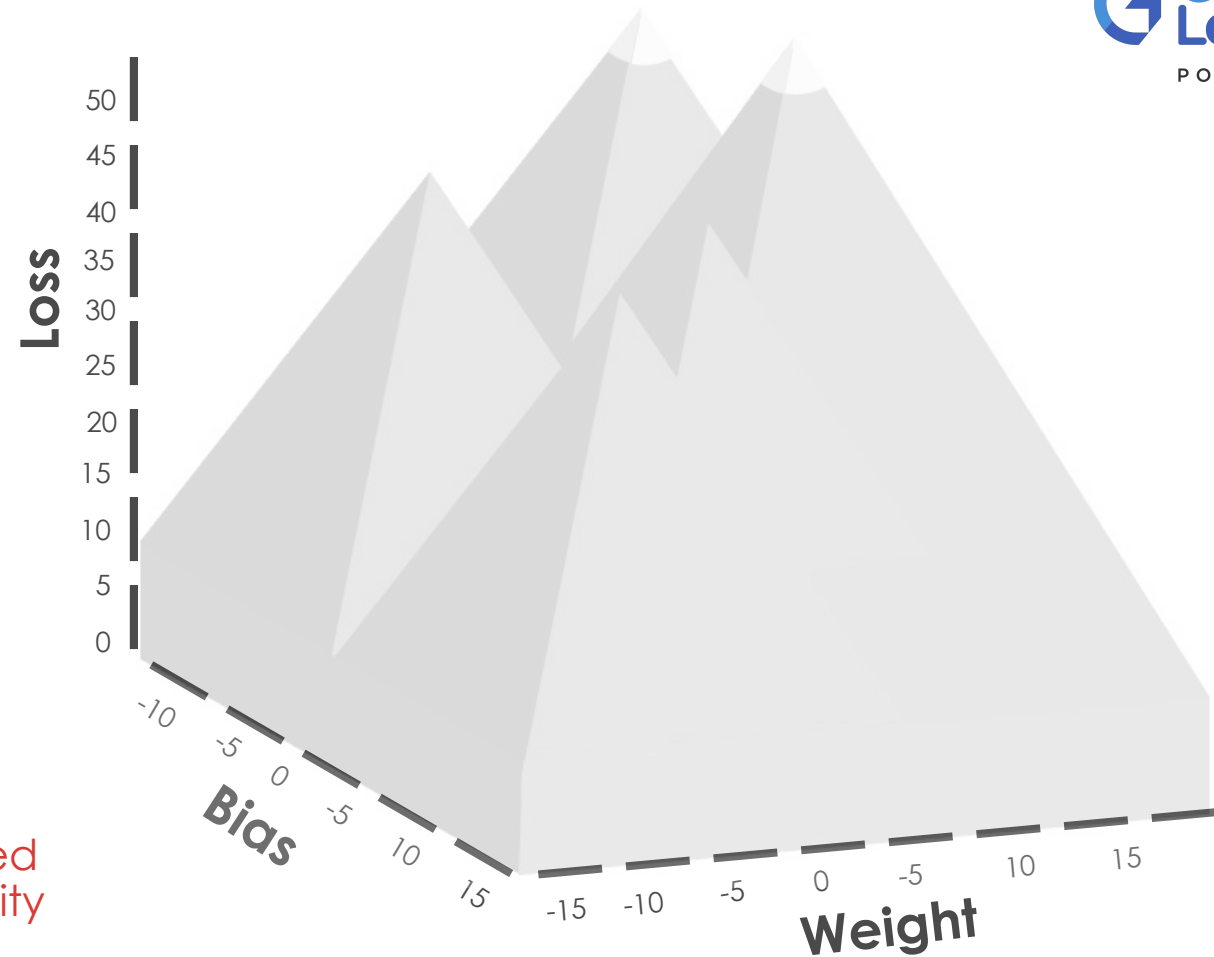
Cross Entropy

$$-\sum_{i=1}^k y_i \log(\hat{y})$$

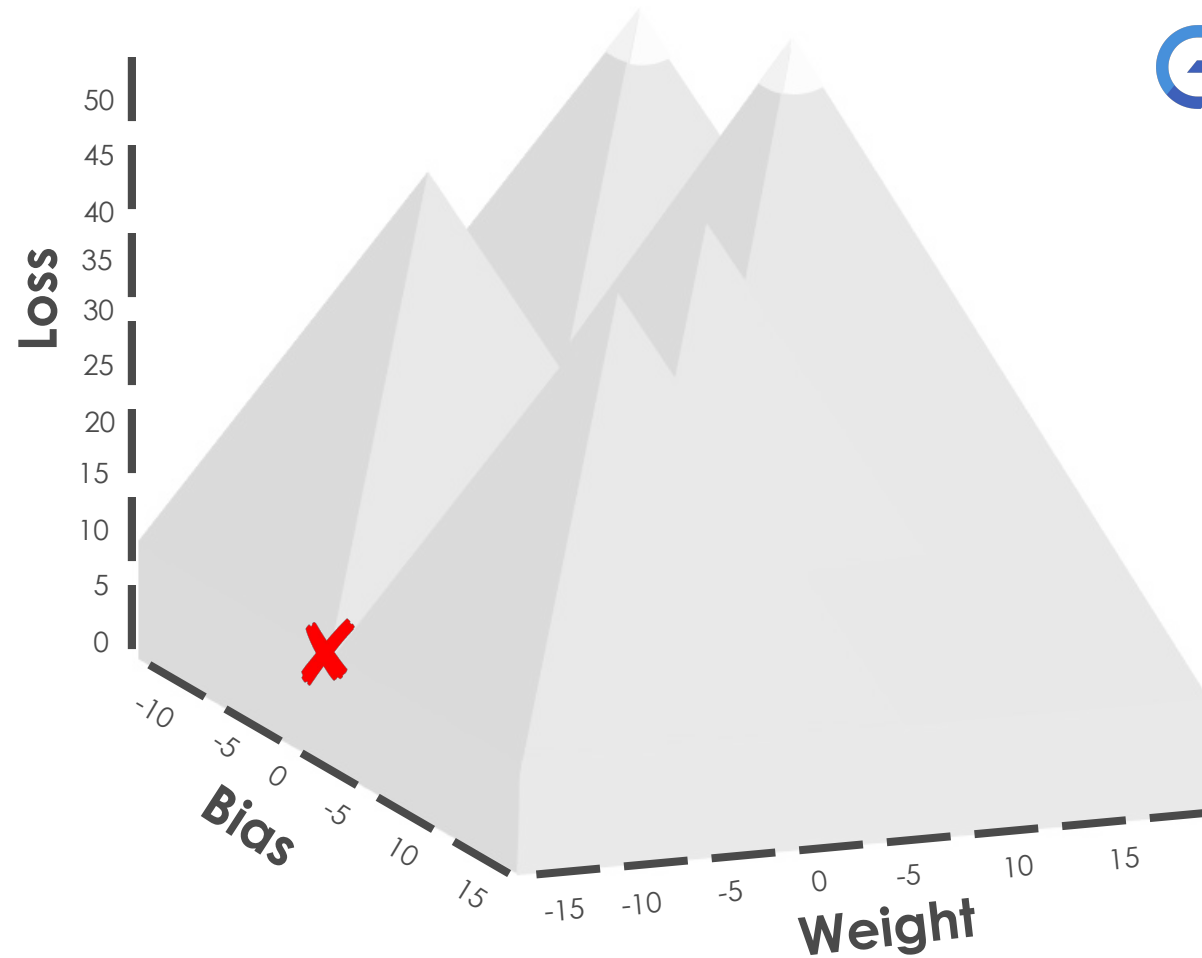
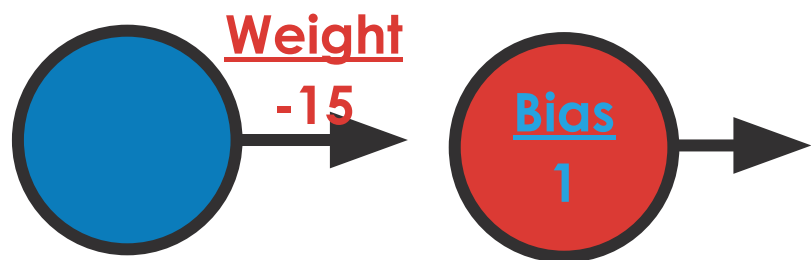
Actual Predicted Probability



The diagram shows the Cross Entropy formula. The term  $y_i$  is labeled 'Actual' with an arrow pointing to it. The term  $\log(\hat{y})$  is labeled 'Predicted Probability' with an arrow pointing to it. The text 'Cross Entropy' is written in blue above the formula.



# Loss

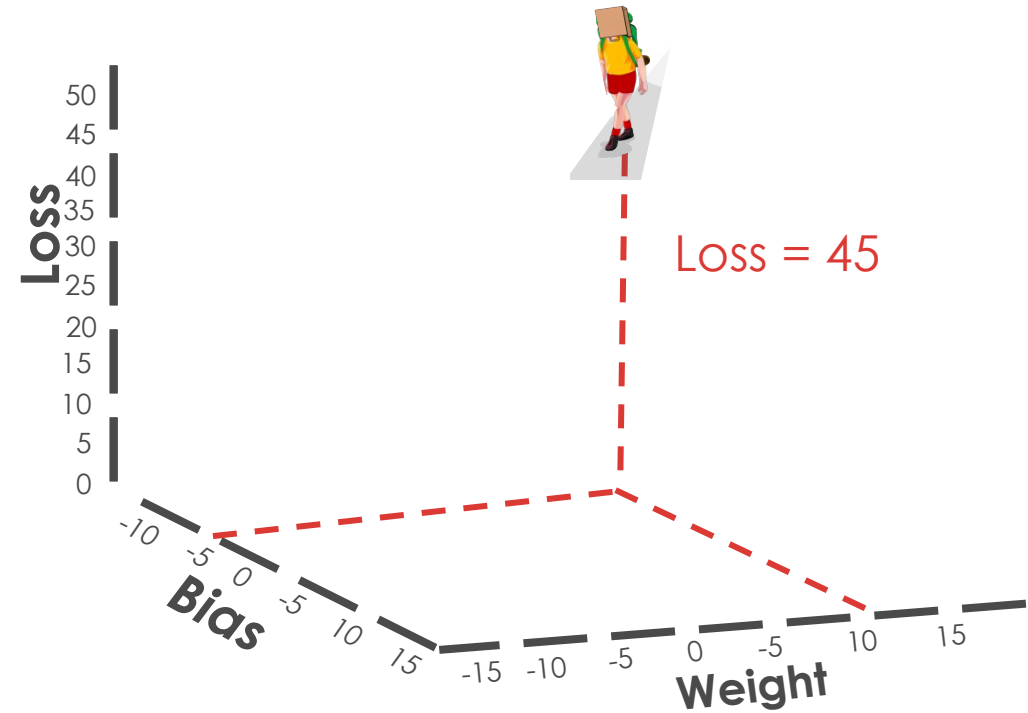
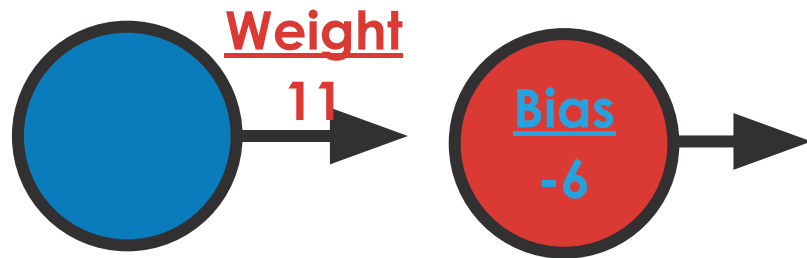


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# Gradient Descent Steps

**Step 1** Start at a random bias and weight and calculate the loss



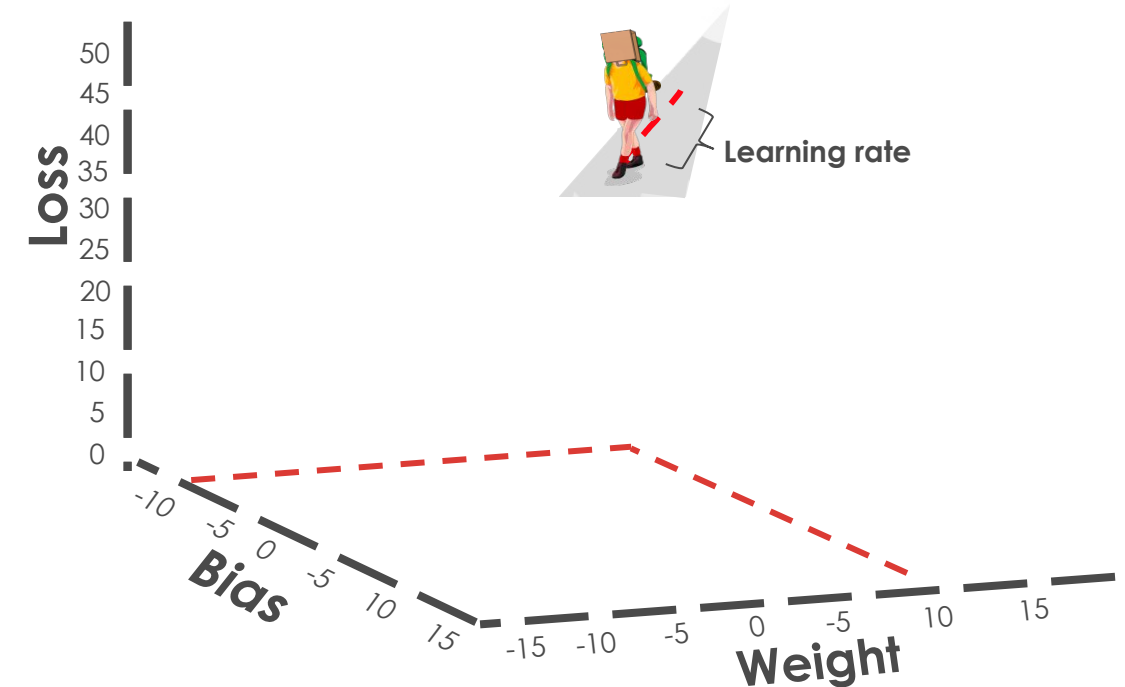
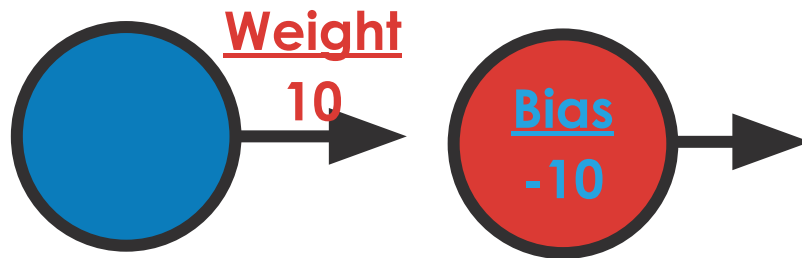
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# Gradient Descent Steps

Step 1 Start at a random bias and weight and calculate the loss

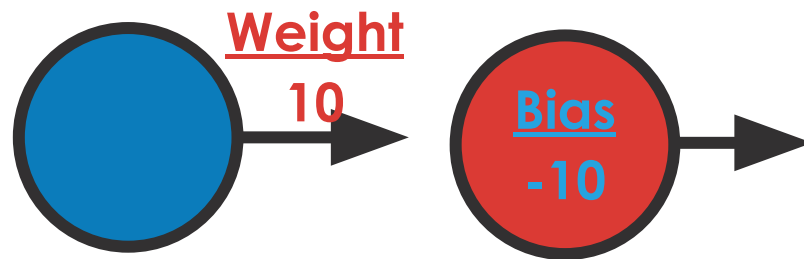
Step 2 Take a step in the direction with the steepest gradient



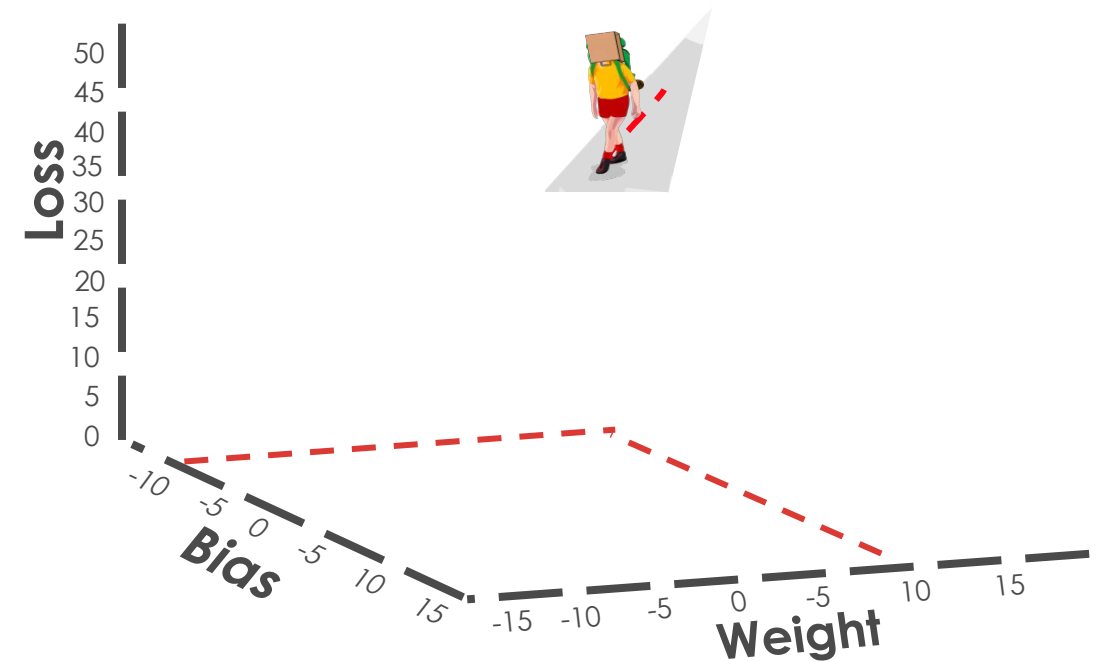
# Gradient Descent Steps

Step 1 Start at a random bias and weight and calculate the loss

Step 2 Take a step in the direction with the steepest gradient

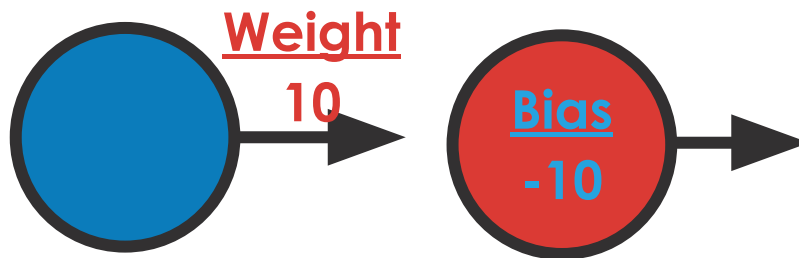
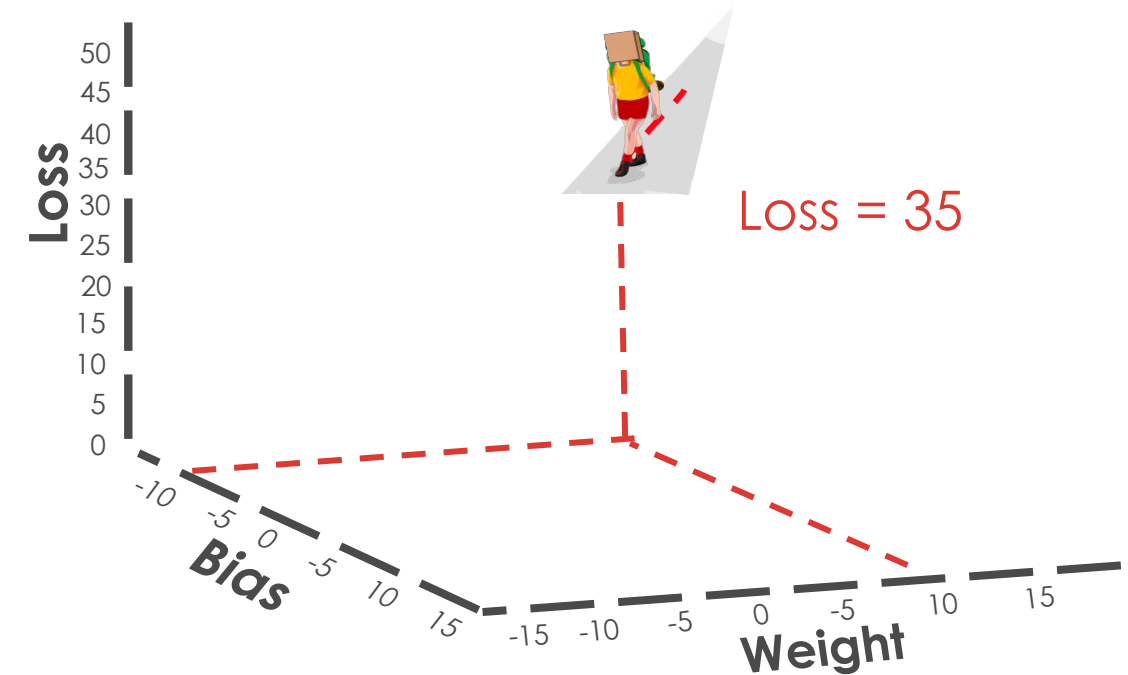


**Backpropagation**



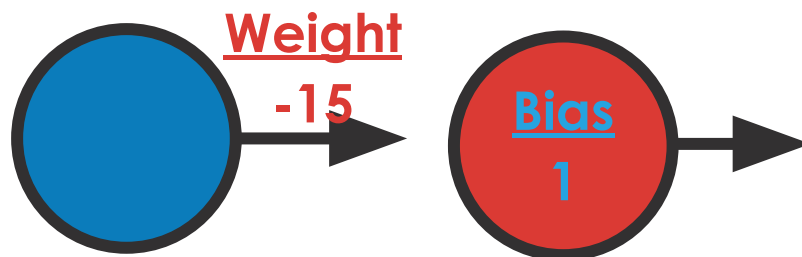
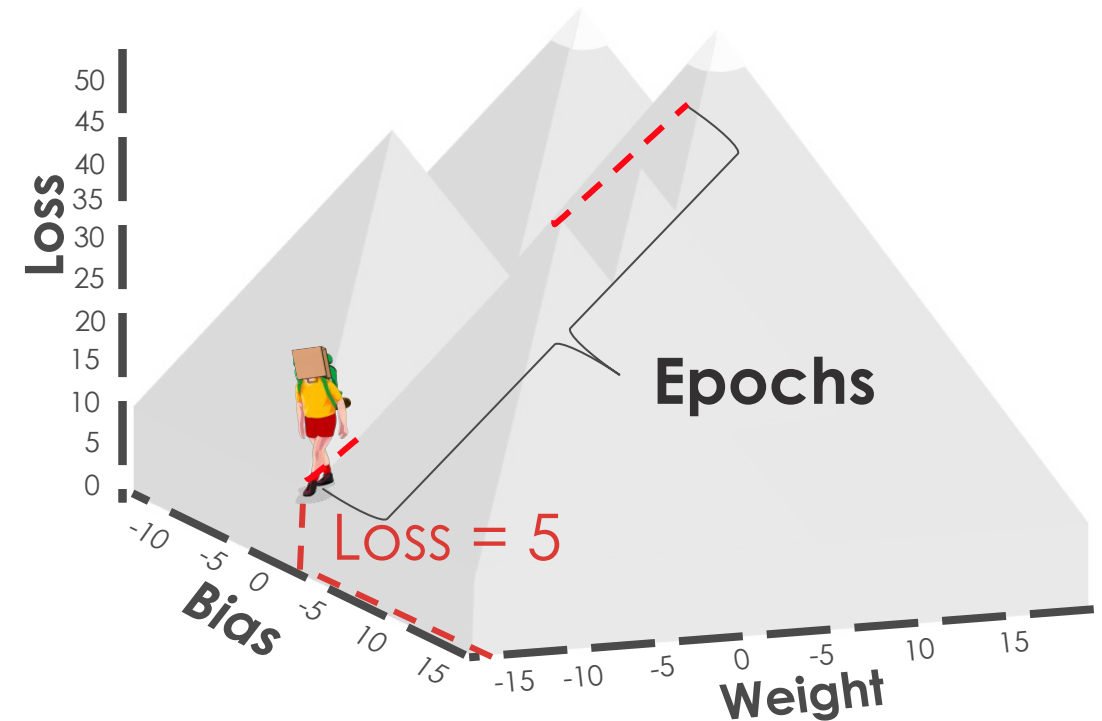
# Gradient Descent Steps

- Step 1 Start at a random bias and weight and calculate the loss
- Step 2 Take a step in the direction with the steepest gradient
- Step 3 Calculate the new loss**



# Gradient Descent Steps

- Step 1 Start at a random bias and weight and calculate the loss
- Step 2 Take a step in the direction with the steepest gradient
- Step 3 Calculate the new loss
- Step 4 Repeat steps 2 and 3



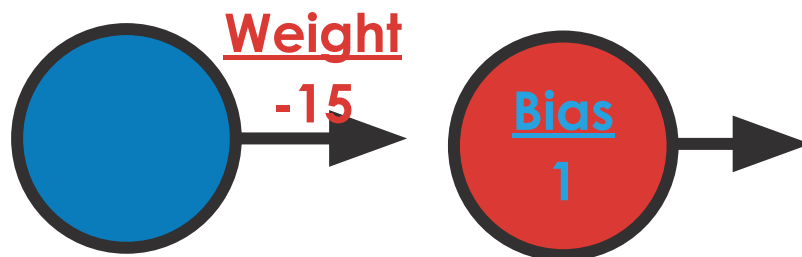
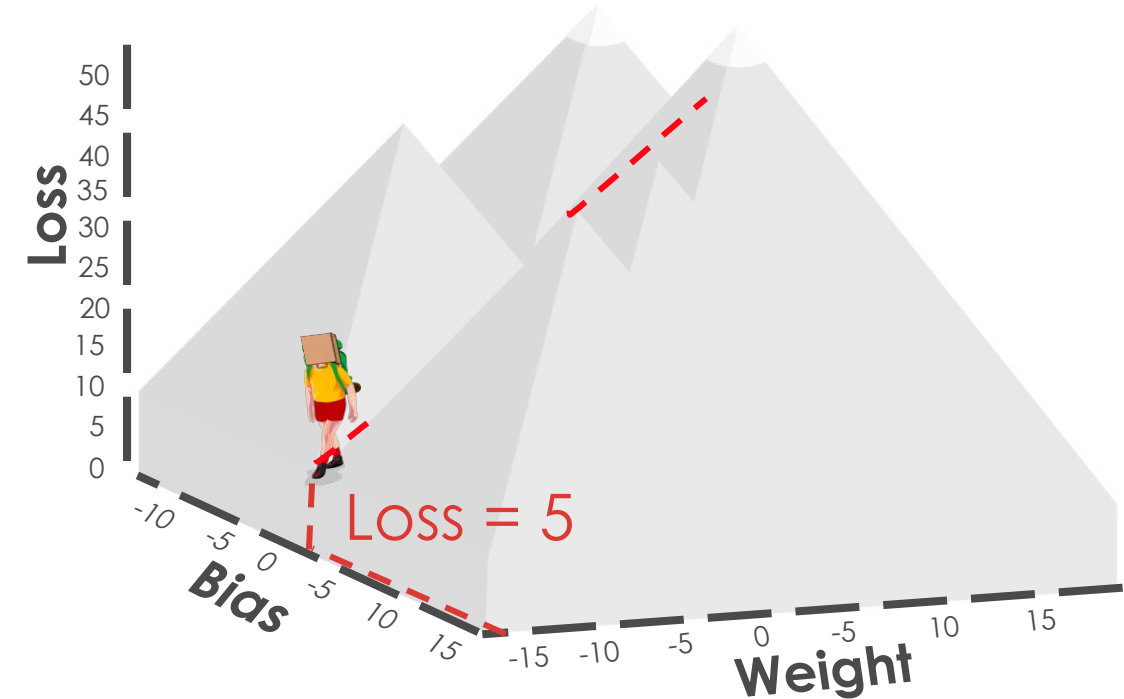
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# Gradient Descent Steps

- Step 1 Start at a random bias and weight and calculate the loss
- Step 2 Take a step in the direction with the steepest gradient
- Step 3 Calculate the new loss
- Step 4 Repeat steps 2 and 3**



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