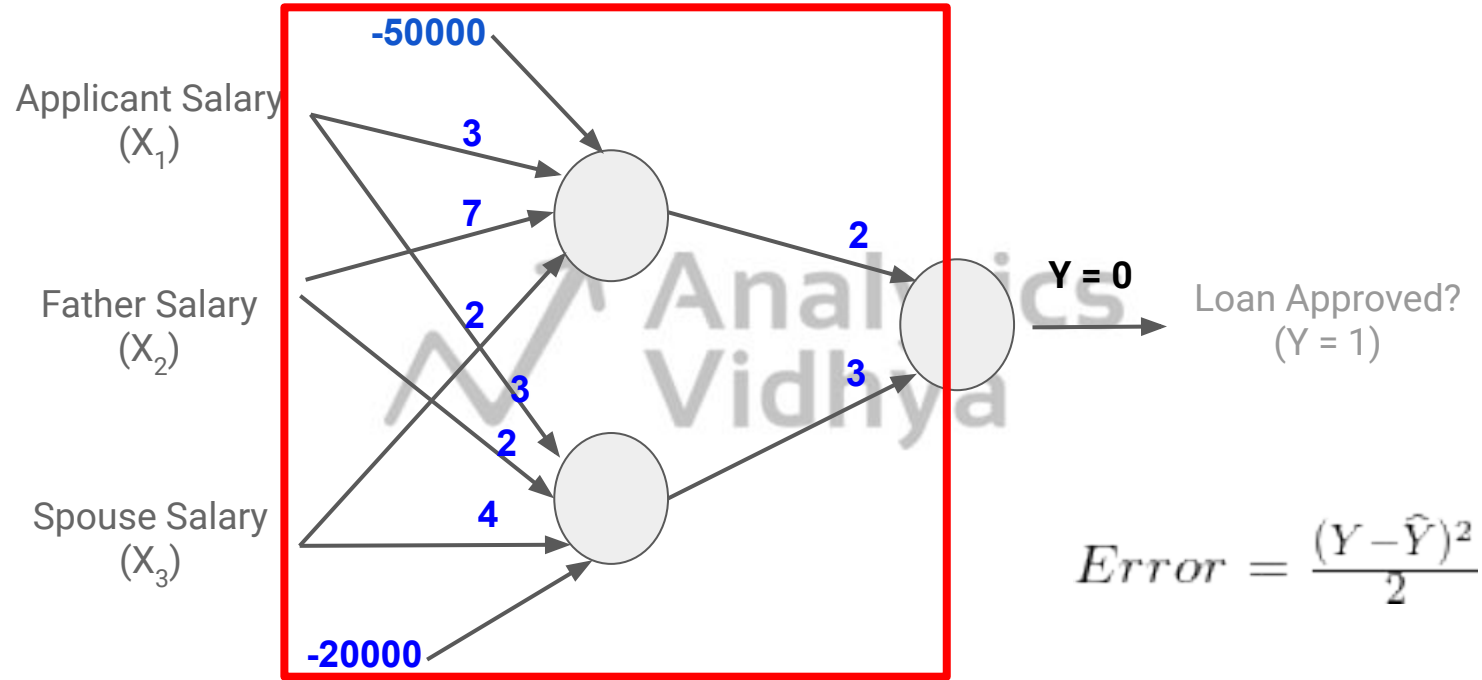
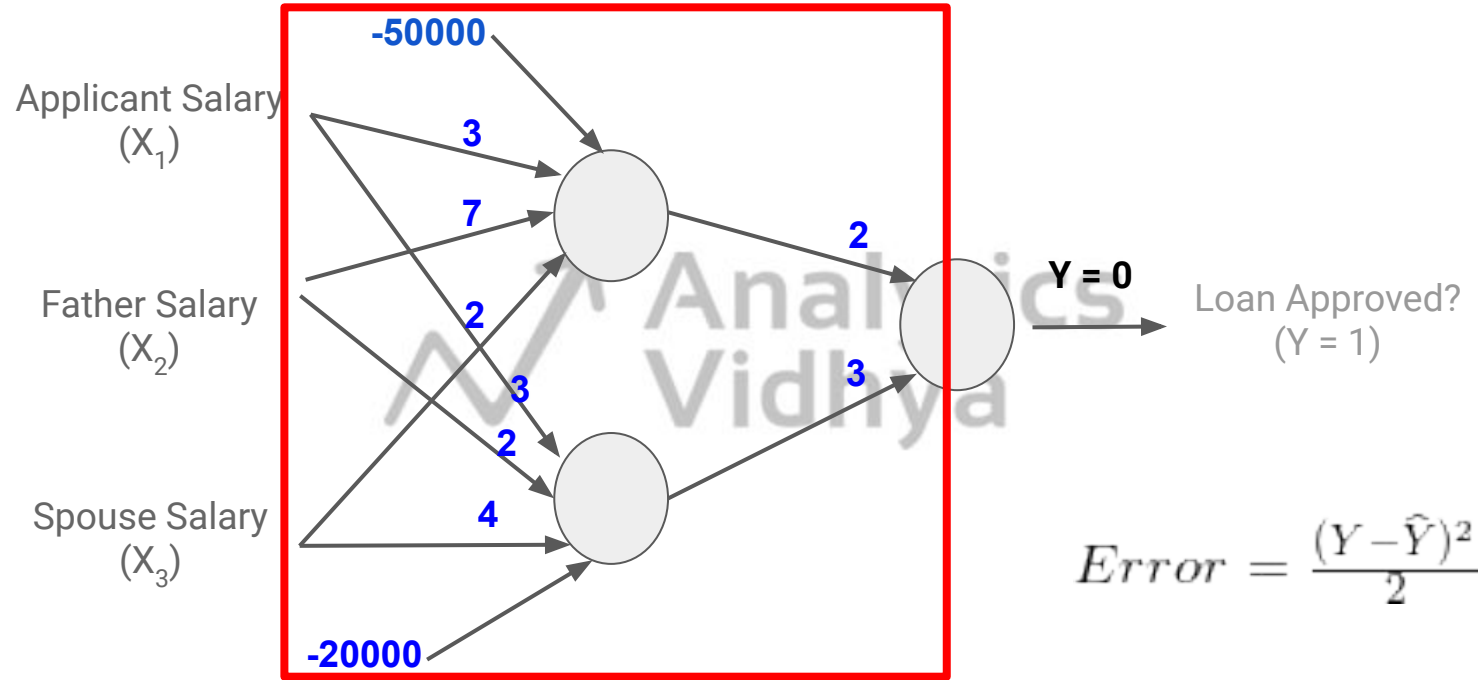


Understanding Gradient Descent

Updating weights and bias

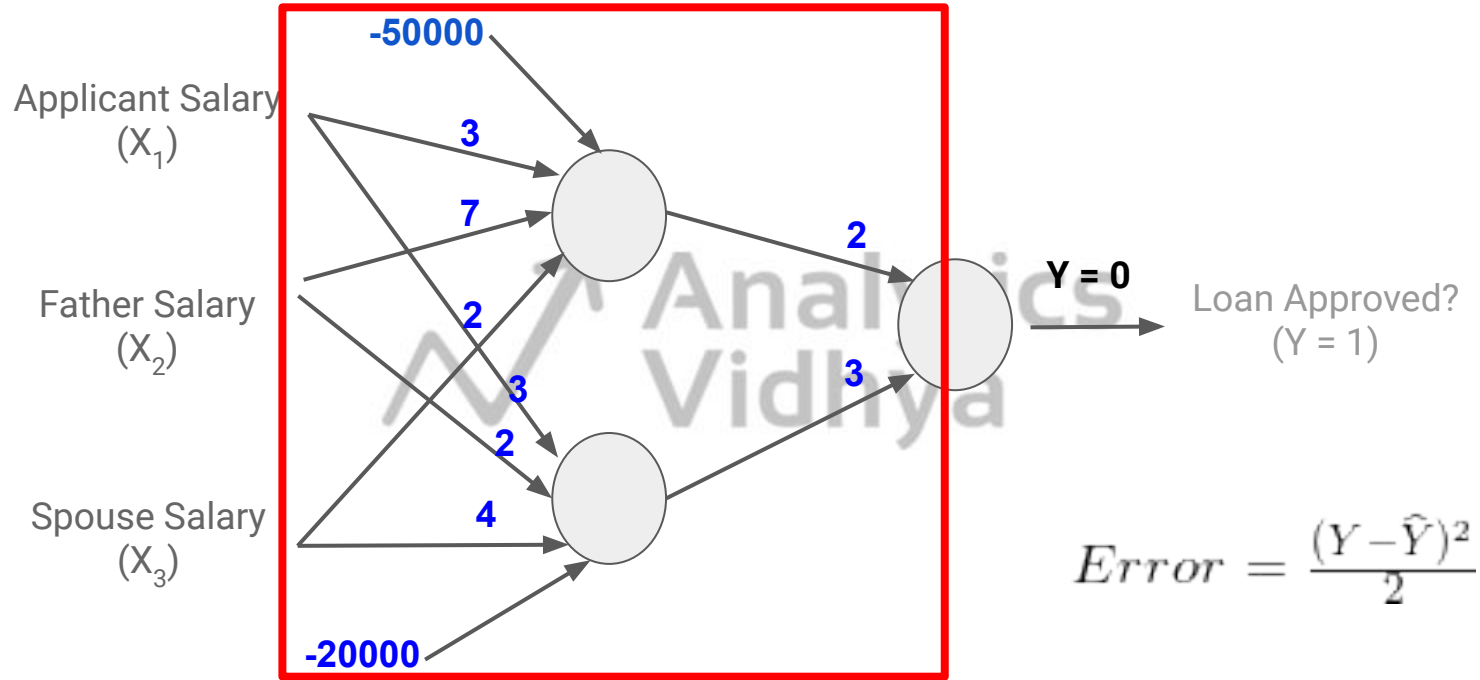


Updating weights and bias



What next?

Updating weights and bias



What next?

Optimize w and b to minimize the error

Updating weights

What next?

Optimize w and b to minimize the error

How to update w and b ?

Updating weights: Randomly

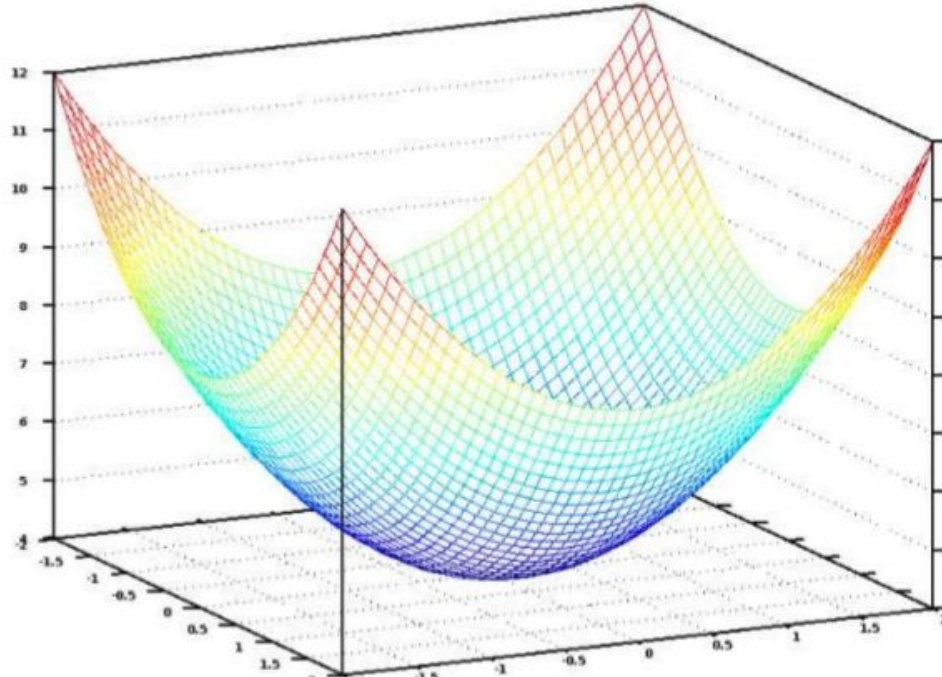
What next?

Optimize w and b to minimize the error

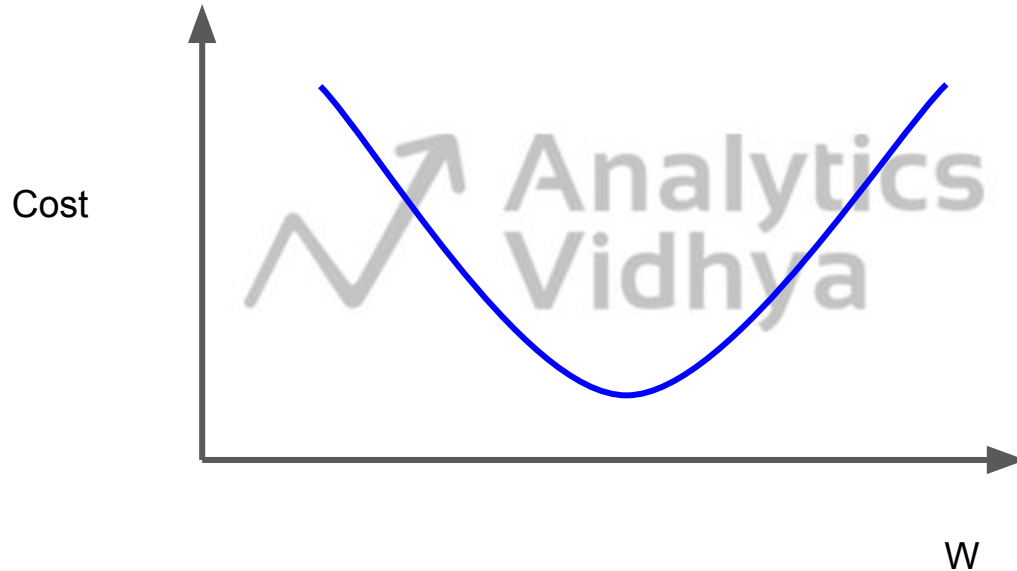
How to update w and b ?

Update them randomly

Updating weights: Randomly

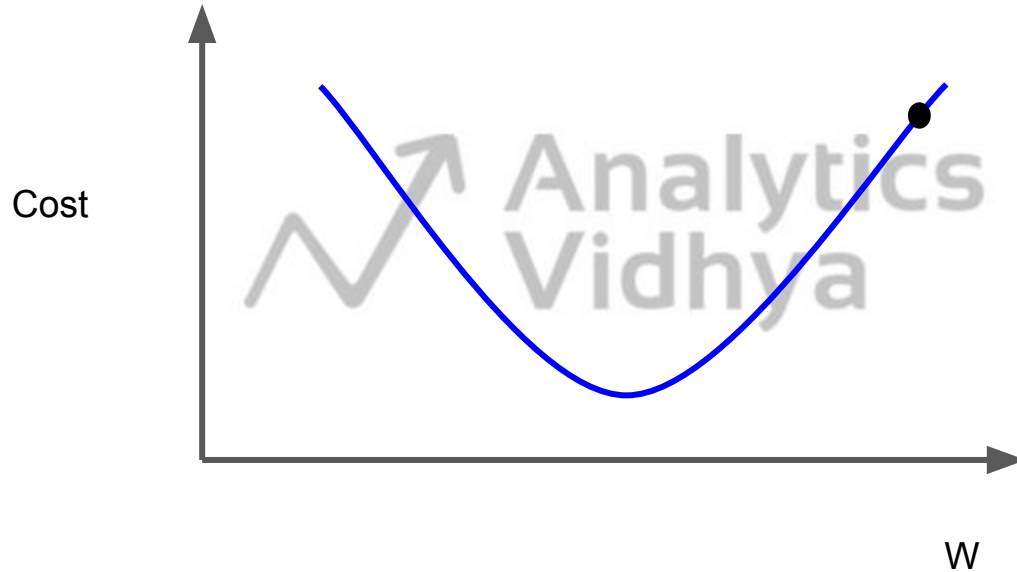


Updating weights: Randomly

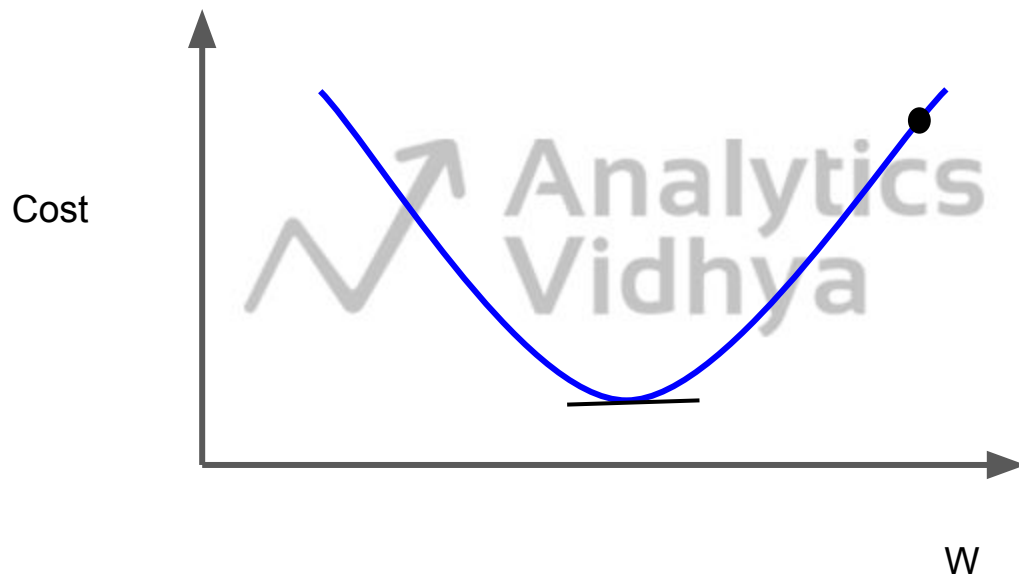


- Continuous
- Differentiable

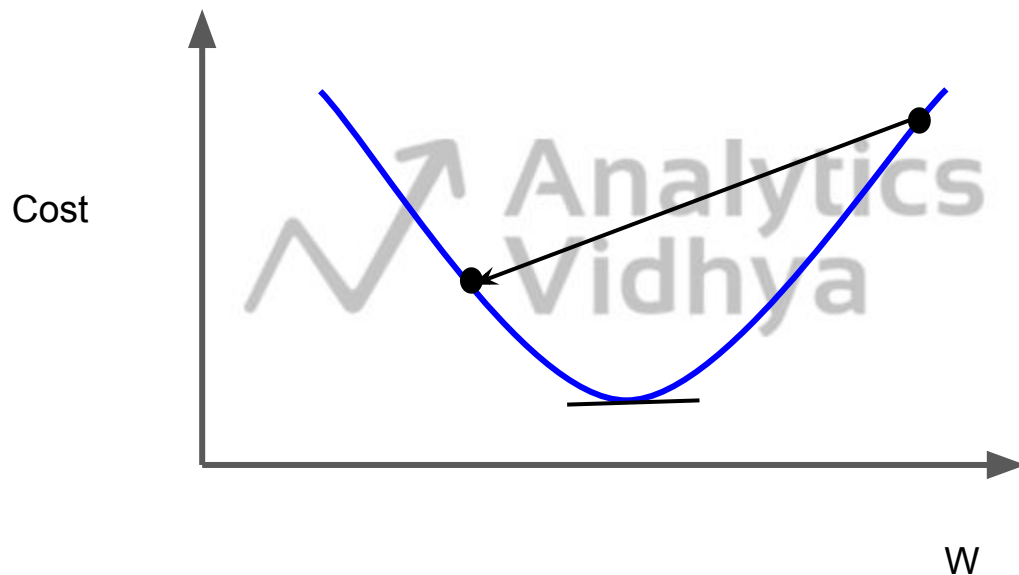
Updating weights: Randomly



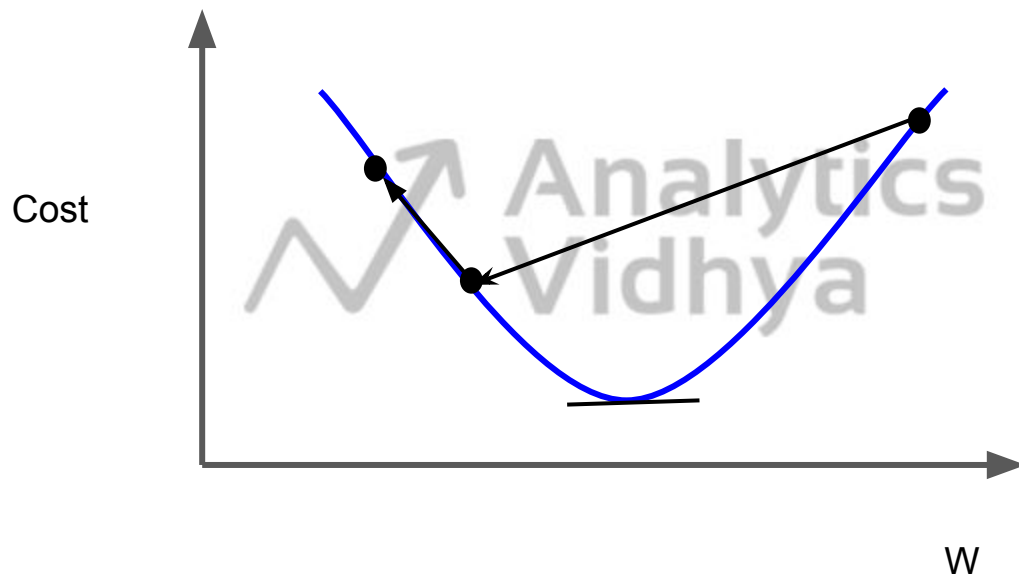
Updating weights: Randomly



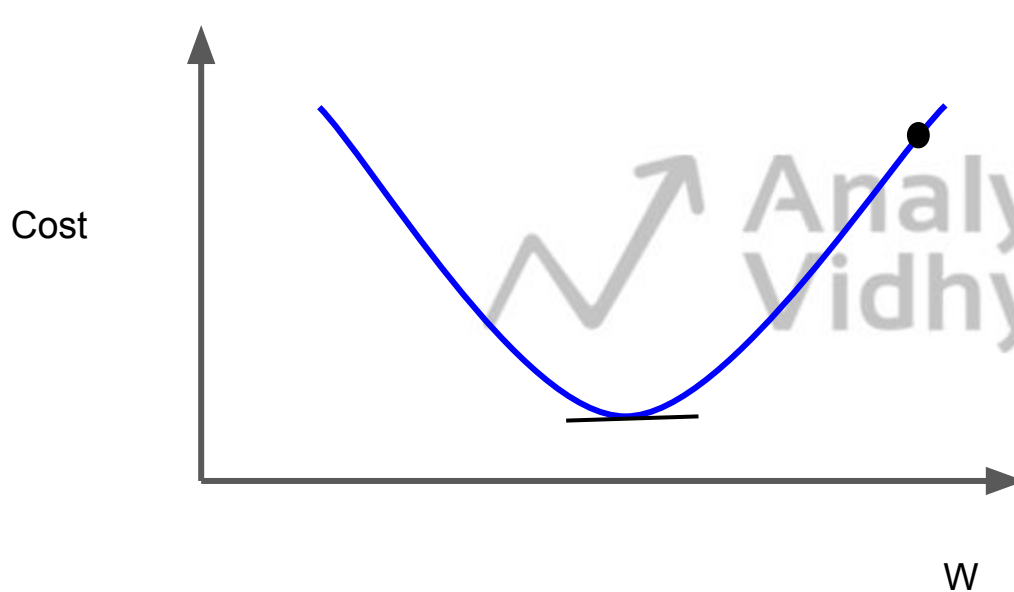
Updating weights: Randomly



Updating weights: Randomly



Updating weights: Randomly



- In which direction should I move?
- How much should I move?

Understanding Gradient Descent

Gradient Descent update equation

$$w = w - \alpha * dE / dw$$

- In which direction should I move?
- How much should I move?

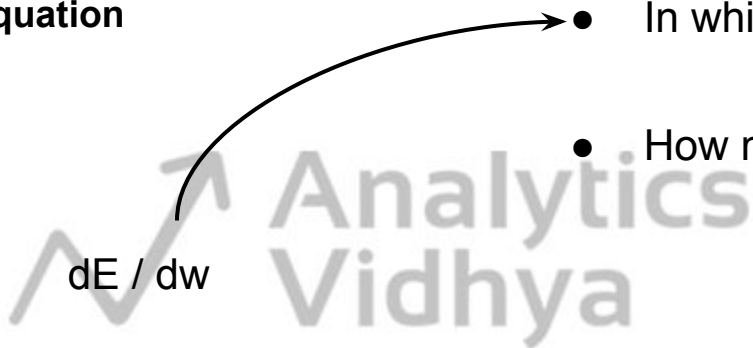


Understanding Gradient Descent

Gradient Descent update equation

$$w = w - \alpha * dE / dw$$

dE / dw



• In which direction should I move?

• How much should I move?

Understanding Gradient Descent

Gradient Descent update equation

$$w = w - \alpha * dE / dw$$

dE / dw

● In which direction should I move?

● How much should I move?

Understanding Gradient Descent

Gradient Descent update equation

$$w = w - \alpha * dE / dw$$

dE / dw

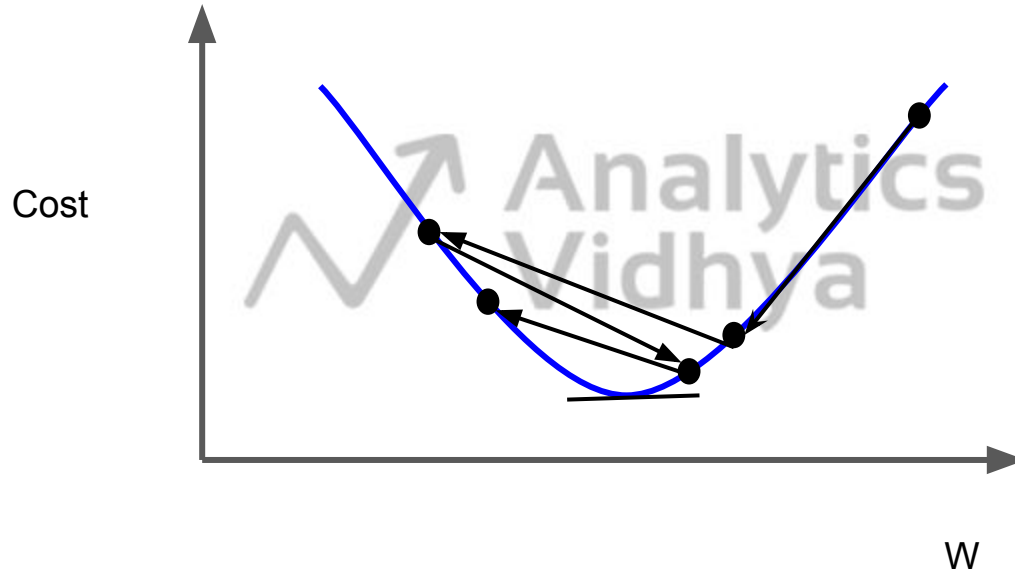
α

• In which direction should I move?

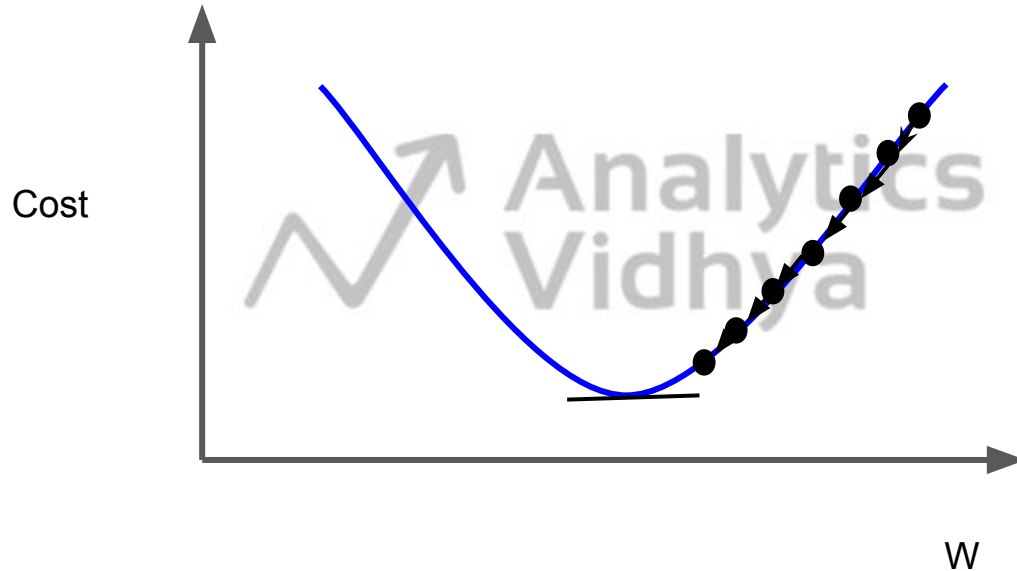
• How much should I move?

• Learning rate

Learning Rate: Too high



Learning Rate: Too low



Steps to perform Gradient Descent



Steps to perform Gradient Descent

- Take current value of w and b



Steps to perform Gradient Descent

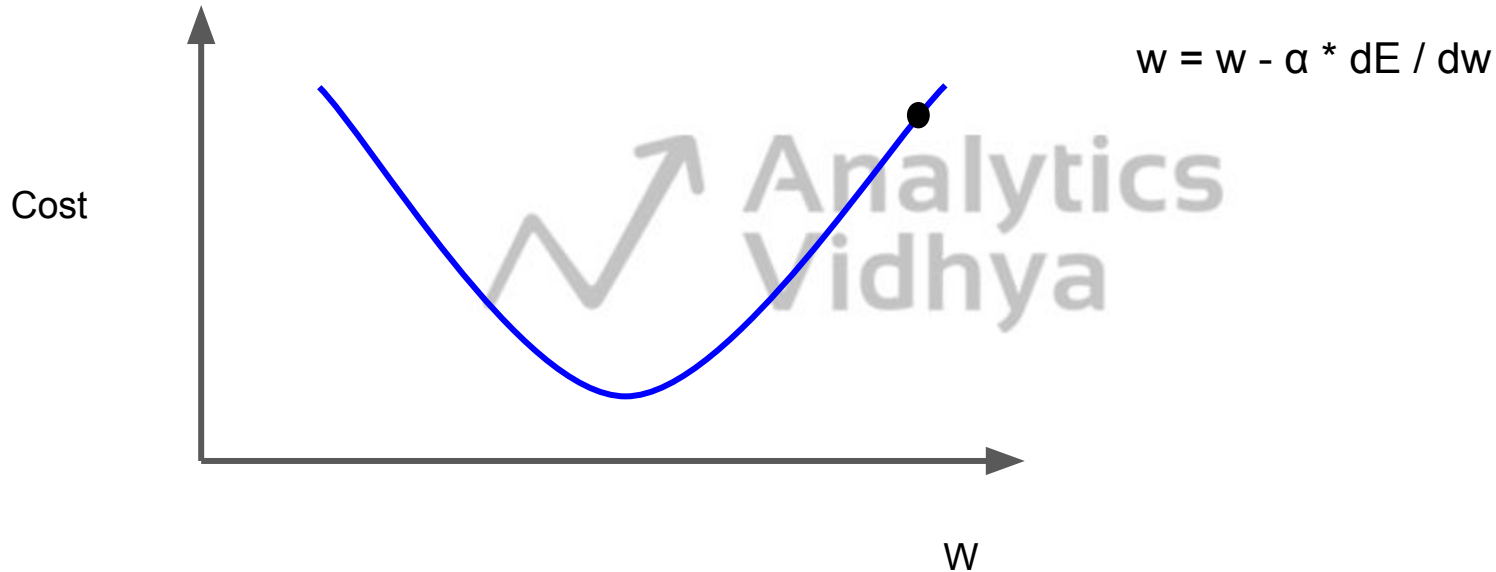
- Take current value of w and b
- Take a step in the steepest downhill direction



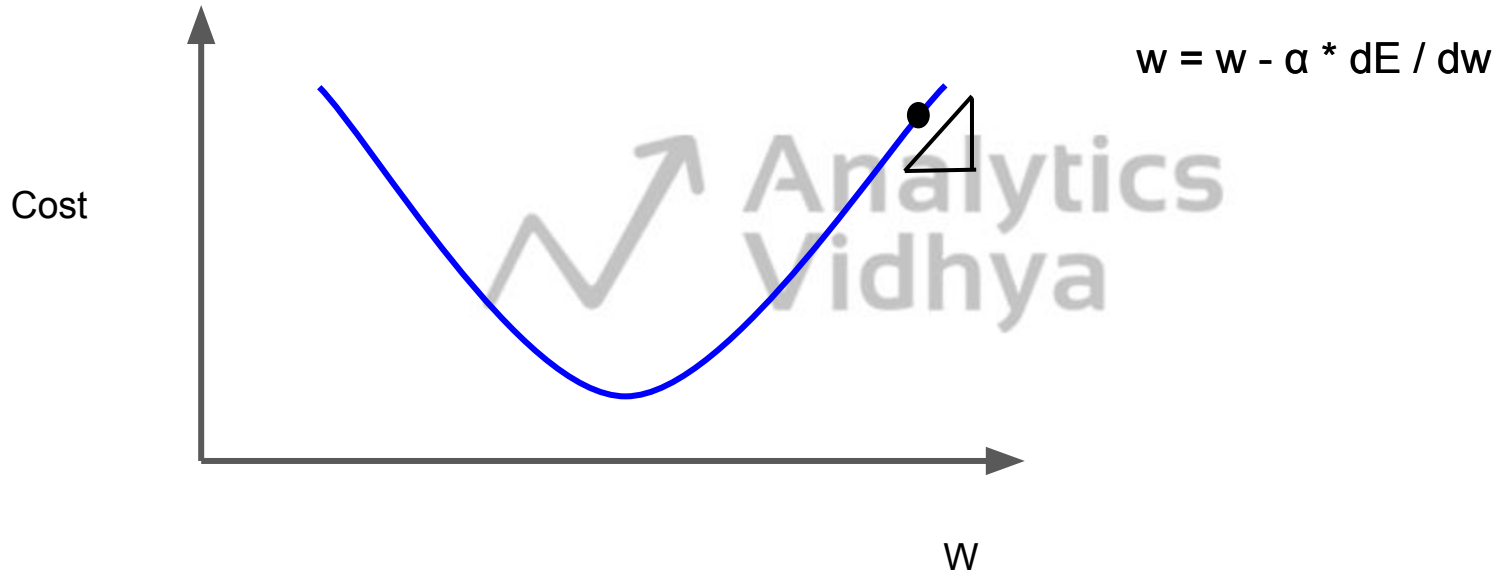
Steps to perform Gradient Descent

- Take current value of w and b
- Take a step in the steepest downhill direction
- Repeat the previous step until minima is achieved

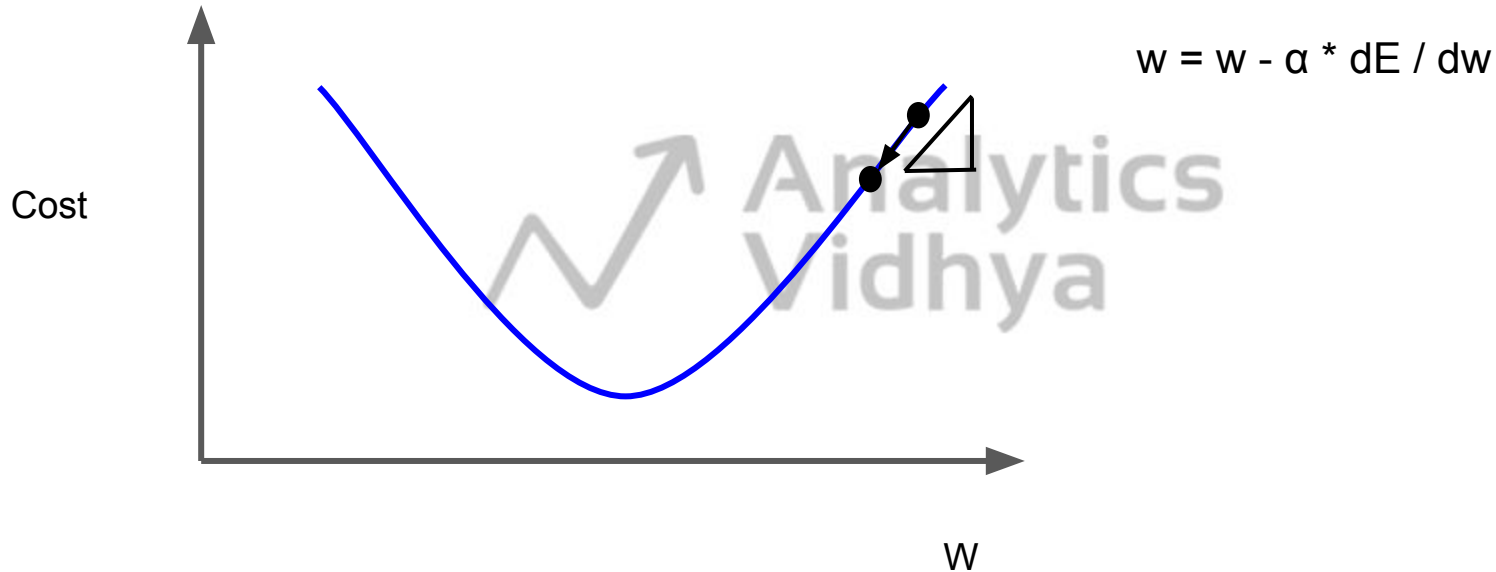
Updating weights: Gradient Descent



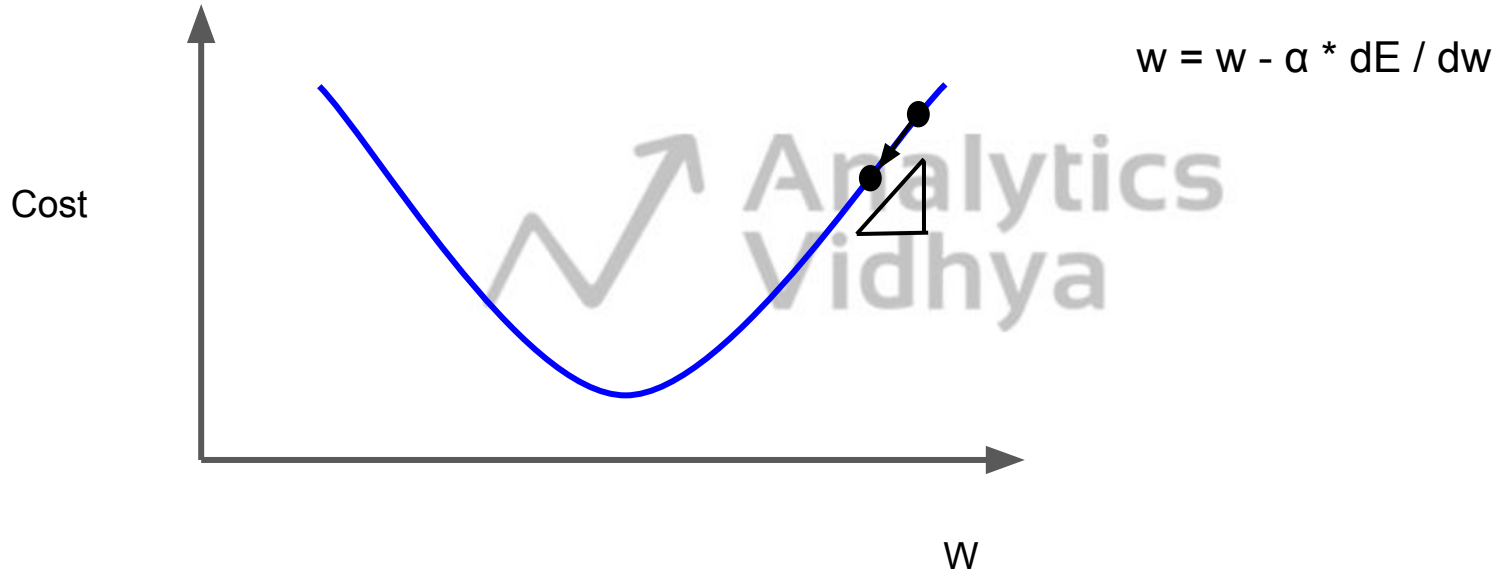
Updating weights: Gradient Descent



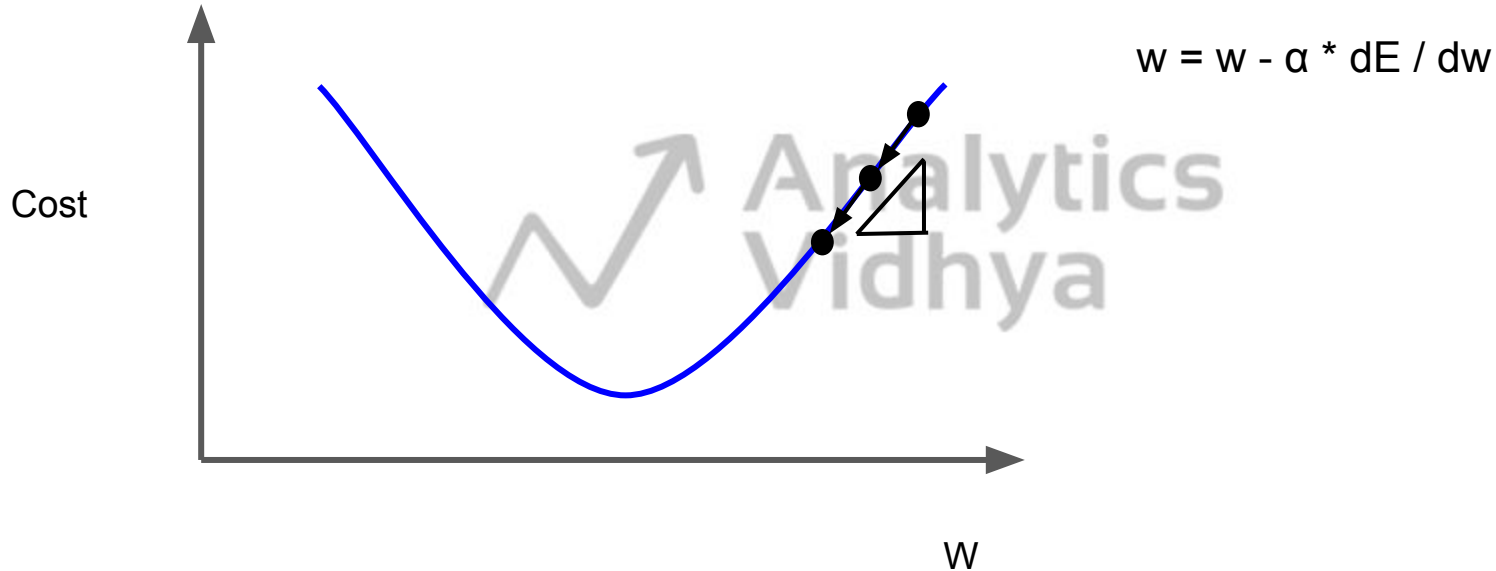
Updating weights: Gradient Descent



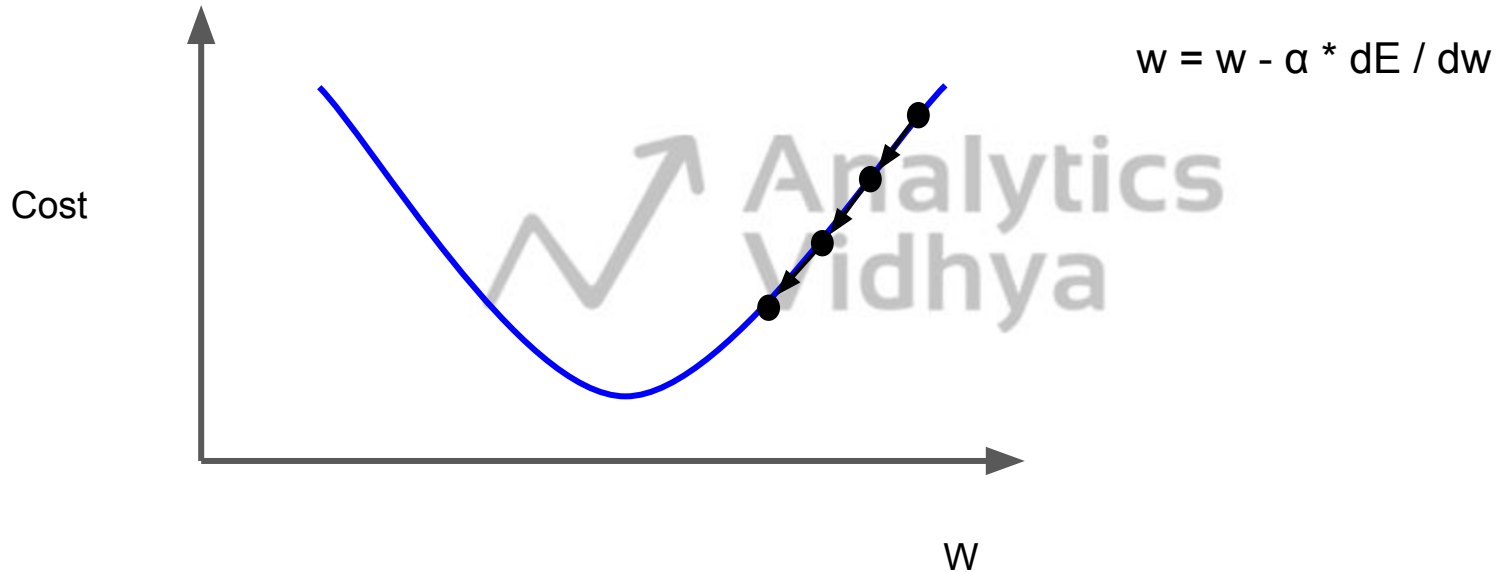
Updating weights: Gradient Descent



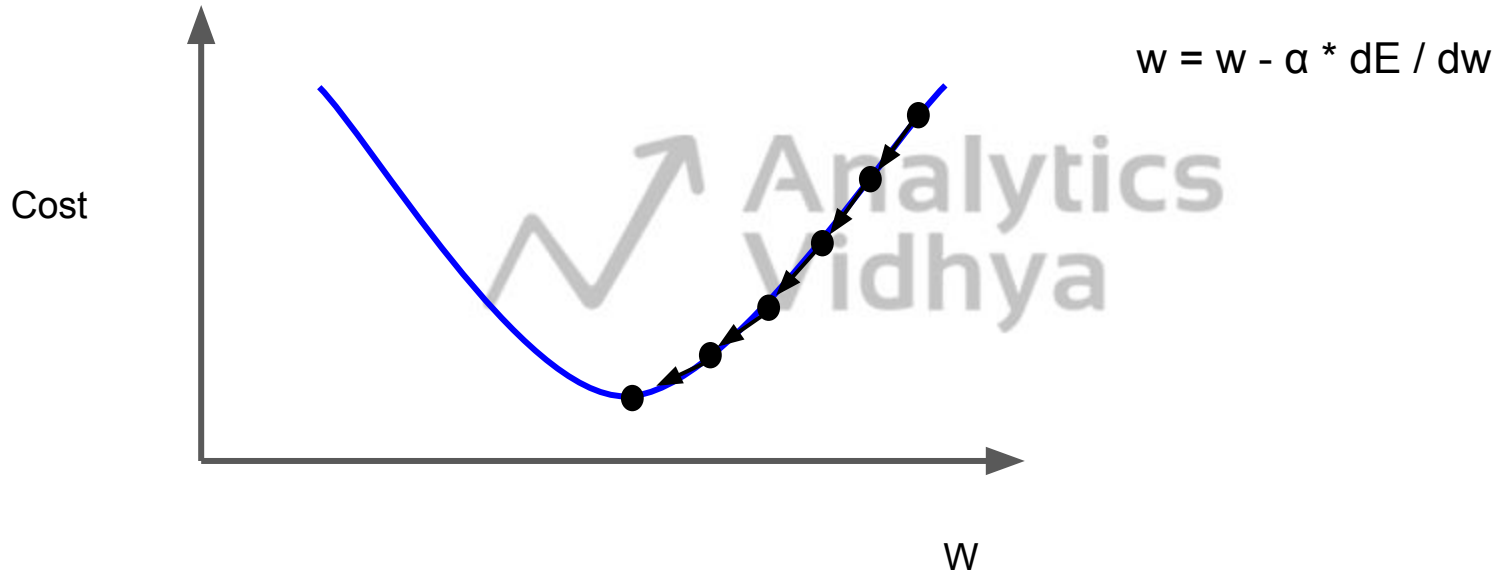
Updating weights: Gradient Descent



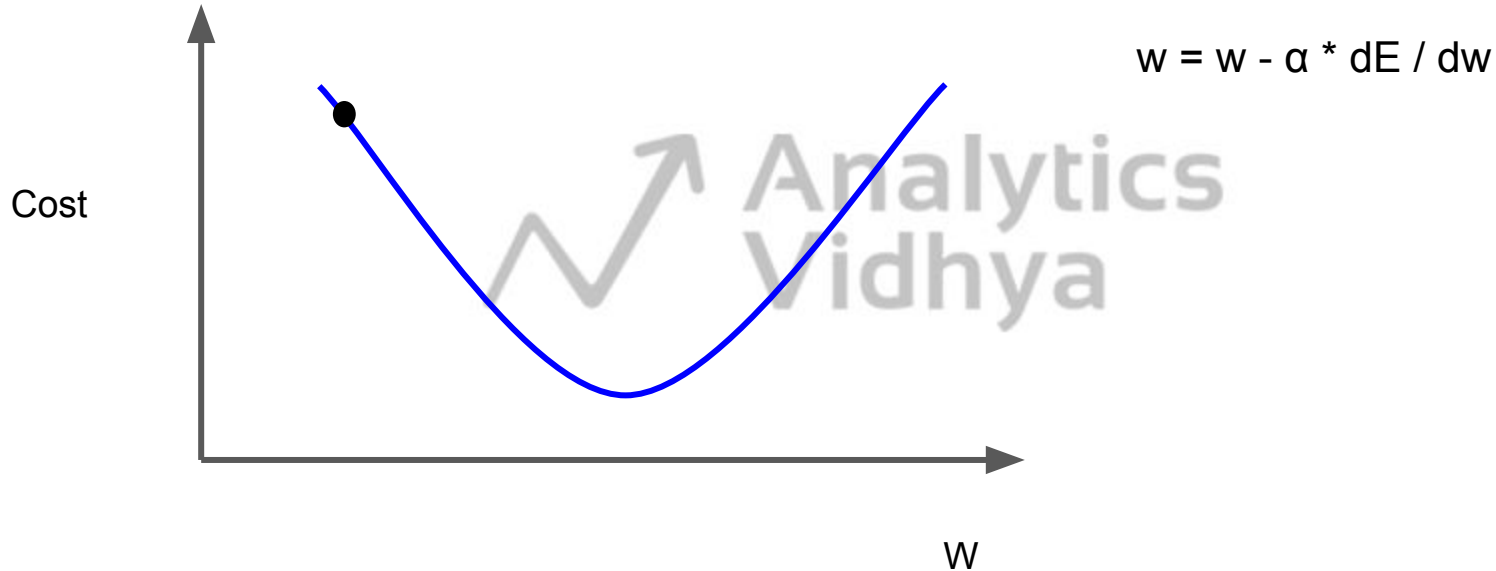
Updating weights: Gradient Descent



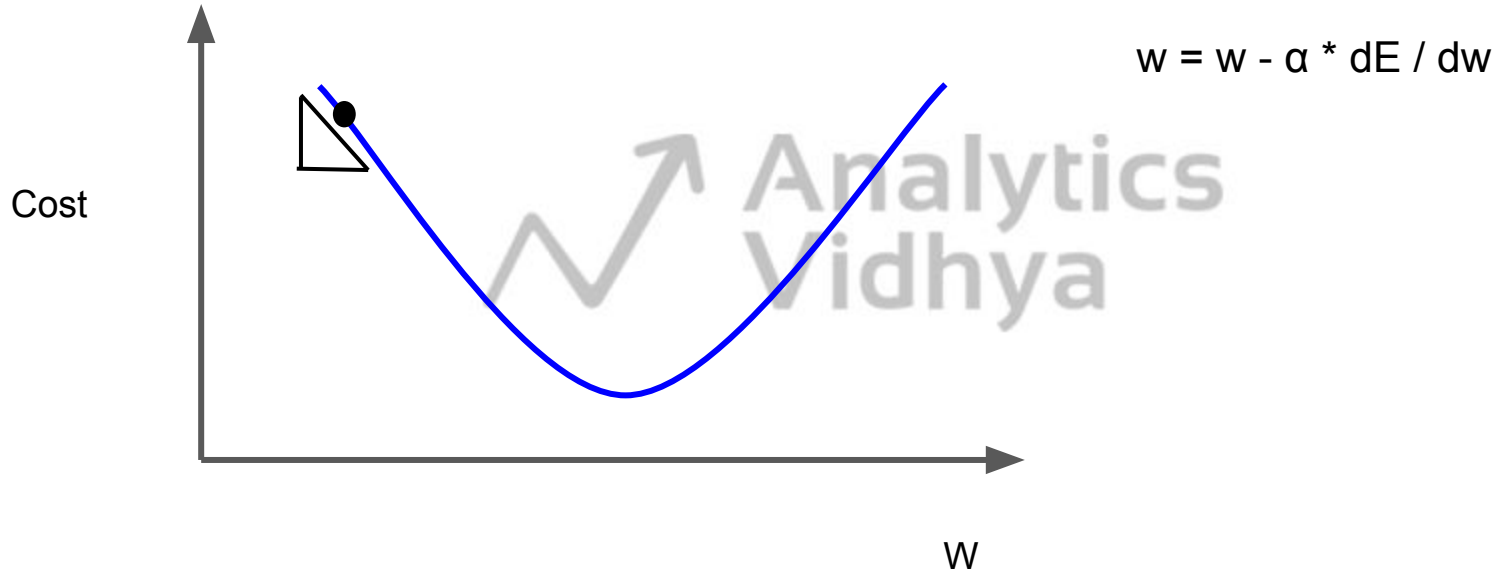
Updating weights: Gradient Descent



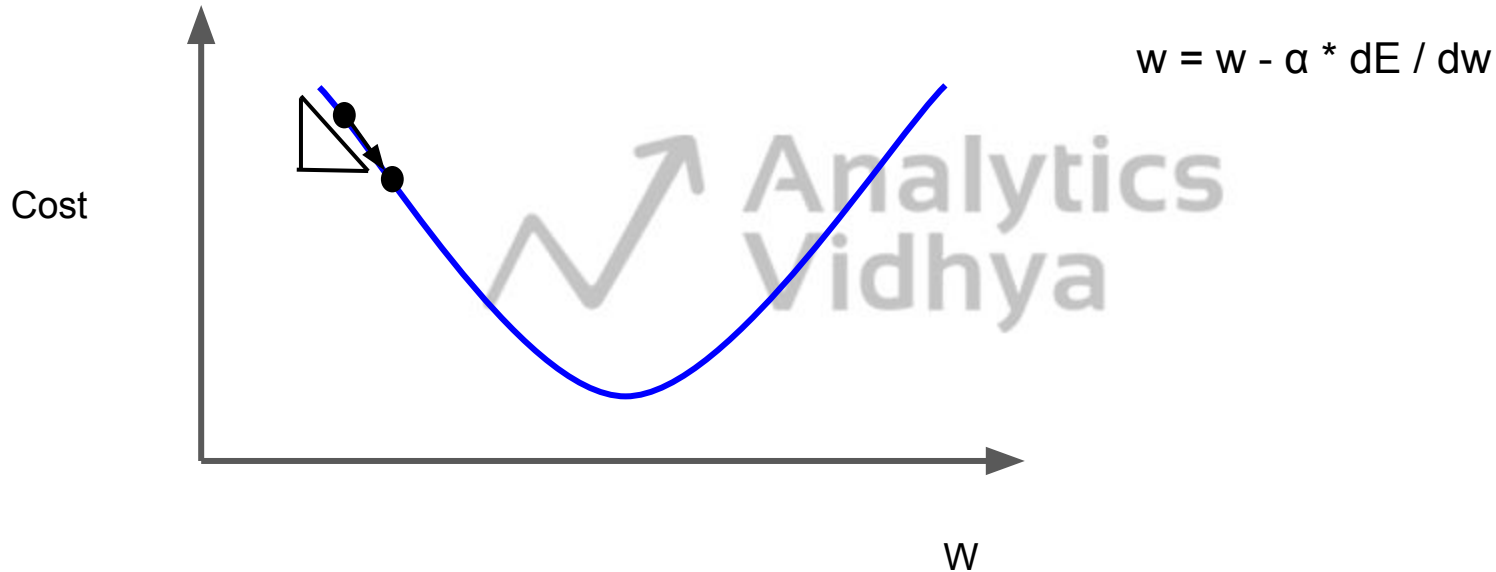
Updating weights: Gradient Descent



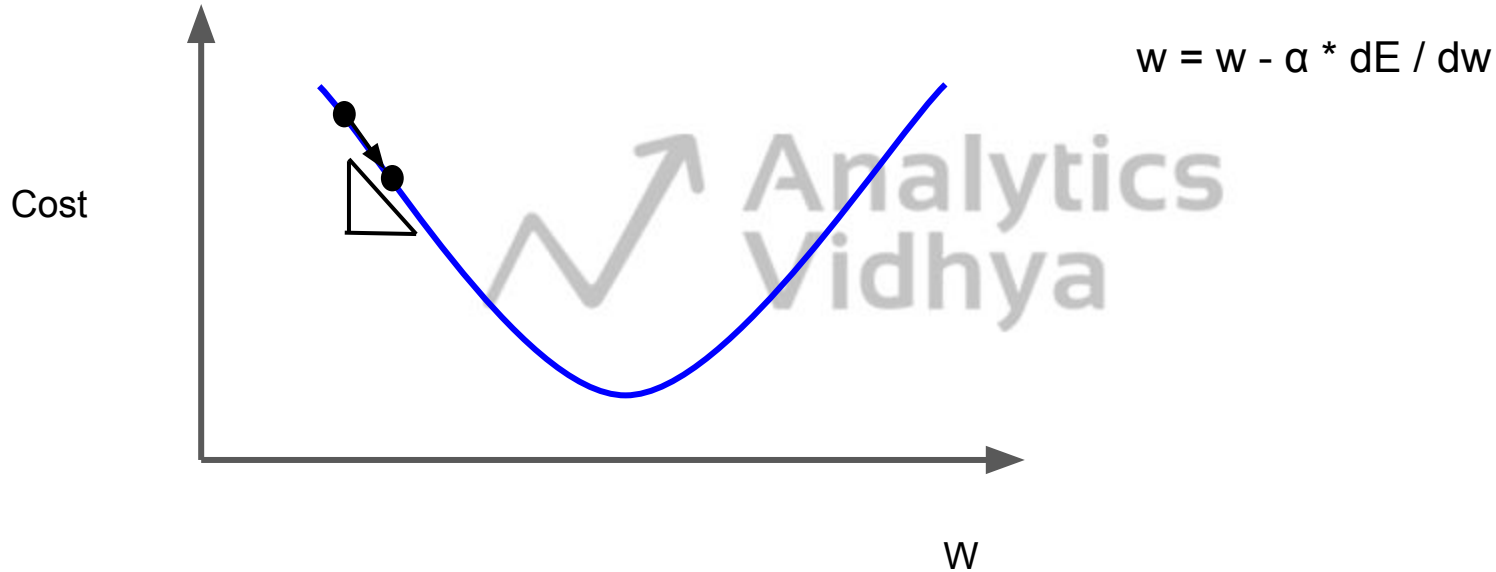
Updating weights: Gradient Descent



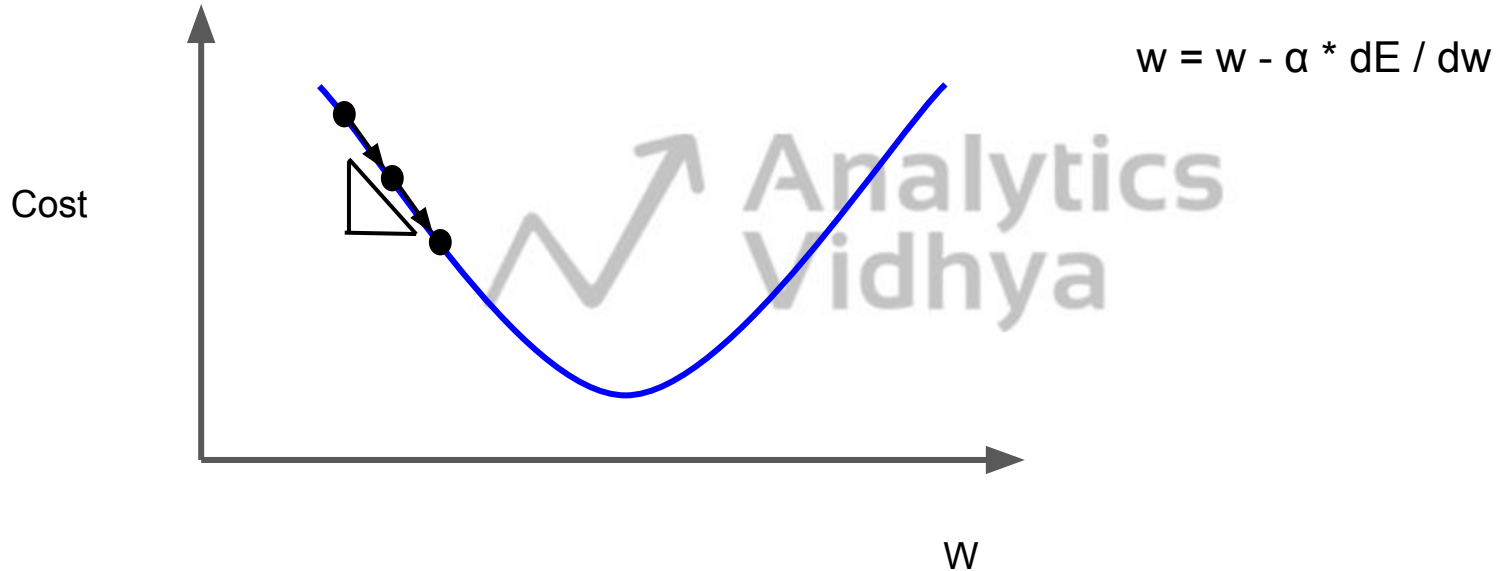
Updating weights: Gradient Descent



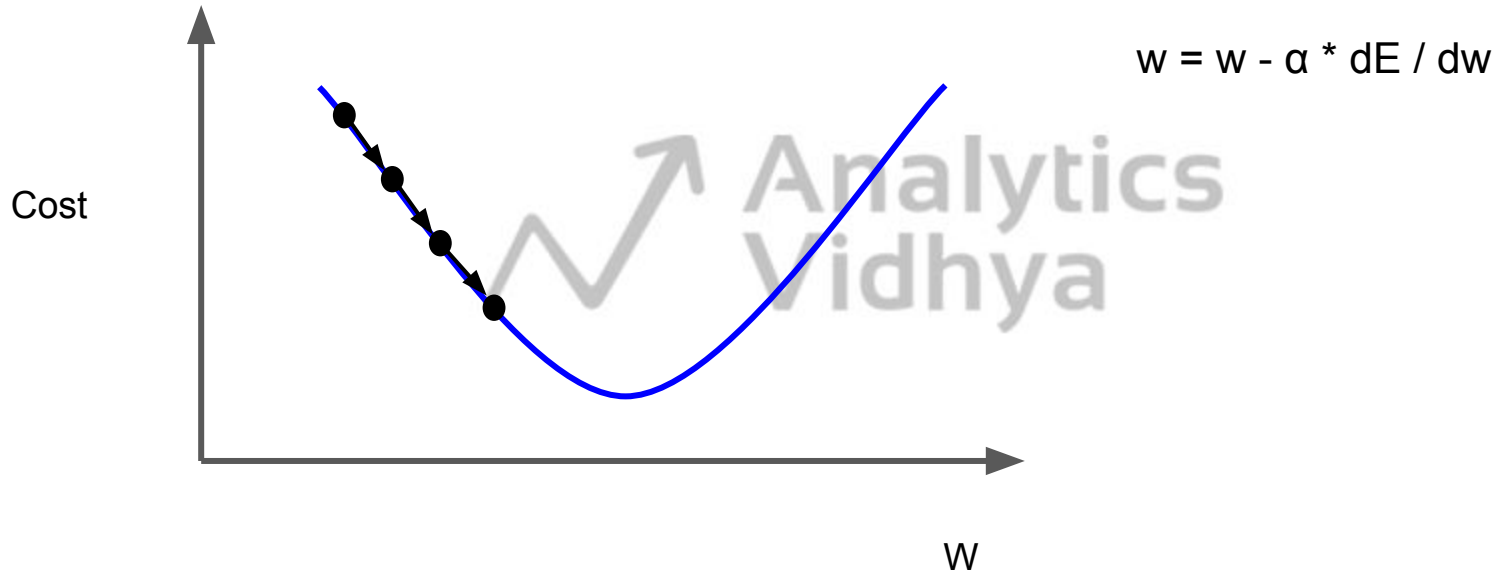
Updating weights: Gradient Descent



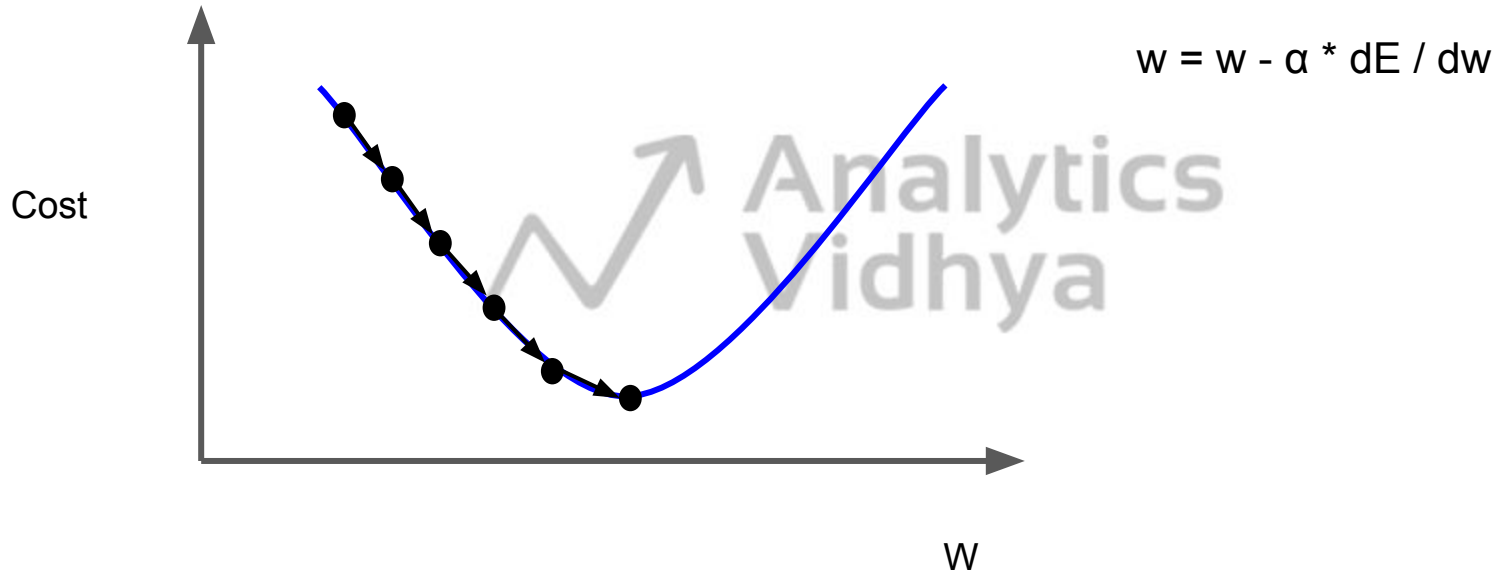
Updating weights: Gradient Descent



Updating weights: Gradient Descent



Updating weights: Gradient Descent



Stopping Criterion for Gradient Descent



Stopping Criterion for Gradient Descent

1. Error is not updating



Stopping Criterion for Gradient Descent

1. Error is not updating
2. Number of iterations is reached

