# Machine Learning Engineer Course Day3

## − Mathematics for machine learning −

**DIVE INTO CODE**

25th March 2021
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# Check-in

**3 minutes** Please post the following point to Zoom chat.

**Q. What do you think is most important for graduating on time?** (Other than DIVE INTO CODE lecture)

# Agenda

1. Please Note
2. Today's word
3. Today's Objective
4. Assignment review
5. ToDo until the next class

# 🚨 Please Note

**How to proceed with this course and precautions**
You will be the leader in the IT industry in Sierra Leone.

## ❶ Advance at top speed

We do not bottom up

## ❷ Promote autonomous self-propelled

We do not accept unexplained questions

## ❸ Focus on problem-solving ability

We do not give lectures on building up the foundation

# Earth is my amusement park.

Yuichiro Miura (Japanese Mountaineer)

# Today's Objective

Purpose of learning. Purpose clarifies a person's role and the learning required. Clear learning leads to a sense of growth and confidence.

|  | Objective | NOT Objective |
|---|---|---|
| 1 | **Learn how to think about the program with your peers** | Memorize lots of functions |
| 2 | **Use the basic elements of the program** | Complete assignments quickly |
| 3 | **Feel like a climber** |  |

# Today's Objective

**Reason why NOT objective**

| | NOT Objective | Reason |
|---|---|---|
| 1 | **Memorize lots of functions** | It is important to combine functions to solve problems. The basic elements are enough to handle the content |
| 2 | **Complete assignments quickly** | It is easy to complete for now for people of a certain level. However, there is no right answer in programming. Use your time to the fullest and learn as much as you can |

# Feel like a climber

## "Feel like a climber"

Today we will learn the gradient descent method using a mountain descent as our subject. Let's imagine the following.

| | Concept | Real world example |
|---|---|---|
| 1 | Climber | Myself |
| 2 | Gradient | Tilt of my feet |
| 3 | Function | Uncharted mountain |
| 4 | Variable | Current location (point) |
| 5 | Parameters | How to descend (speed, stride) |

# Today's Objective: Feel like a climber

In machine learning, we want to find the minimum value of a function. In this case, the gradient descent method, which is an exploratory method, is used.

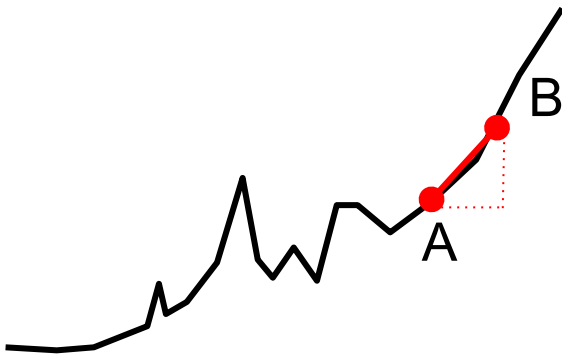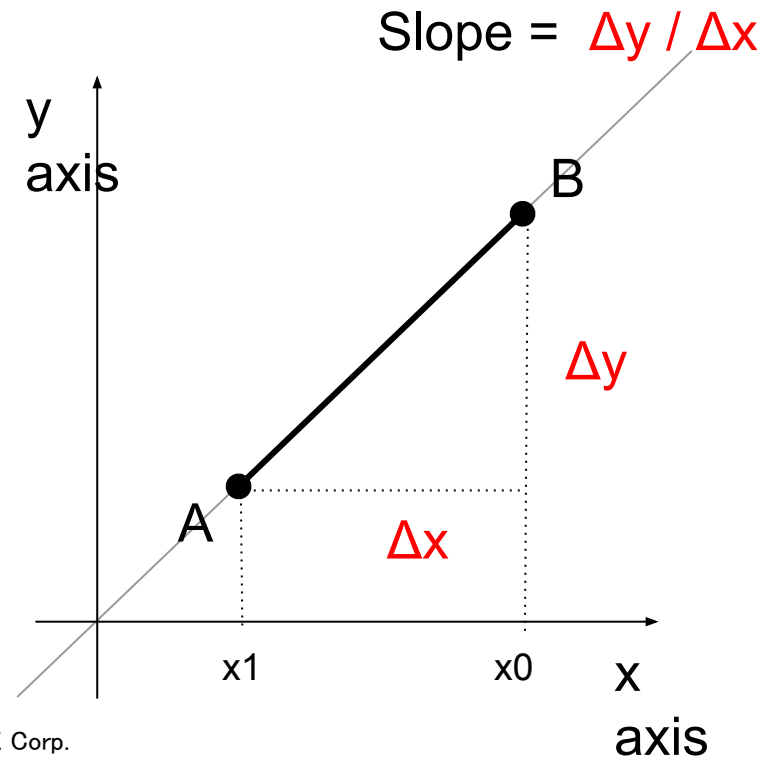A gradient can be compared to the slope of a mountain. Aim for a lower elevation.

# Feel like a climber

Let's imagine the slope of a mountain as a line connecting two arbitrary points A and B on two-dimensional coordinates.

## Mountain Slope

## Coordinates and Slope

Slope = $\Delta y / \Delta x$

y axis

B

A

$\Delta y$

A

$\Delta x$

x1          x0        x axis

10

**Feel like a climber**

**Let's calculate the new point based on the ground point, inclination, and stride length.**

Point of the first step
**x1 = at step 0, x0 ー（ slope y' × pace α ）**

| pace | step 0<br>x0 | step 1<br>x1 | step 2<br>x2 | step 3<br>x3 | step 4<br>x4 |
|---|---|---|---|---|---|
| **point on a map x** | Initial value<br>**136** | **119** | **113** | **108** | **?** |
| **slope y'** | 168.35 | 55.28 | 53.28 | 26.92 | **?** |

Determine the following values (hyperparameters) and descend the mountain.
pace α =0.1, point at step 0=136, the tilt of your feet will be obvious.

**The gradient descent method**

You will experience the gradient descent method by climbing a mountain, but keep in mind that this is only a parable.

In later assignments, you will deepen your learning by comparing the actual gradient descent method with this mountain climbing example.

# Assignment review

Weekly class will explain the assignments you have submitted.

1. Two-dimensional arrays and gradient exercise
2. Problem of going down Mt. Fuji

# ToDo until the next class

✔️ Next class will be Zoom : Thursday 1 April 2021 19:30~20:30

🚨ToDo: Analysis of irises
https://diver.diveintocode.jp/curriculums/1633

🚨ToDo: Analysis of housing information
https://diver.diveintocode.jp/curriculums/1634

🚨ToDo: Credit information analysis
https://diver.diveintocode.jp/curriculums/1636

# Check-out

**3 minutes** Please post the following point to Zoom chat.

**Q. In a word about your current feelings**