

Lesson Plan

- Lesson 1.1:** Neural Networks
- Lesson 1.2: Image Recognition Training
- Lesson 2.1: Programming Fundamentals
- Lesson 2.2: Conditional Programming
- Lesson 2.3: Loops
- Lesson 2.4: Functional Programming
- Lesson 3.1: Basic and Advance Training
- Lesson 3.2: AI Interfacing
- Lesson 3.3: Autonomous Systems
- Lesson 4 : Debugging your code

Lesson 1.1 Neural networks

Introduction (10 min)

Main Activity (15 min)

Wrap up (10 min)

Extras

Lesson Overview:

In this chapter, children will learn about artificially intelligent (A.I) systems and how they function. We talk about why AI is the future and will also discuss wide applications of this technology.

Lesson objectives:

1. Students will understand what is artificial intelligence?
2. They will learn about neural networks and how to implement them.
3. Students will also learn about practical applications of AI and why is the future.

Requirements:

1. CoderMindz game board
2. Decks of Coder Mindz Code cards
3. Pictorial representation of human brain
4. Pictorial representation of a neuron

Getting started:

1. We'll introduce the Coder Mindz Code cards, wooden bots, die and game board from the rulebook

2. We'll be introducing Artificial Intelligence and Neural Networks to the students.
3. Announce the class that today you'll be starting a new series of lectures on Artificial Intelligence and Neural Networks.

Artificial Intelligence:

Artificial Intelligence or AI is nothing but a program which makes a computer to learn from data. This process of learning from data is called training and the outcome of training is a model. A model is a mathematical representation of the problem that we are trying to solve. The training process keeps on updating the model file continuously so that the model will give accurate results on our problem set most number of times.

Once again, welcome the students on this valuable journey towards the technology of the future and invite them to learn real-life AI applications like *image recognition* and *neural networks* along with some fundamental *programming concepts*.

Neural Networks:

Computers follow our commands blindly. Taking advantage of this behavior, we use computers to achieve human-like intelligence by training them with lots of data. Training a neural network involves a lot of optimization in the algorithm to find the right sets of weights to get the correct mapping of inputs to the outputs. Weights in neural network represent the strength of connection between two nodes.

The best analogy to training a neural network can be taken from the story of a mountain climber. Imagine we have a guy called Po, who is a very enthusiastic mountain climber and loves to climb mountains to the top. One evening, Po reached to the top of a high mountain where it was very cold and visibility was only a few meters due to the fog. The sunsets and now our friend Po has to get down to his base camp. He only has a small torch which gives him visibility of a few meters. So, Po begins his journey downwards by looking at every side to search for a way that steeps towards the ground the most and then begins his journey downwards following the steepest way. On his way downwards, he faces some difficult valleys and troughs which are impossible to cross. So, Po has to go back a few steps and start looking for an alternate route. Finally, after a few hours of struggle, Po finds his way back to the camp with lots of changes in the route during his journey downwards.

The story we described above is analogous to gradient descent algorithm which is one of the algorithms used in neural network training to update the weights (dodge the obstacles) and get the output.

(The story in this post is inspired from here:

https://ml4a.github.io/ml4a/how_neural_networks_are_trained/)

Behind the concept of training Neural networks is a driver code using instructions, logical conditions and loops that are necessary for programs to meet the requirements. We'll study them later.

Applications of AI:

Tell students about some applications of artificial intelligence like facial recognition, object detection, smart cars, smart cities and smart homes to name a few. Arouse in them some curiosity to discuss more on the applications and gather some inputs from the students.

Board Activity:

1. Introduce the CoderMindz game board to the students.
2. Introduce our 4 bots of the game - Bo, Jo, Mo and Po.
3. Explain the two types of cards in the game - basic and advanced cards.

Extended Learning:

Give an introduction to students on computer science in general and ask a few questions to test their knowledge on computers. Make them very comfortable with keeping an open conversation and solve their doubts if any. Here is a little speech below we created to warm up the class with the introduction to the game:

“Hello, World! Its 2020 and we're in the most technologically advanced world already. Thanks to computers. They are everywhere. As we all know, a computer is a machine that follows a set of instructions to do some tasks, and a collection of instructions is called a program or code. These programs or codes are written in a programming language which is converted into a machine-readable language (binary code). Today we can do anything with a computer. They have become more powerful, smarter, very compact and highly

efficient over the years. And due to their reducing sizes, we're also able to carry them in our pockets."

Engage students in an open discussion and let them talk about ideas and applications of how computers are making their lives better, be it with games, or videos, or anything they could relate to.