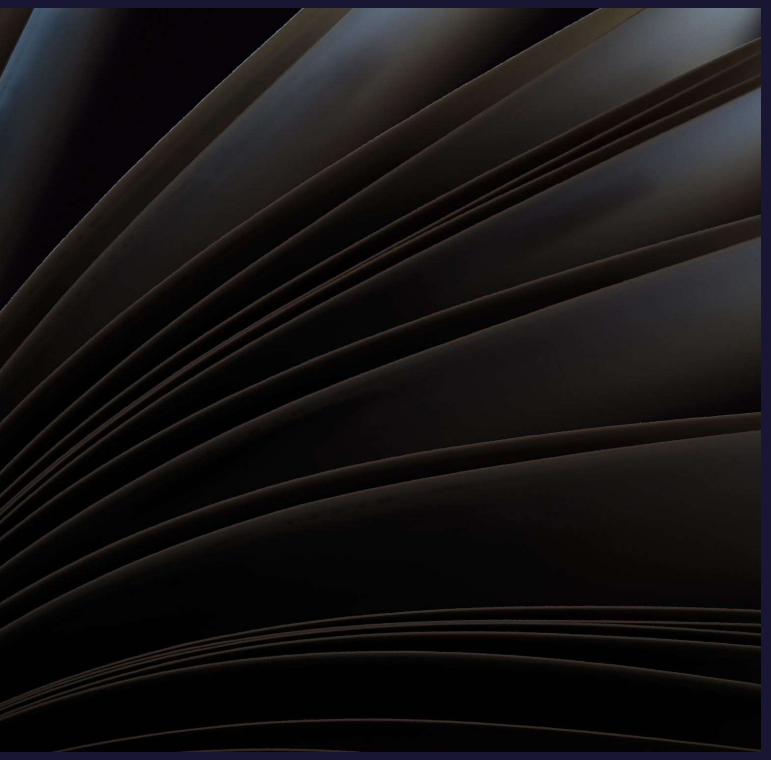

INTRODUCTION TO DEEP LEARNING

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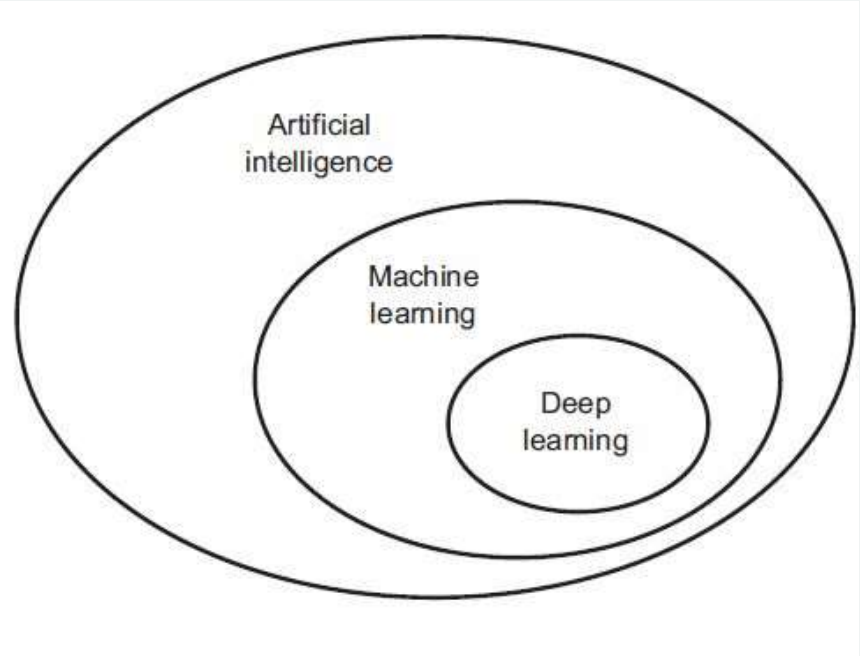
Dept. of Mechanical Engineering, Kasetsart University

Outline

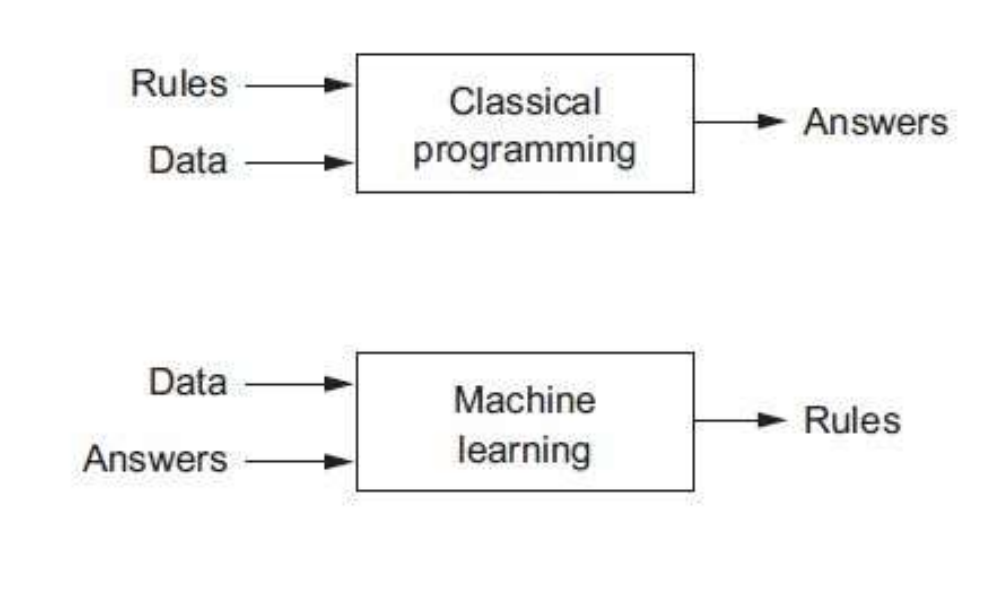
- Fundamentals of deep learning
- AI, machine learning, and deep learning
- New programming paradigm
- Deep learning structure
- Gradient descent
- Neural network architectures
- using Google colab
- Jupyter notebook and TensorFlow installation on local machine
- Exercises
- References

What is Deep Learning?



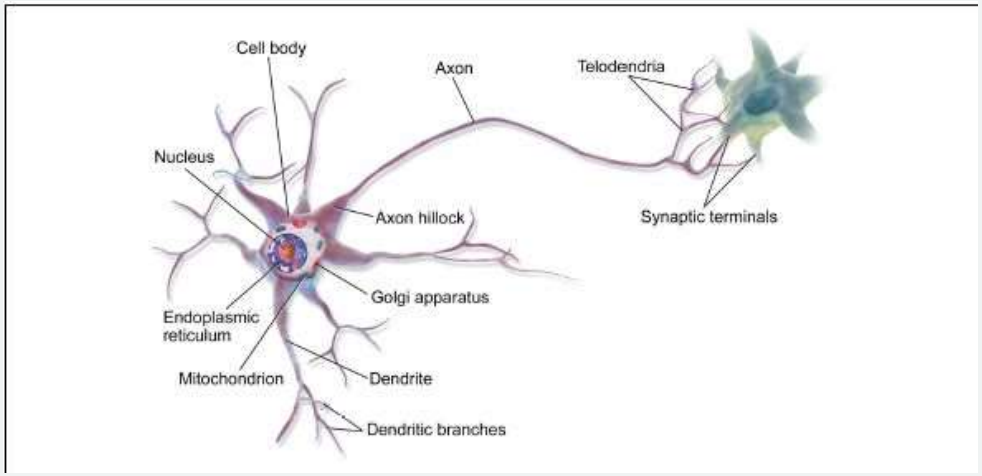
*From Deep Learning with Python, Francois Chollet, 2018

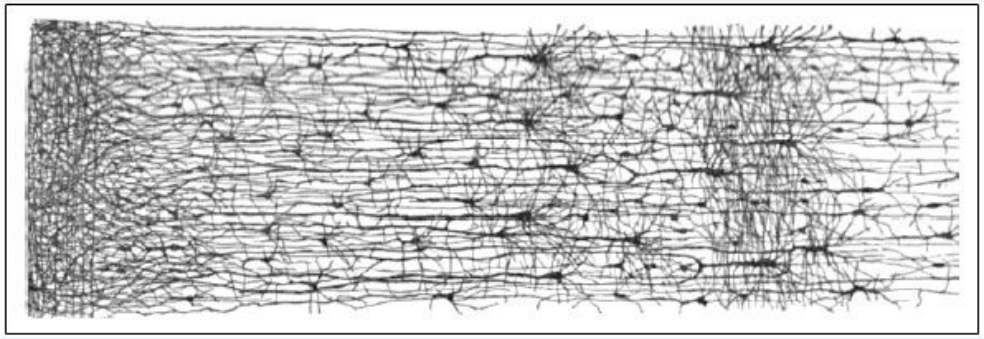
New programming paradigm in ML



*From Deep Learning with Python, Francois Chollet, 2018

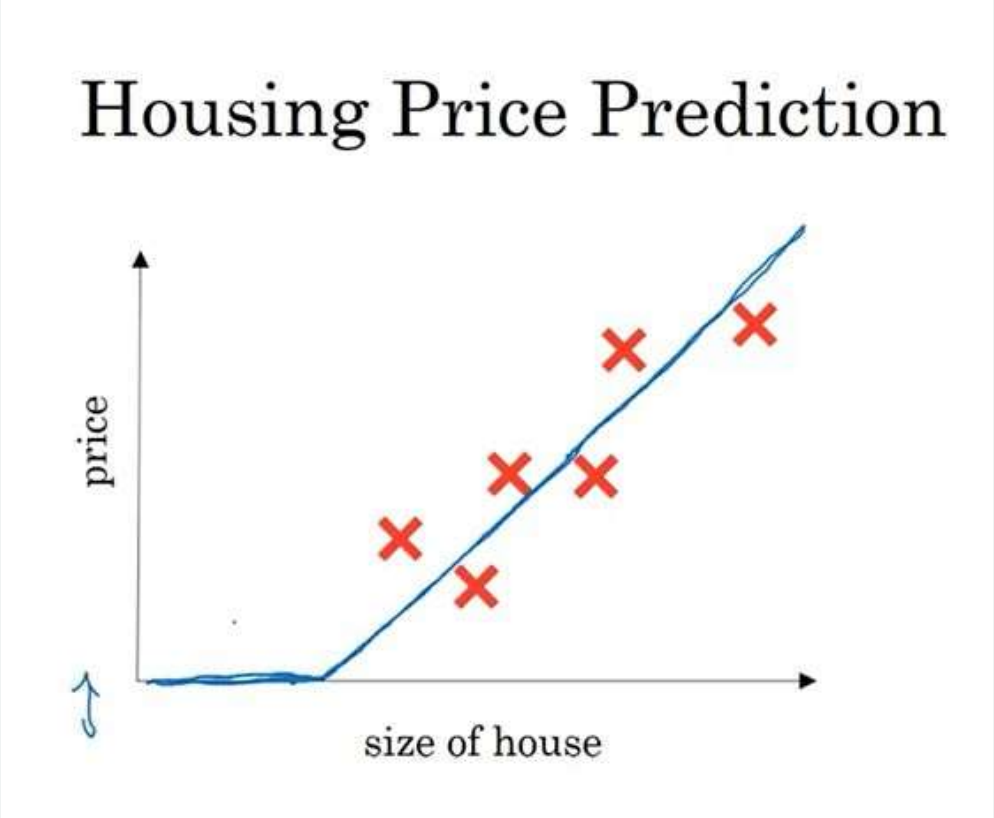
Motivation from biological neurons



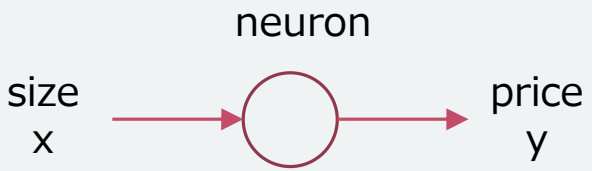


*From Hand on Machine Learning with Scikit Learn, Keras, and TensorFlow, Aurelien Geron. 2019

Simple Idea

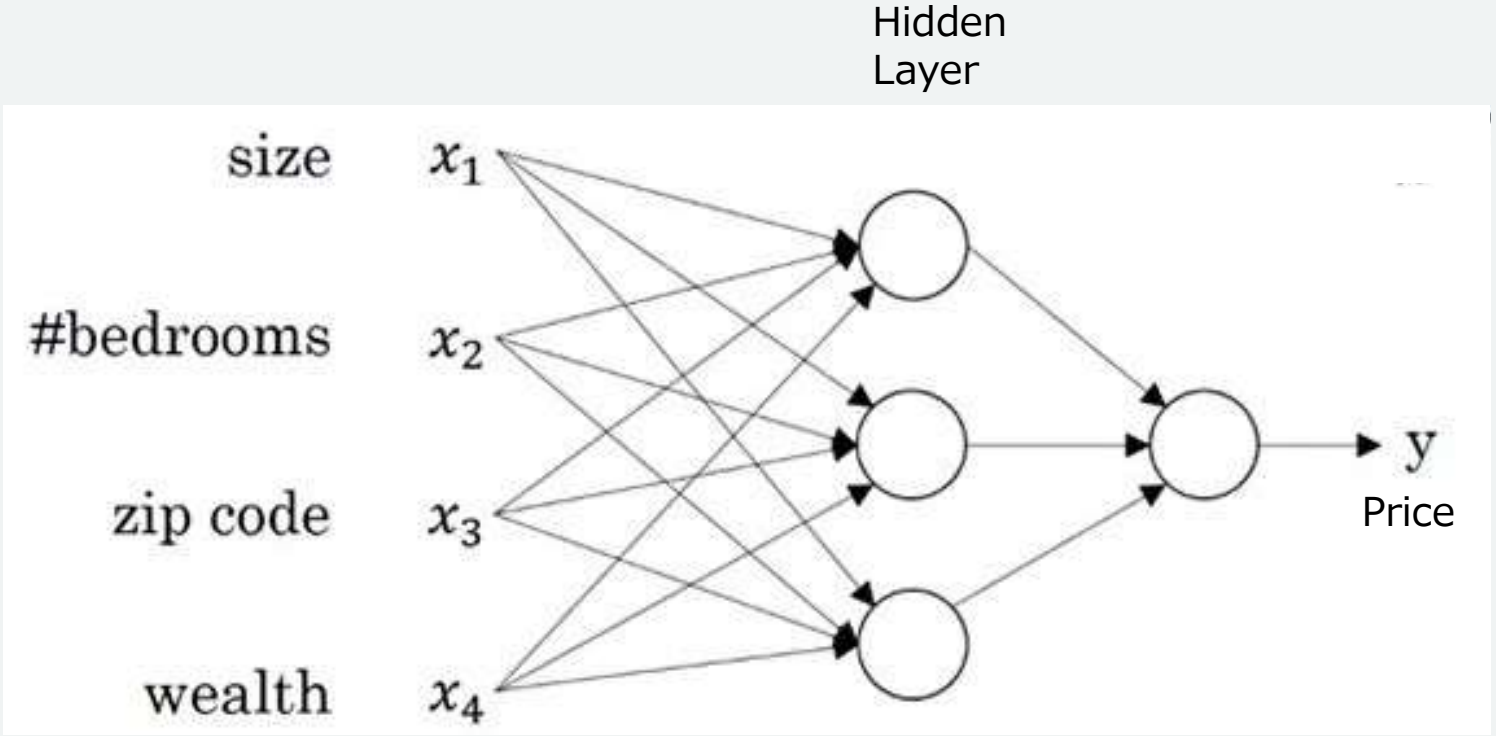


ReLu = Rectified Linear Unit

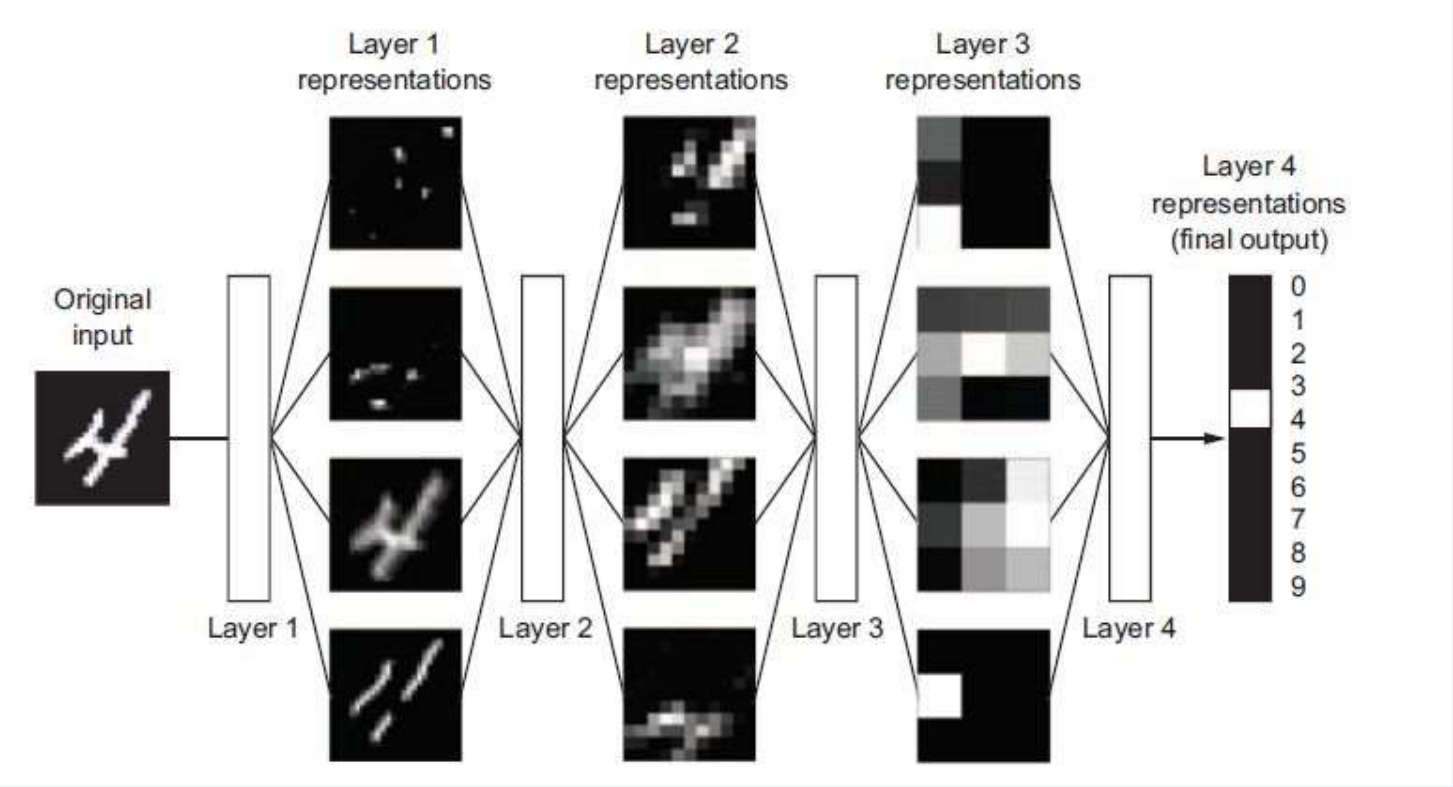


*Neural Network and Deeplearning course, deeplearning.ai, Coursera

Input Features

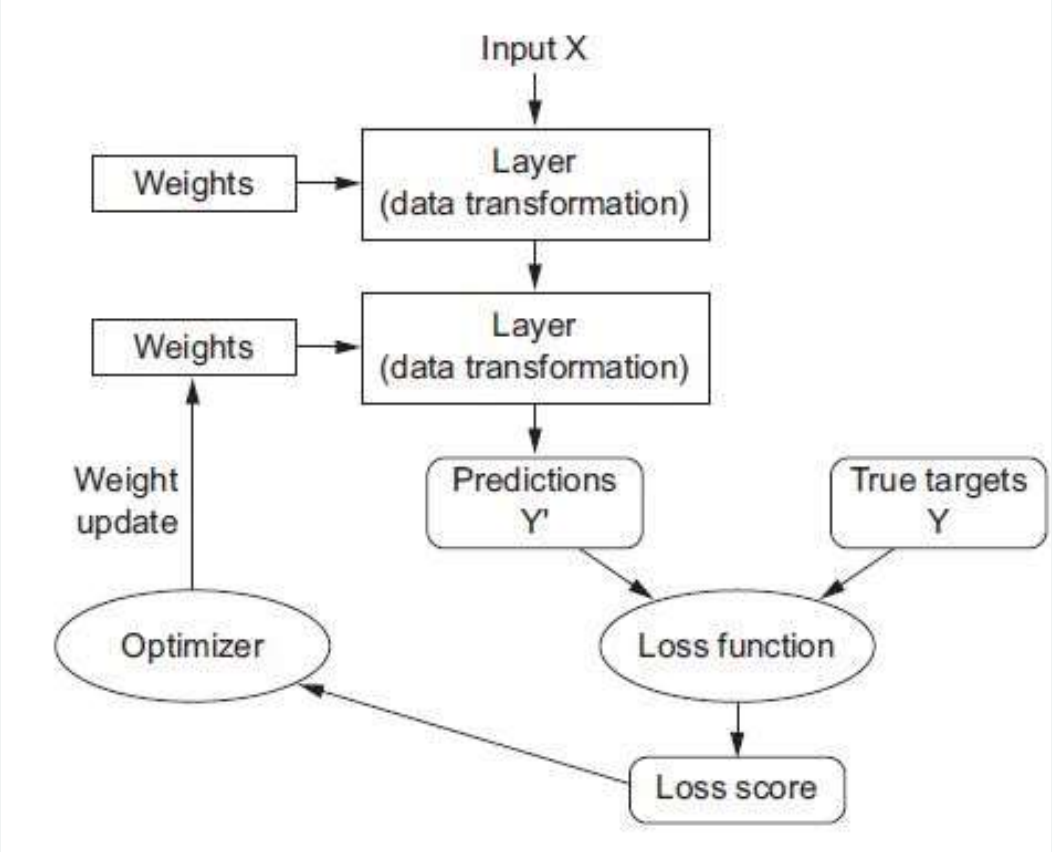


Deep neural network for digit classification



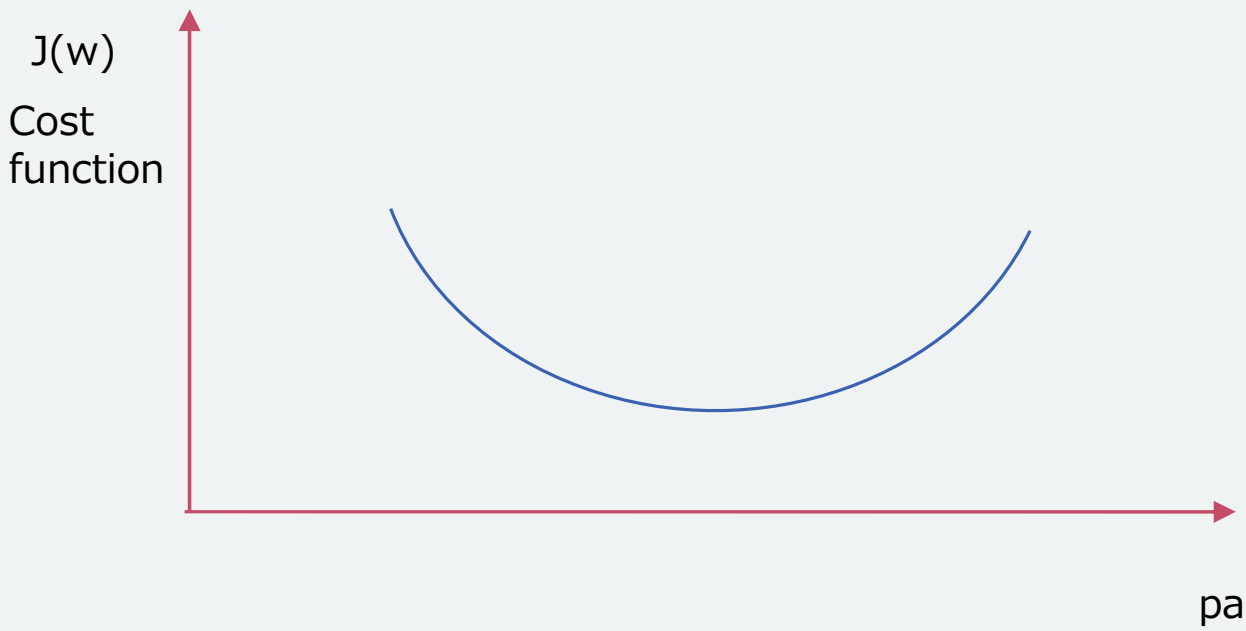
*From Deep Learning with Python, Francois Chollet, 2018

Deep learning structure



*From Deep Learning with Python, Francois Chollet, 2018

Gradient descent

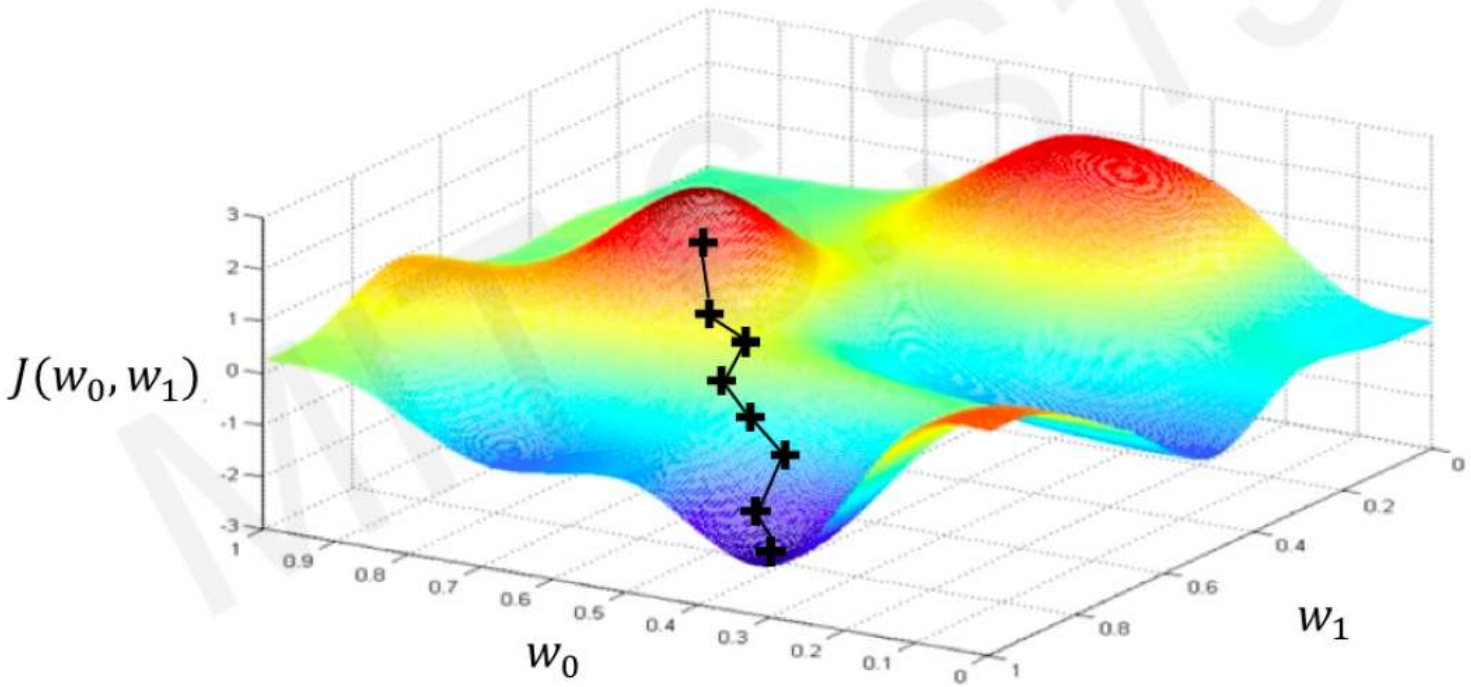


Learning rate

$$W := W - \alpha \frac{dJ(W)}{dw}$$

Gradient Descent

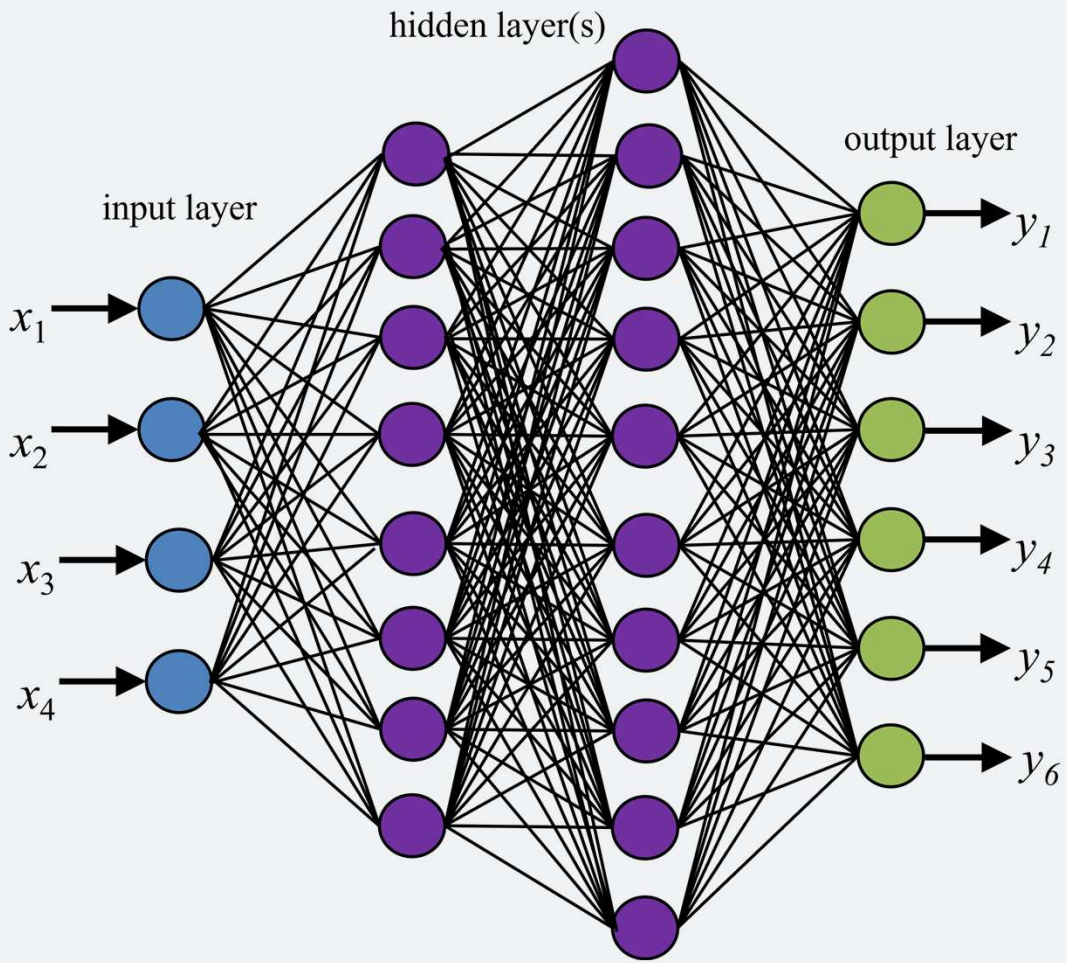
Repeat until convergence



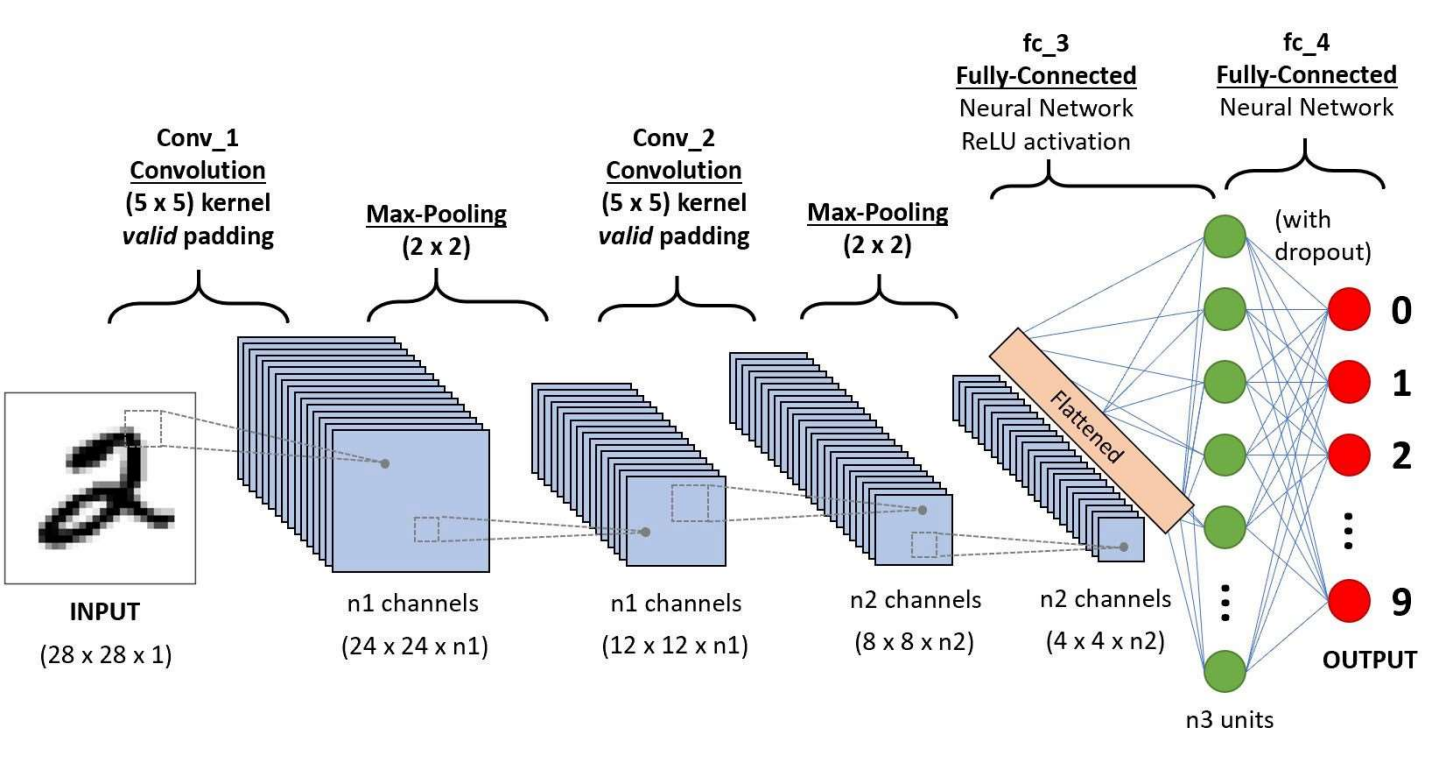
*From MIT 6S191 Deep Learning Lecture 1

SOME COMMON NEURAL NETWORK ARCHITECTURES

Dense Neural Networks (DNN)

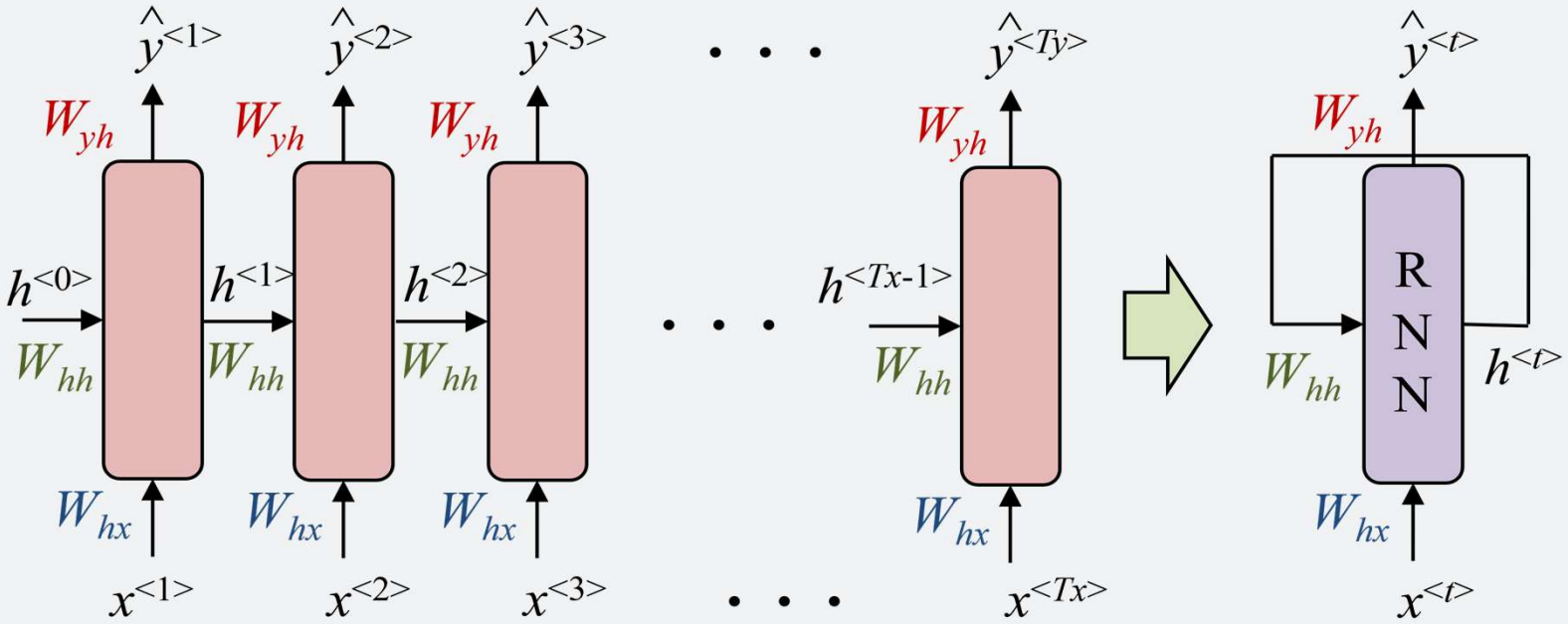


Convolutional Neural Networks (CNN)

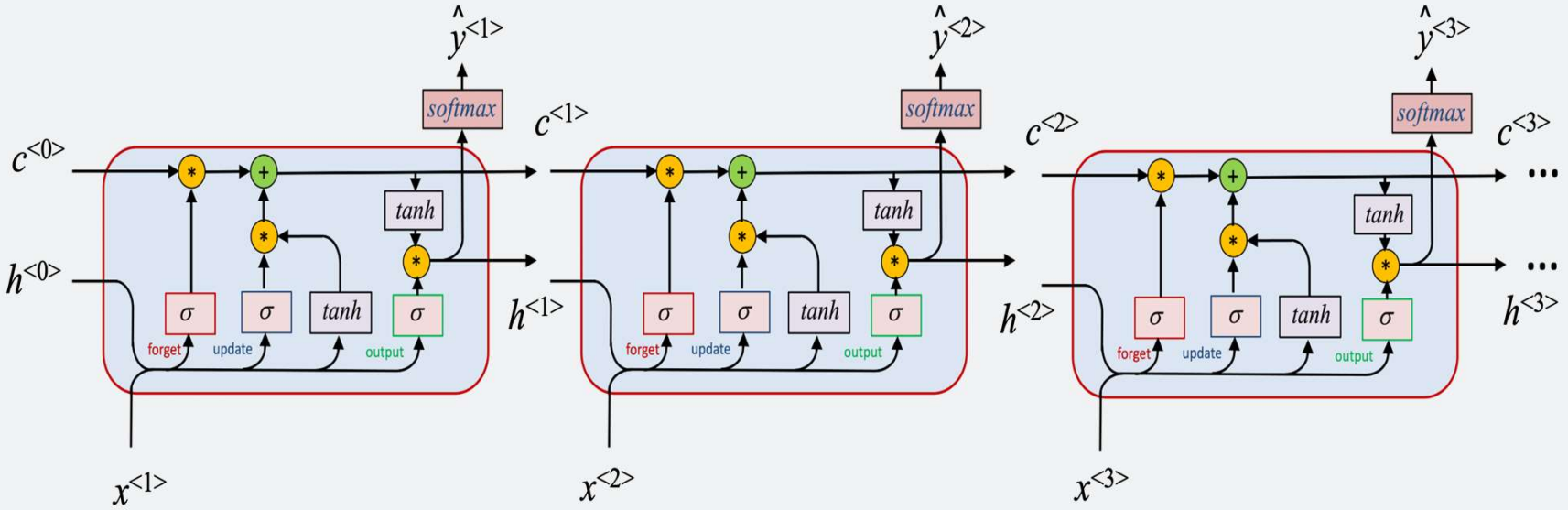


https://towardsdatascience.com/a-comprehensive-guide-to-convolutional-neural-networks-the-eli5-way-3bd2b1164a53

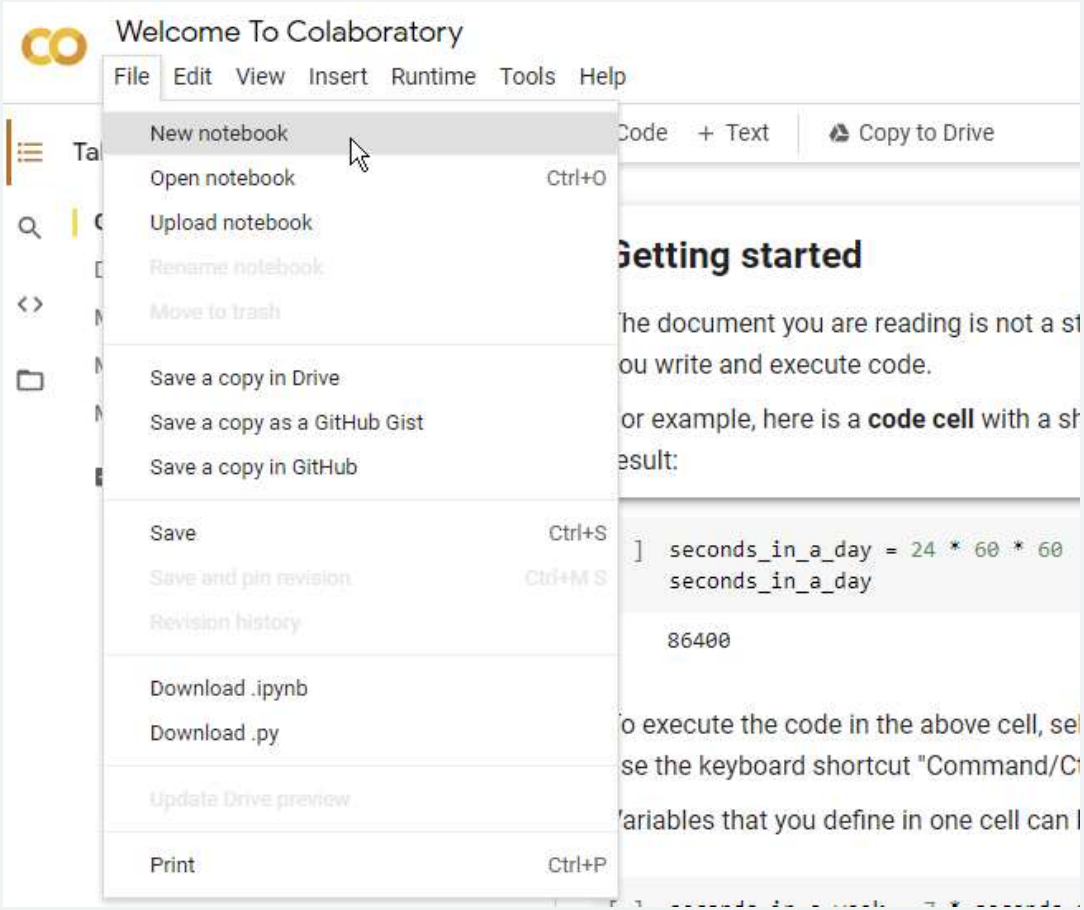
Recurrent Neural Networks (RNN)



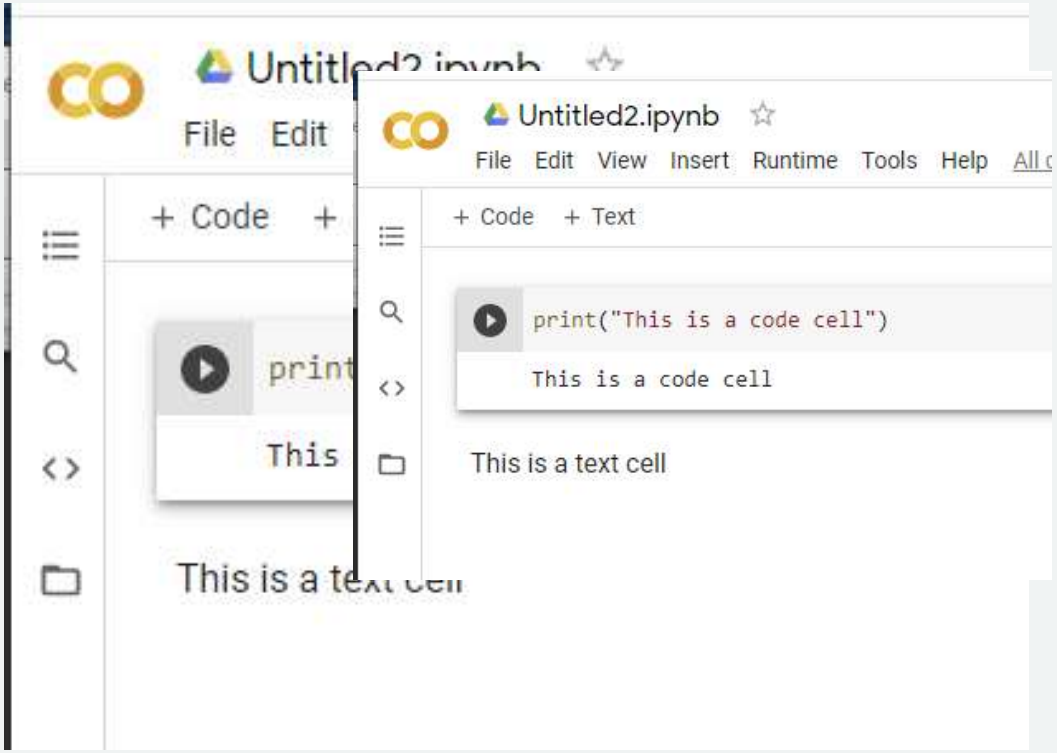
Long Short Term Memory (LSTM)



Begin Deep Learning Development in Colab



2 types of cell in notebook



TensorFlow is already installed in Colab

Install TensorFlow locally

See instructions from

https://github.com/dewdotninja/books/blob/main/th/anndl/appendixB.ipynb

Exercises:

เข้าสู่หน้าเพจของบทที่ 1 ของหนังสือ “โครงข่ายประสาทเทียมและการเรียนรู้เชิงลึก” และรันตัวอย่าง 1.1, 1.2 ใน Google colab หรือ Jupyter notebook ที่ติดตั้งบนเครื่อง

https://github.com/dewdotninja/books/blob/main/th/anndl/chapter1.ipynb

References

- F. Chollet. Deep Learning with Python 2ed. Manning Publications Co. 2021.
- A. Geron. Machine Learning with Scikit-Learn, Keras & TensorFlow. O'Reilly Media, Inc. 2019.
- I. GoodFellow, Y. Bengio and A. Courville. Deep Learning. www.deeplearningbook.org.
- Coursera
  - Deep Learning Specialization. Deeplearning.ai.
  - DeepLearning.AI TensorFlow Developer
- MIT 6.S191 Introduction to Deep Learning http://introtodeeplearning.com/