



深度學習研究與應用中心

DEEP LEARNING RESEARCH & APPLICATION CENTRE

香港恒生大學

THE HANG SENG UNIVERSITY

OF HONG KONG

Harness the Power of Neural Networks for AI: Applications of Deep Learning

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Deep Learning is Everywhere

AlphaGo

Speech/
handwriting
recognition

Automatic
translation

Self-driving cars
and many more



Deep Learning is Everywhere

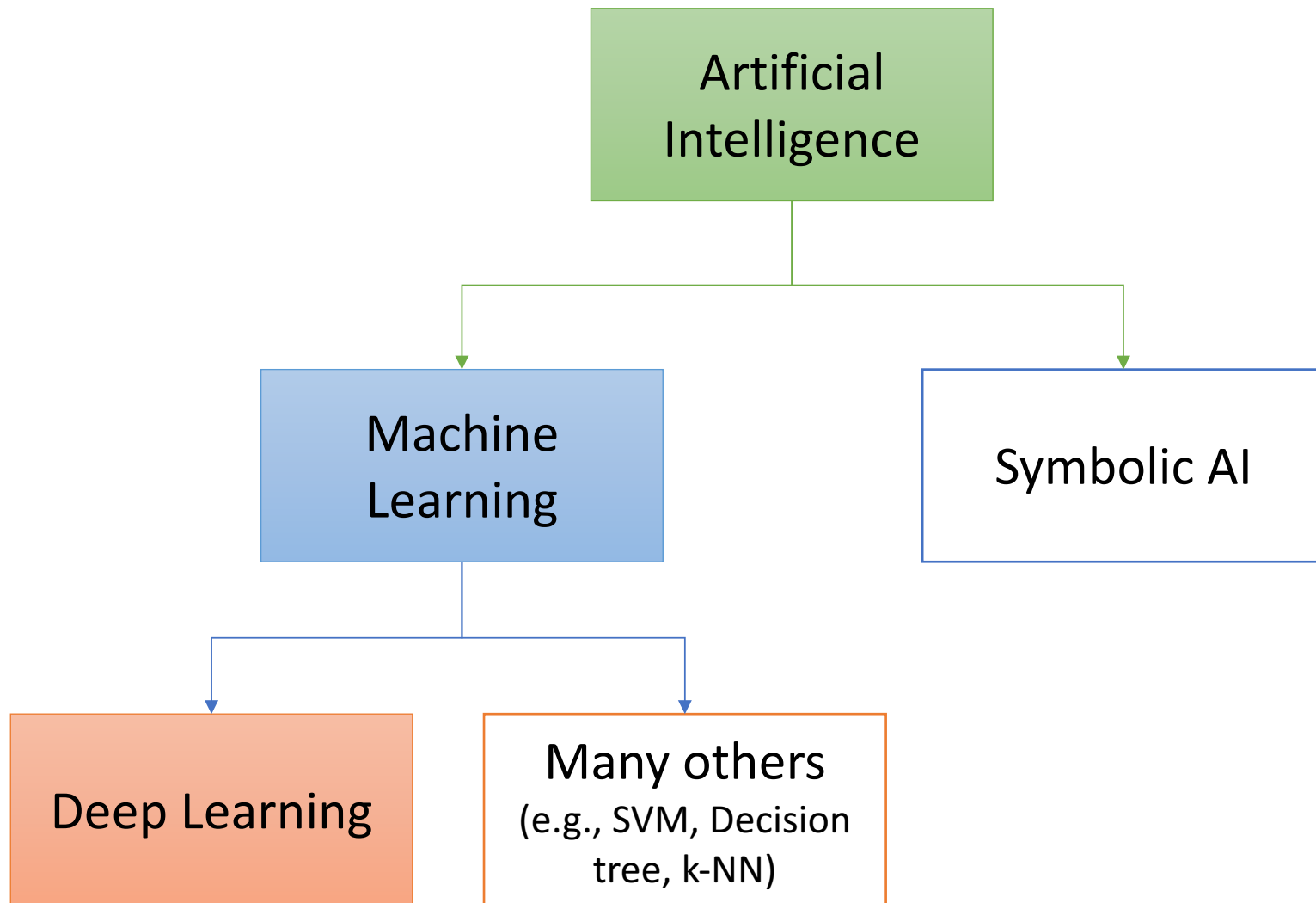
- <https://trends.google.com/trends/explore?date=all&q=deep%20learning>



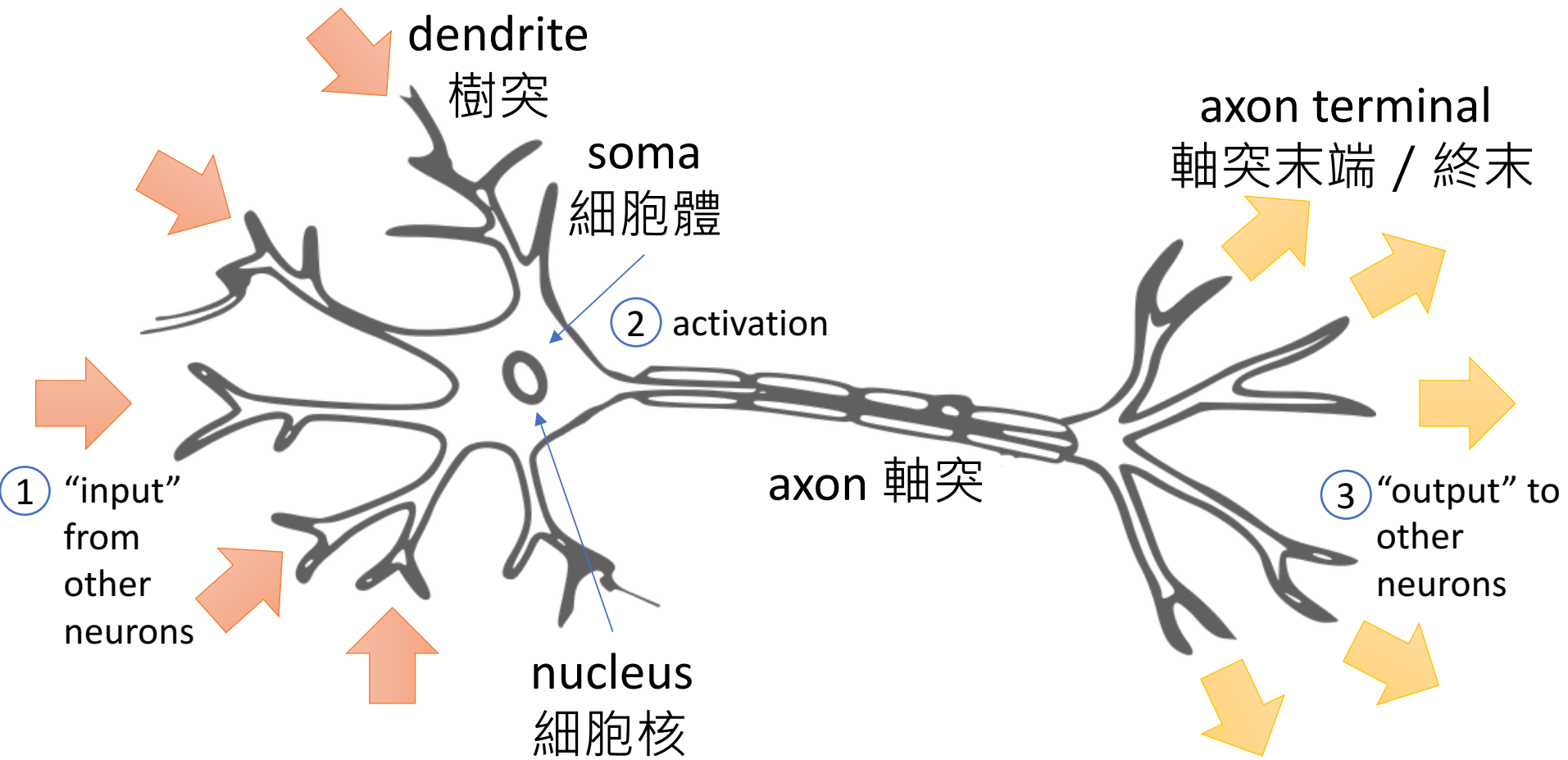
Outline

- Artificial Intelligence, Machine Learning and Deep Learning
- Key Features
- Applications
- Ways to Develop Deep Learning Applications

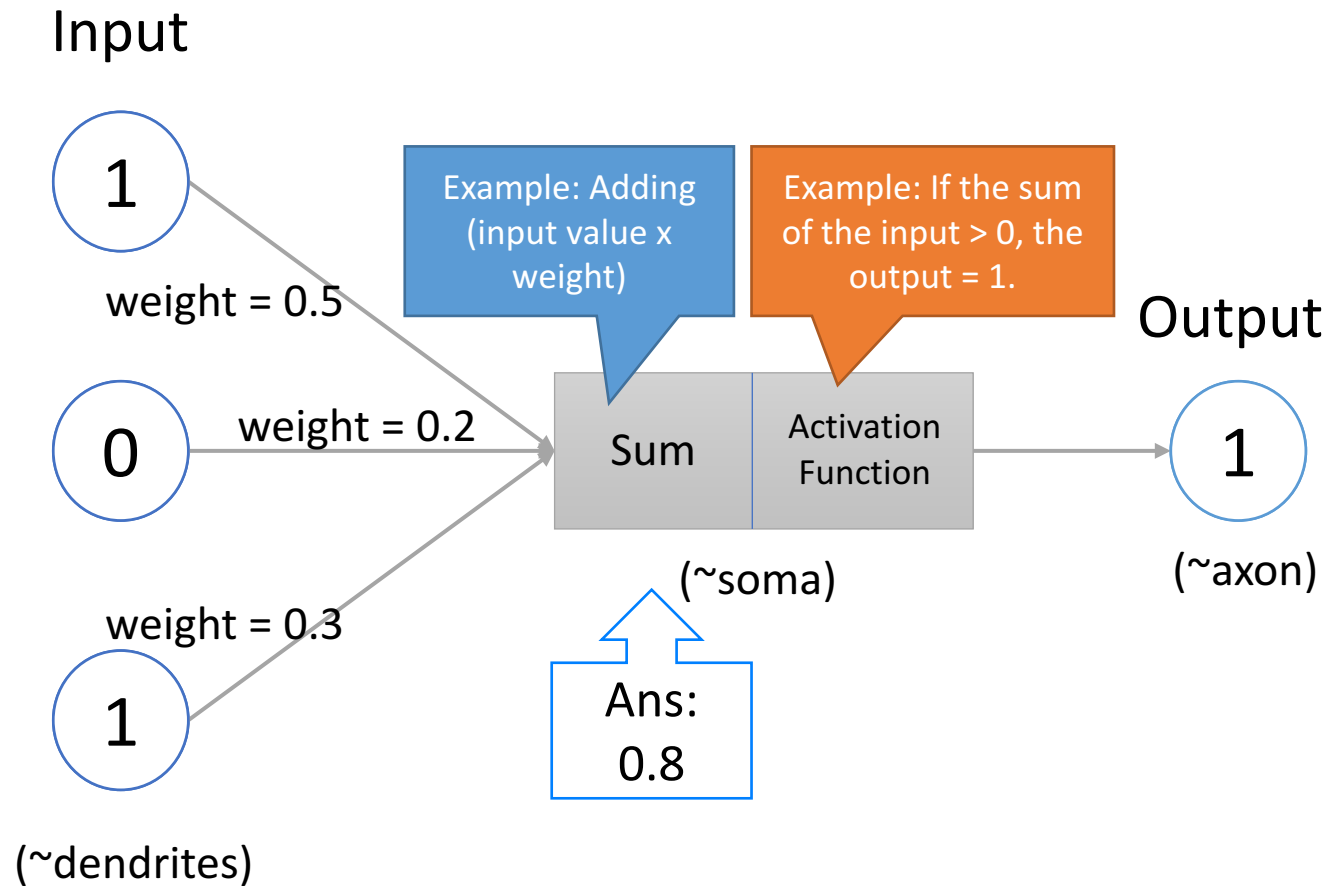




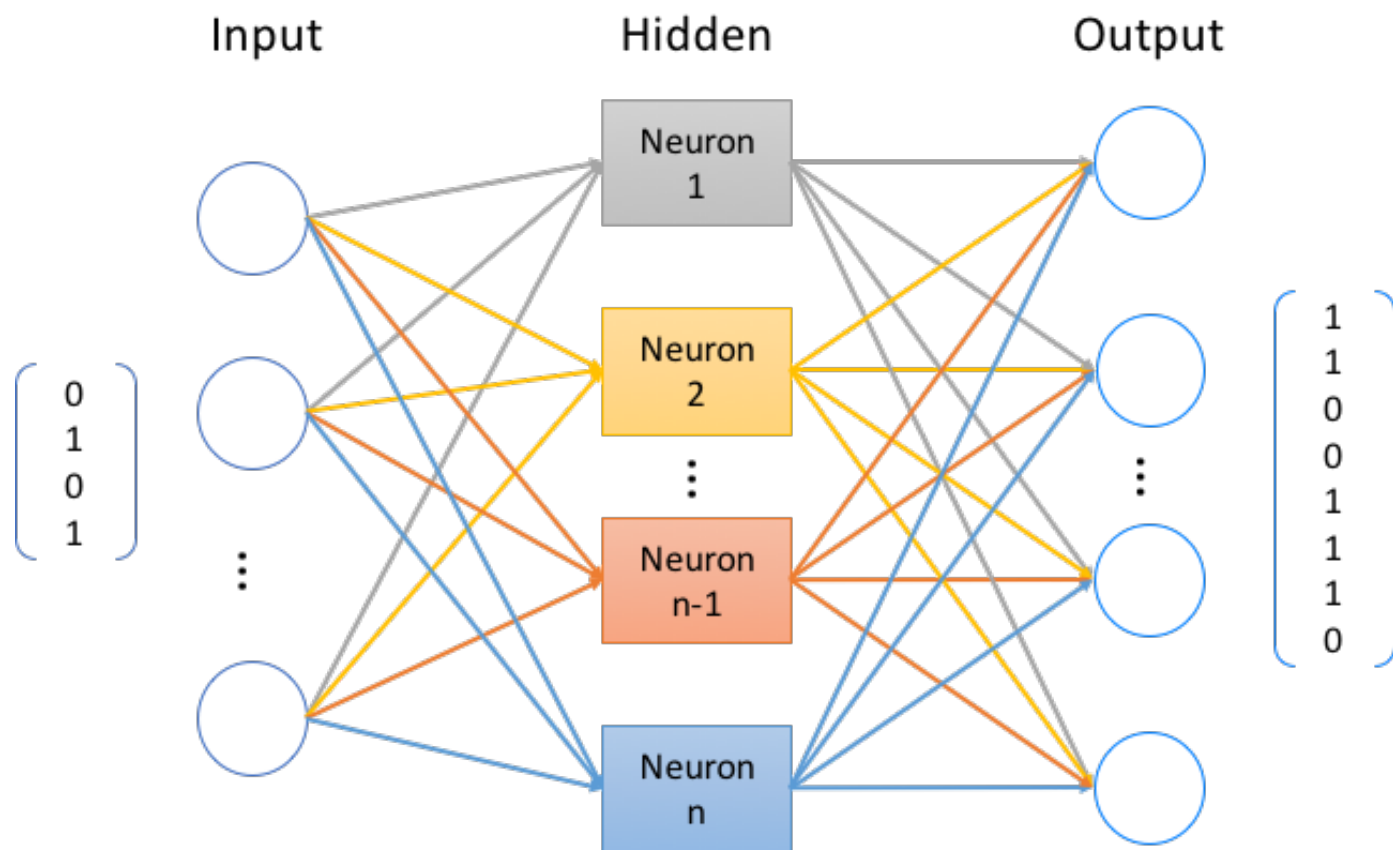
Biological Neuron



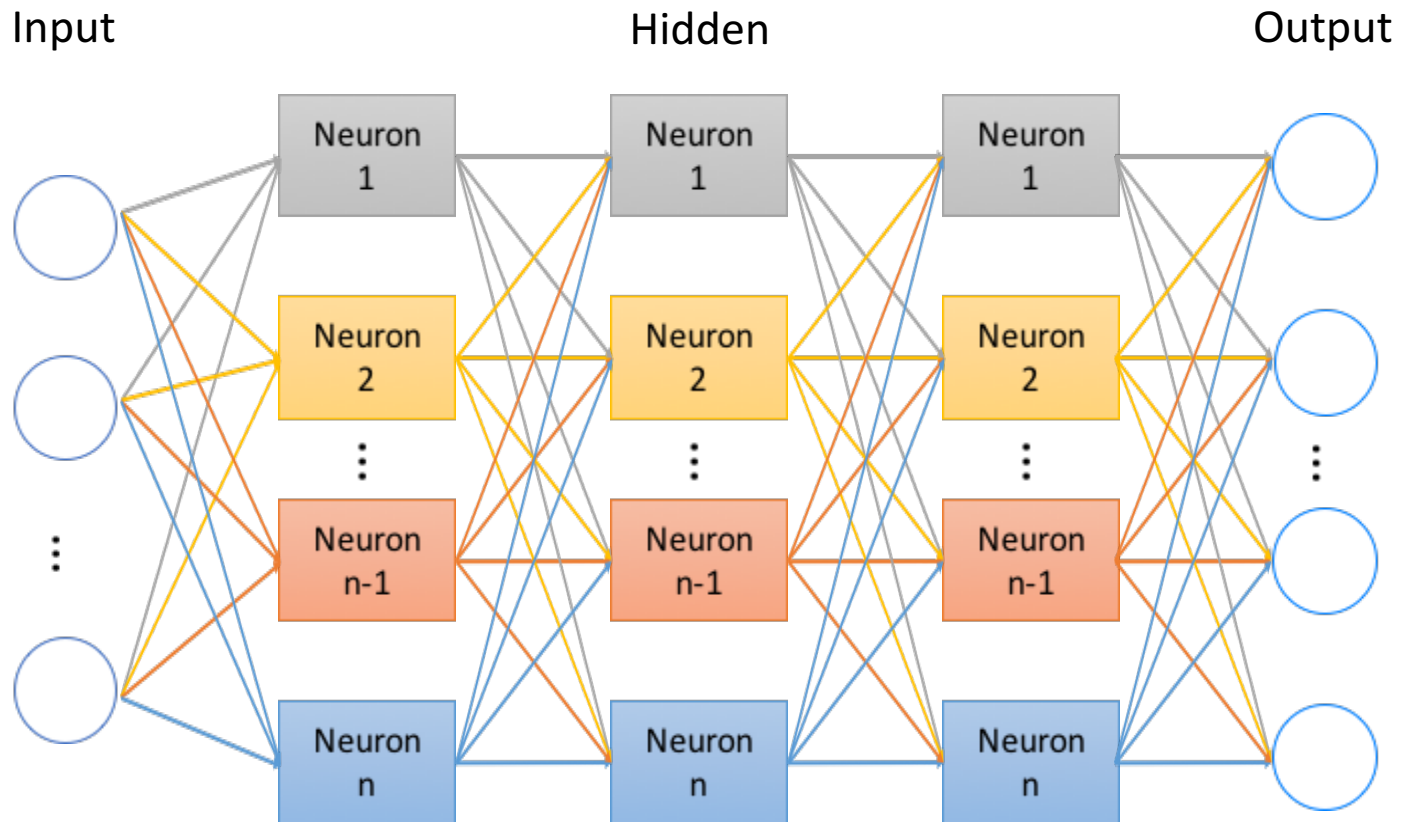
Artificial Neuron



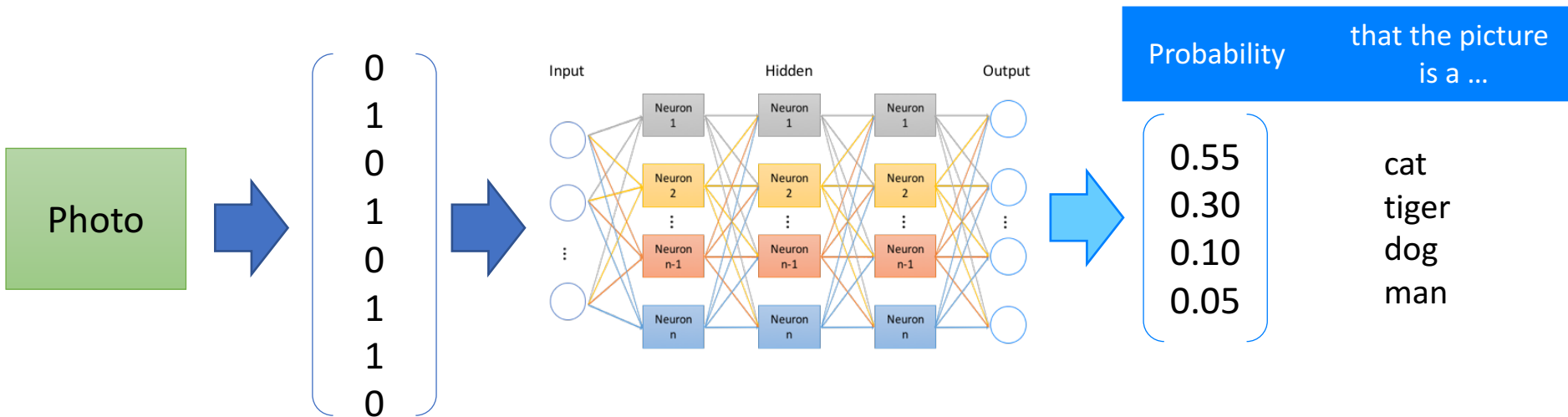
Artificial Neural Network: Many Neurons



Deep Learning: Multiple Hidden Layers



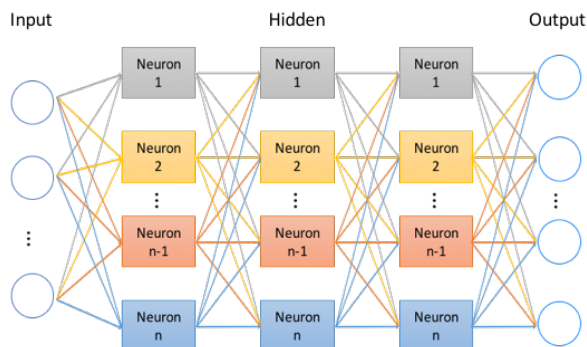
Example 1: Multi-class Classification



Example 2: Neural Machine Translation

ST: I go to
school by bus.

0
1
0
1
0
1
1
0
1
0
0
1
0
1
0
1
0
1
0
1
0



Probability

of the next
Chinese word

0.02

你

0.95

我

0.03

他

0

乘

0

走

0

跑

0

公車

0

計程車

0

火車

0

去

0

來

0

學校

0

公司

0

公園



Revival of Deep Learning

1. Computing
Power

2. Big Data

3. Design and
Architecture

1

Cell types:
New ways to build cells

Activation functions

- Binary step
- Sigmoid
- Hyperbolic tangent
- Rectified Linear Unit (ReLU)

Cell types / components

- Long-short Term Memory (LSTM)
- Gated Recurrent Units (GRU)

2

Network types:
New ways to connect cells

- Feed Forward Neural Networks
- Auto-encoders
- Convolutional Neural Networks (CNN)
- Recurrent Neural Networks (RNN)



Applications

Sentiment
analysis

<https://stanford.io/1moo7lB>

Summarization

<https://bit.ly/2DKnpBd>

Chatbot

<https://bit.ly/2gIR7rY>

Grammar
checker

<https://bit.ly/2DLKpPY>

Text generation

<https://bit.ly/2zeukC0>



Applications

Time Series
Forecasting

<https://bit.ly/2FH0Xv9>

Object detection

<https://bit.ly/2fXFbXS>

Image caption
generator

<https://bit.ly/2BxKBkF>

Art creation

<https://deepart.io/>

Music creation

<https://deepjazz.io/>



Areas

Finance

- Stock Price Prediction (<https://bit.ly/2PT1ZZX>)
- Financial Sentiment Analysis (<https://bit.ly/2r33w0o>)

Business

- Smart Checkout, Retail Stocking and Behavioral Checking (<https://bit.ly/2QgOyCf> and <https://bit.ly/2Qiv9B3> (ML in general))
- Marketing automation and personalized marketing (<https://bit.ly/2Be0deT>)
- Retail Forecasting (<https://bit.ly/2P1HOn8>)

Healthcare

- Medical Image Classification (<https://bit.ly/2TBzsGt>)
- Drug Discovery (<https://bit.ly/2P2dUiL>)



Methods

Deep Learning
Libraries

Deep Learning
Platforms

Application
Programming
Interface (API)



More About Us

- Deep Learning Research and Application Centre (<http://dlc.hsmc.edu.hk>)

Automatic
Translation

Grammar
Checker

Chatbot

Image
Processing



Thank you very much!

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