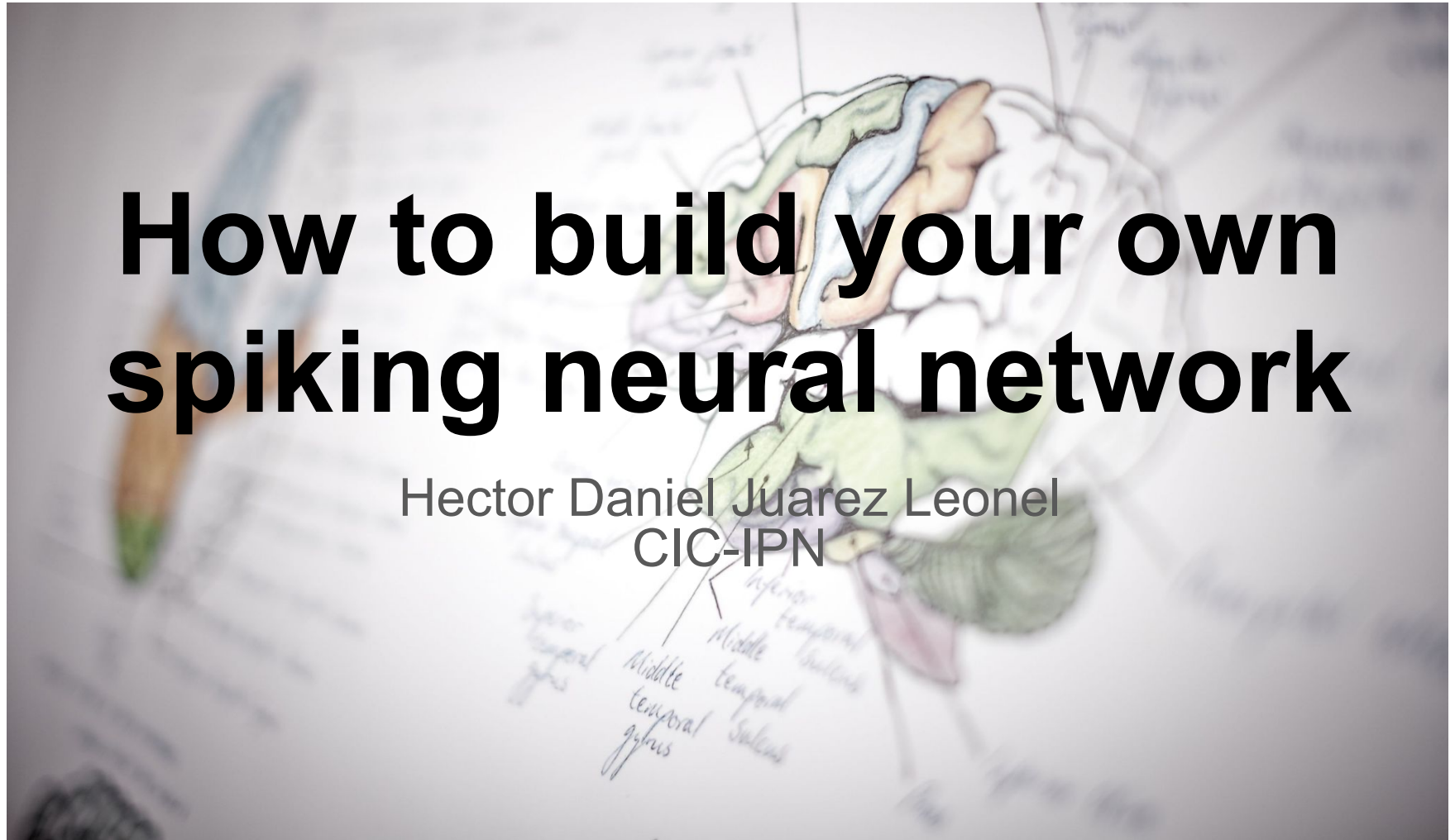


How to build your own spiking neural network

Hector Daniel Juárez Leonel
CIC-IPN



What public is this intended for



Artificial Intelligence

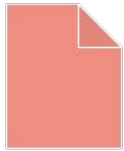
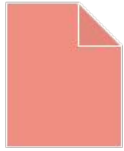
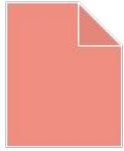
Machine Learning

Neural Networks

Data science

Expert systems

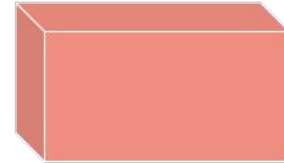
Inputs



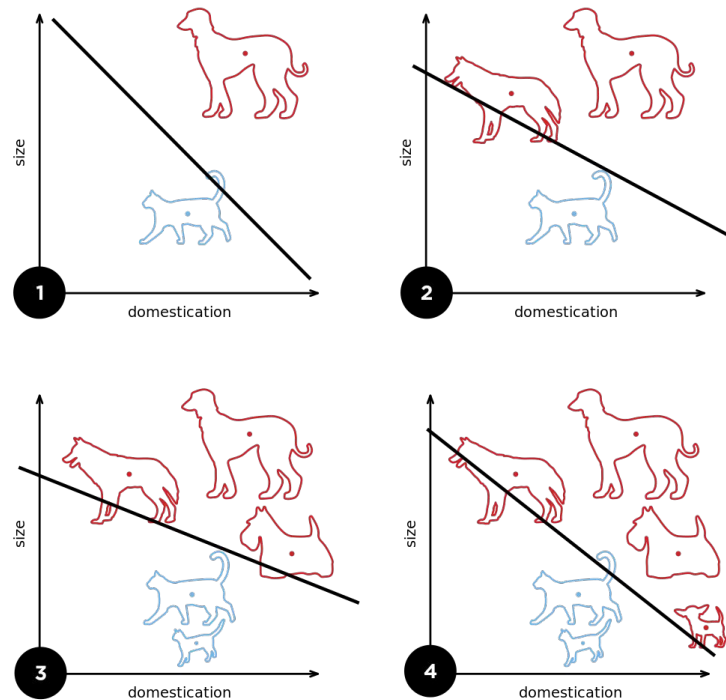
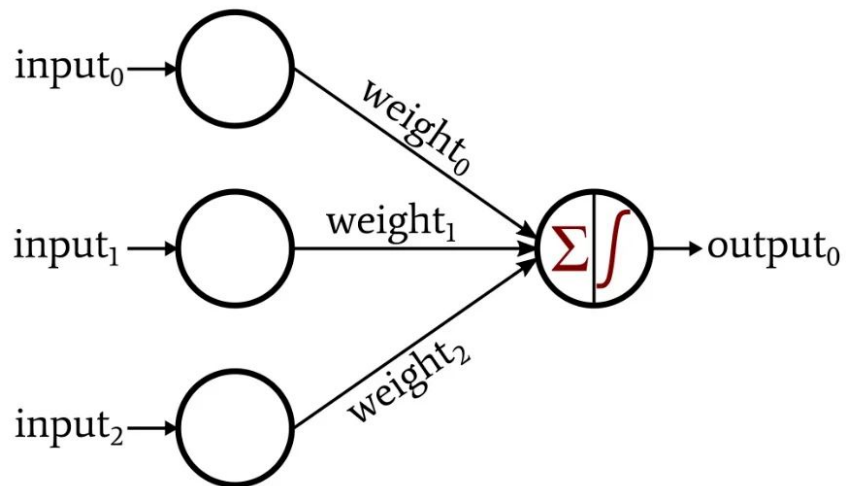
Logic
&
Rules



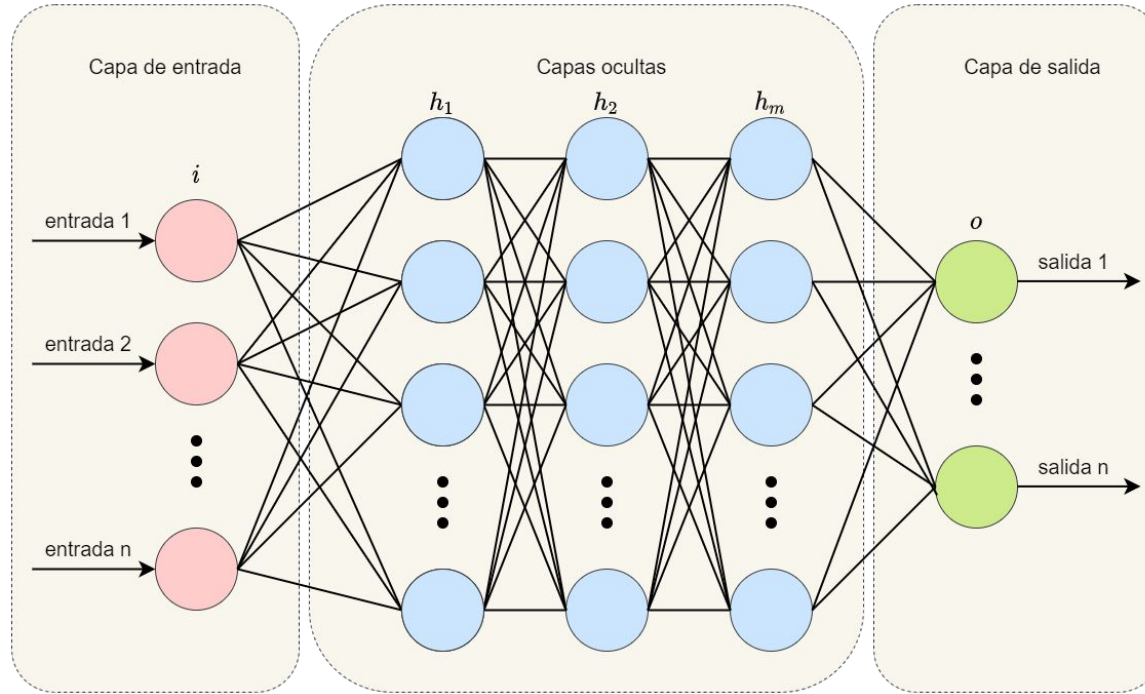
Outputs



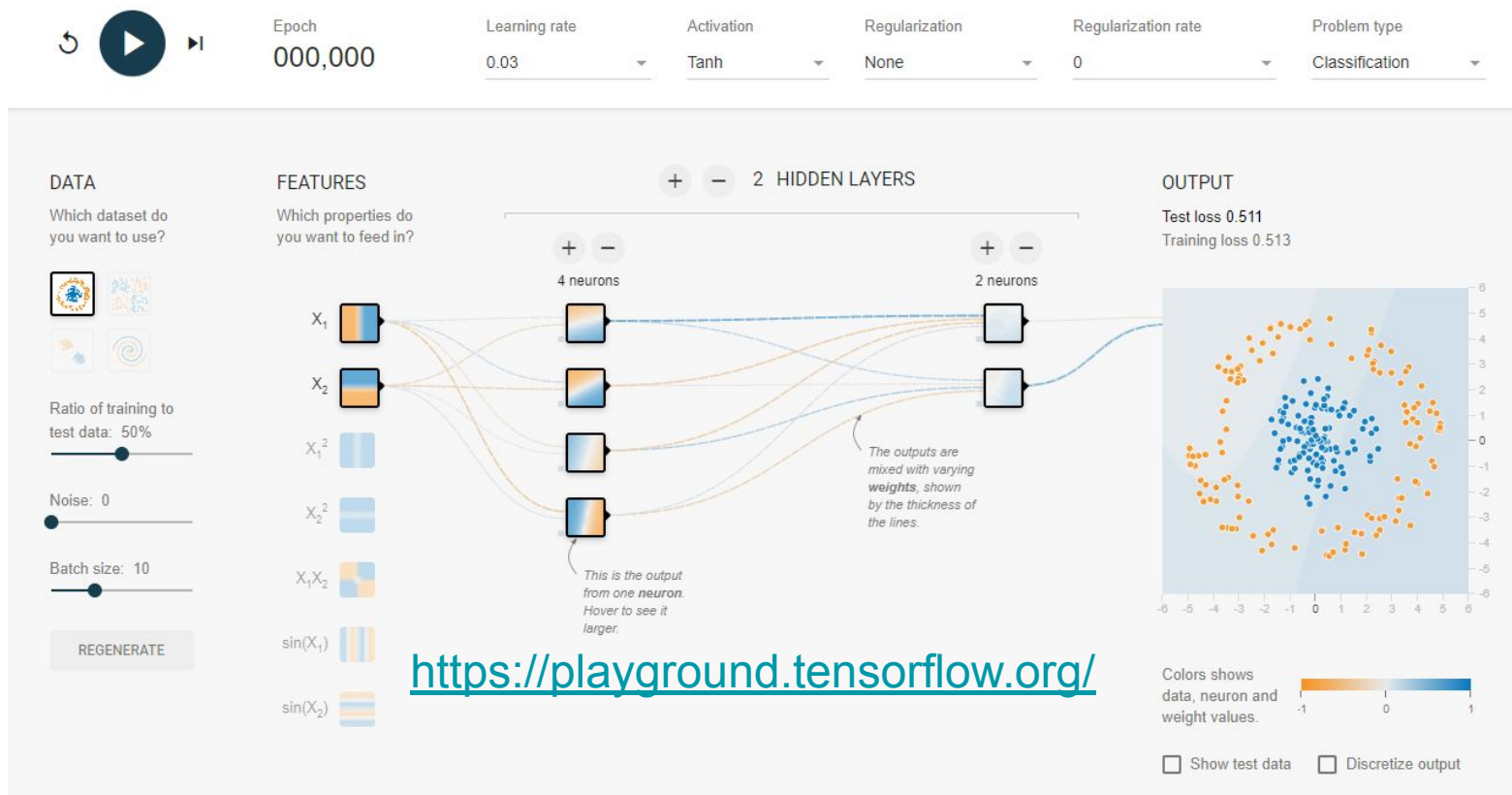
Perceptron



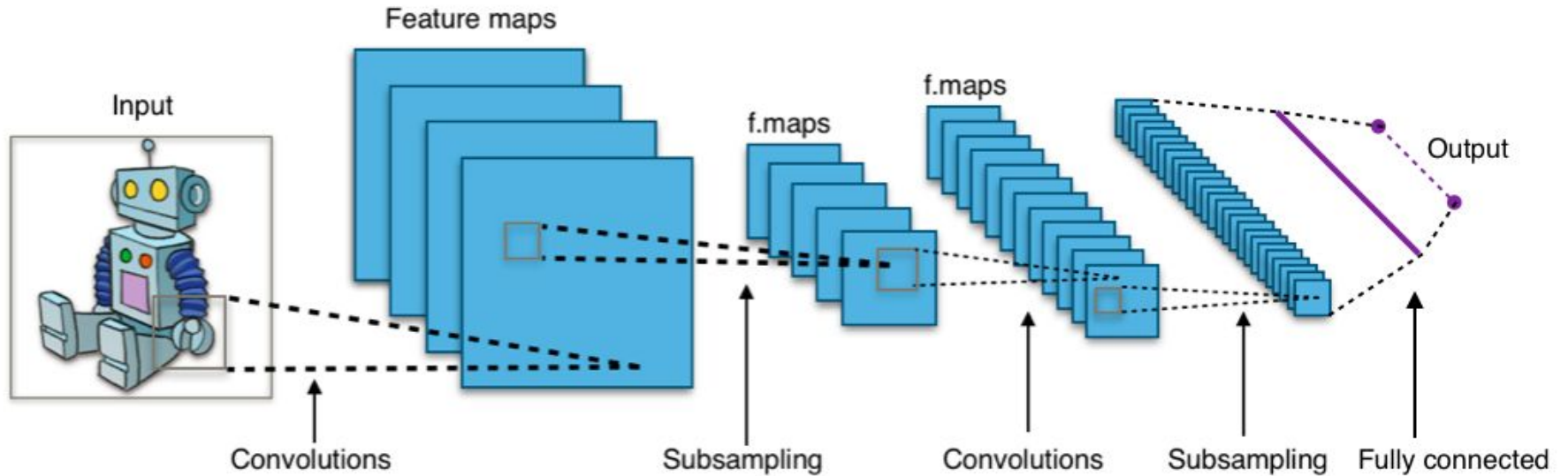
Neural Network Multilayer Perceptron



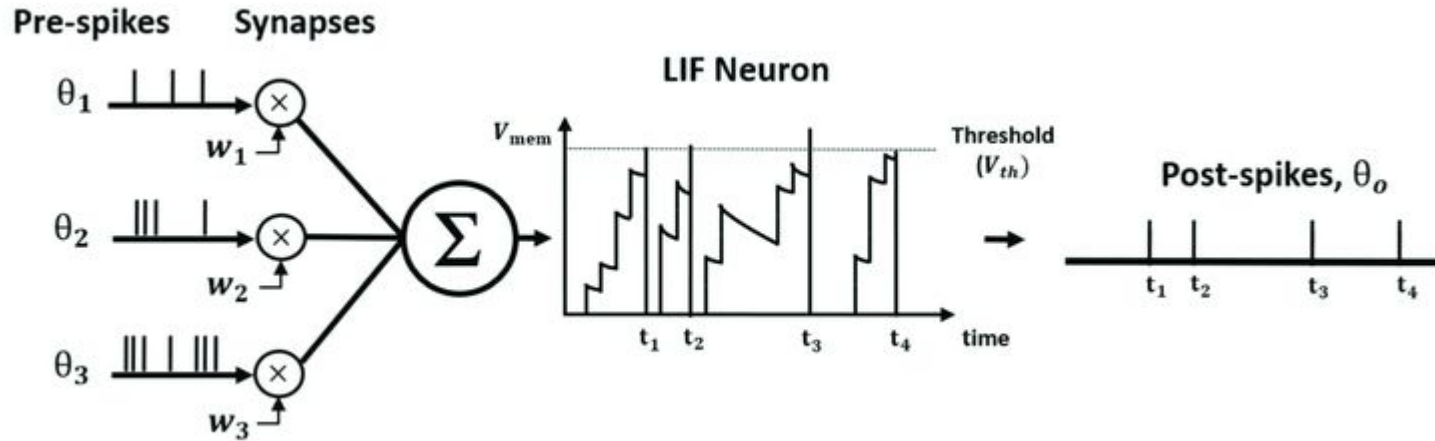
How a neural network works



Convolutional Neural Networks



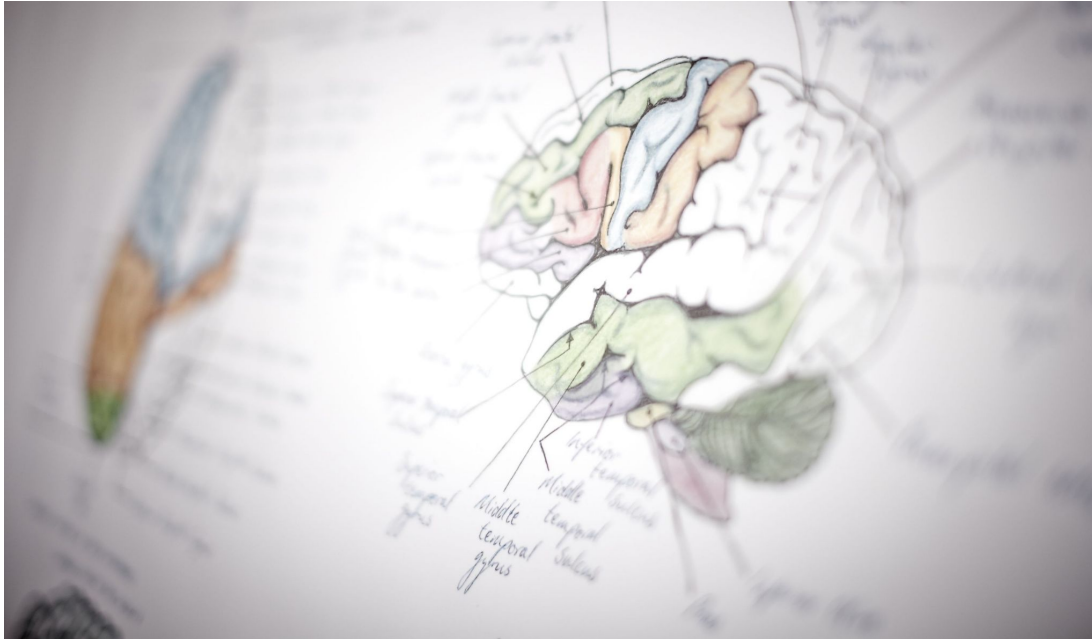
Spiking Neural Networks



Frameworks for neural networks

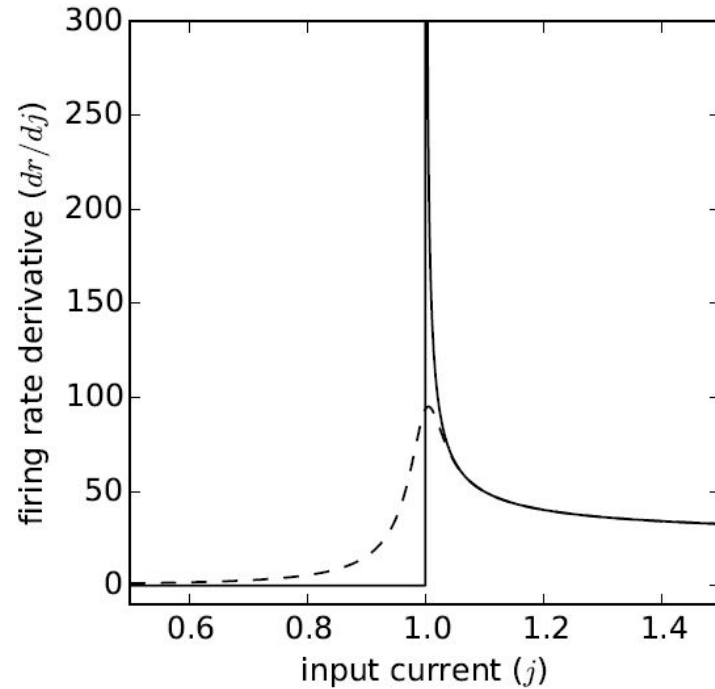
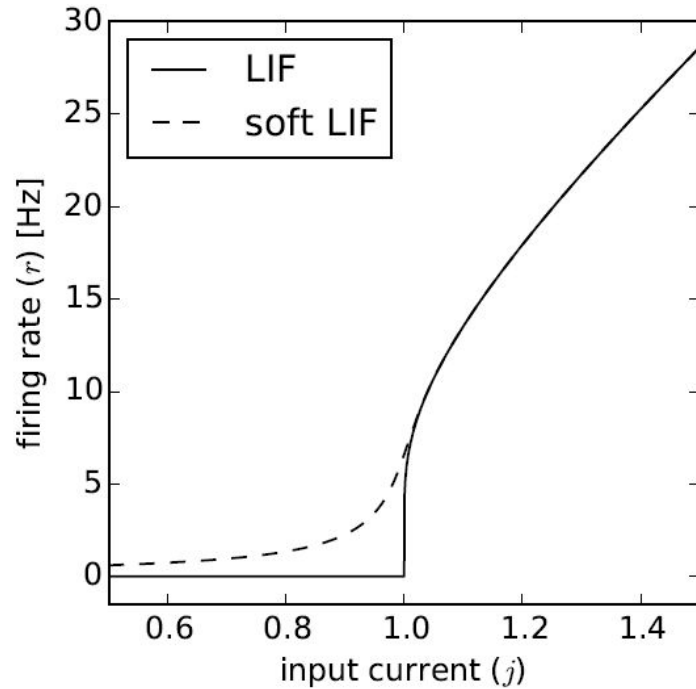


Python library for spiking neural networks

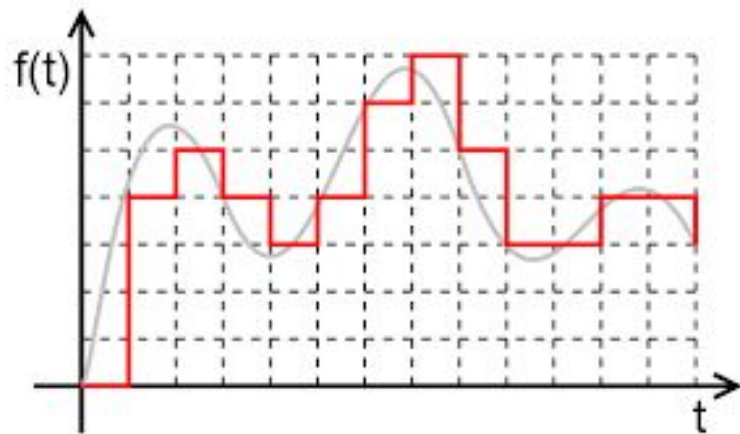
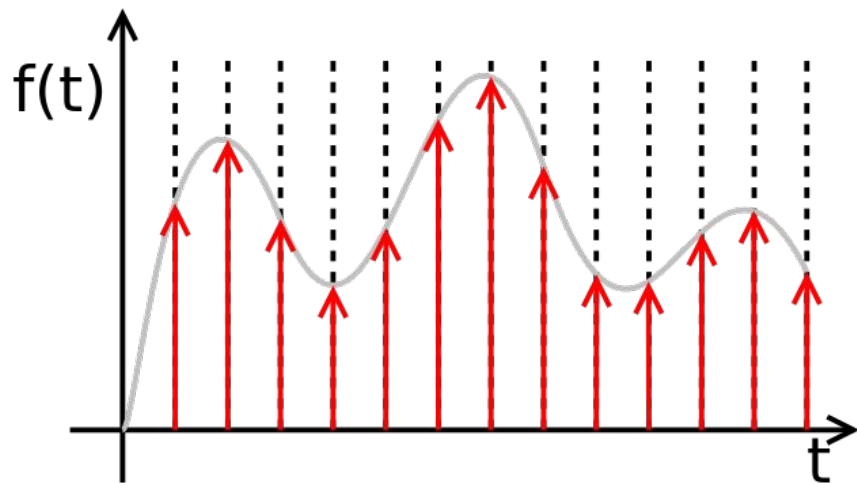


Nengo

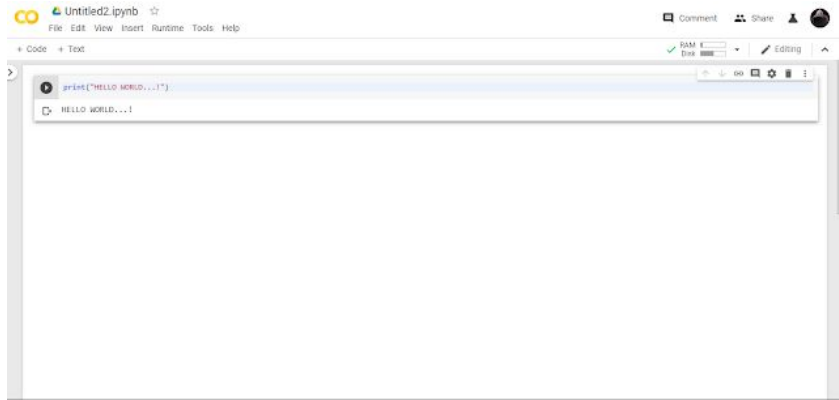
Neuron model Leaky Integrate-and-fire



Signal digitalization



Google colaboratory



Free! Cloud Server
TPU & GPU



Google
colab

Stage

Celsius



Fahrenheit

```
def celsius2fahrenheit(C):  
    F = C * 1.8 + 32  
    return F
```

Inference by data

Celsius
-40
-20
-10
0
1
30
100

Fahrenheit
-40
-4
14
32
33.8
86
212

Code examples

Basic code (celsius to Fahrenheit)

<https://github.com/yniad/Some-Nengo-Codes/blob/main/NengoBasic.ipynb>

keras with nengo

<https://github.com/nengo/nengo-dl/blob/master/docs/examples/keras-to-snn.ipynb>

Tensorflow with nengo

<https://github.com/nengo/nengo-dl/blob/master/docs/examples/spiking-mnist.ipynb>

Pytorch with spiking neural network

<https://github.com/nengo/pytorch-spiking/blob/master/docs/examples/spiking-fashion-mnist.ipynb>

Note: to open a jupyter notebook from Github to Colab, it is enough to add “tocolab” after “github” and before “.com”