fitness function $f(x)$
$f(x)$ **evaluates** x **numerical score**
Higher better
fitness landscape

x
x' **small change** x
$f(x') > f(x) x = x'$
$x' x$
$_{o}ptimum$
local optimum
global optimum
biological evolution
population N
$0 N$
$i + 1 N$ **fittest** i
All chance
fittermore often
tournament selection
t
i
$x\%i i$ $i + 1$
parameter tuning
$h_1, h_2, \ldots, h_n$
Linear combination

$w_1, w_2, \ldots, w_n$ **weights**
$_{p}rogramming$
code
tree-based
Inspired by
electrically excitable
connected together
excitatoryinhibitory
fires
100 billion
perceptron
$x_1, \ldots, x_m$ **other perceptrons**
weight w_i $-1 +1$
weighted sum

activation function
step function

$\geq$
$<$

$_{p}erceptron$
multilayer perceptron (MLP)
input layerhidden layersoutput layer
perceptrons
every
$_{1}00_{d}igits$
handwritten digit recognition
raster image
Input
Output
Hidden layers
Weights
train
training data
reinforce
accuracy
tagged
Gradient descentgradient ascenthillclimbing
error
Stochasticepochs
subset
patterns