

Machine Reasoning and Deep Spiking Networks

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$U = EB$
 $R_1 = 13,50\Omega$
 $R_2 = 30\Omega$
 $R_3 = 20\Omega$
 $F_A = \rho g V$
 $w = BC$
 $\dot{w} = 0$
 $w = D$
 $\dot{w} = 0$
 $z = w$

$P = \bar{S}$
 $X_{w,T}$
 Plank
 V_{in}
 ω

$w^2 = \frac{mgl}{f}$
 $T = \frac{2\pi}{\omega} = 2\pi \sqrt{\frac{mgl}{f}}$
 $x = x_0 + vt$
 $y = y_0 + vt$
 $z = z_0 + pt$

$x = \rho \cos \varphi, y = \rho \sin \varphi$
 $\rho = \sqrt{x^2 + y^2}$
 $\frac{h}{\lambda} = 10m$
 $\frac{v}{v - 5m}$?
 \sin

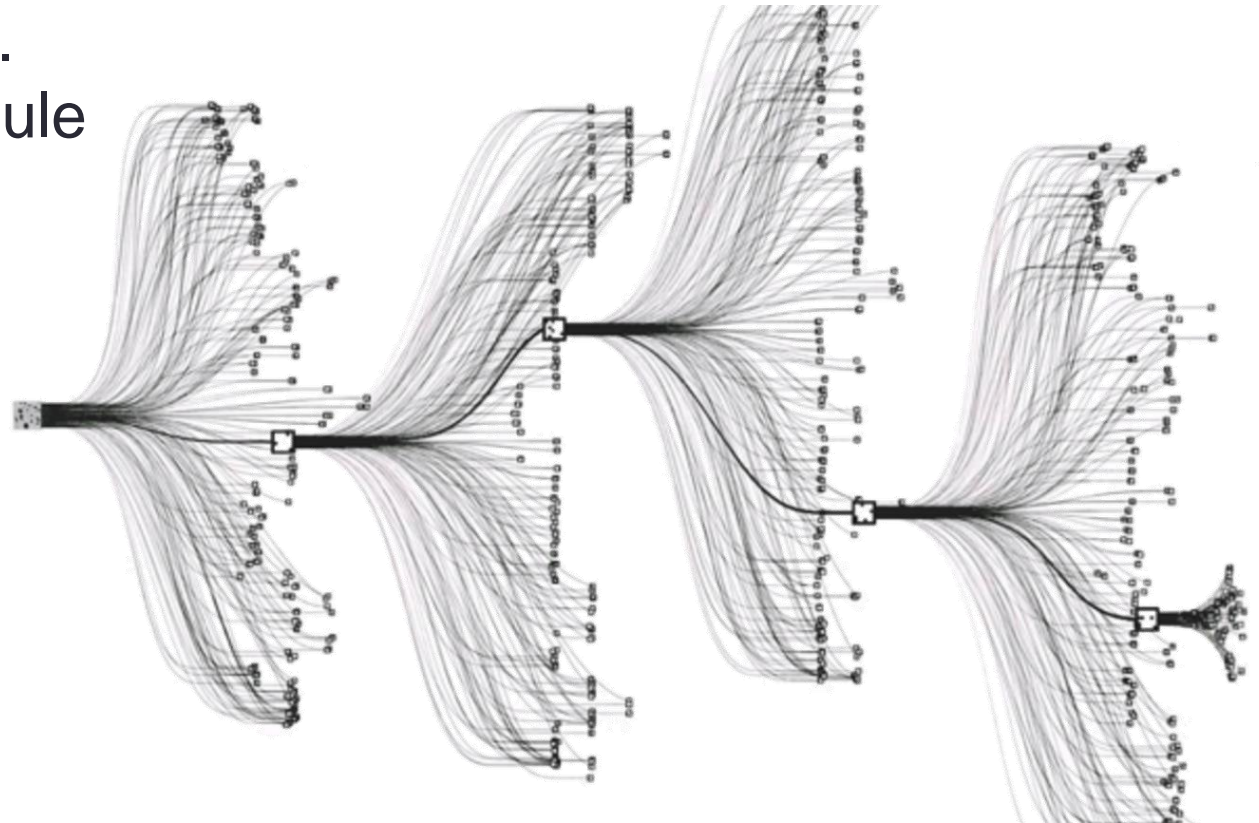
$T = \frac{t}{r}$
 $v = \frac{2\pi r}{T}$
 $v = \frac{v}{2\pi r}$
 $T = \frac{v}{2\pi r}$
 $T = \frac{2\pi r}{v}$

$w = BC, \dot{w} = 0$
 $w = D, \dot{w} = 0$
 $z = w, \dot{z} = A$
 $\frac{dp}{p} + \gamma \frac{dv}{v} = 0$
 $I = \frac{U}{R}$
 $\downarrow \dot{v} = \text{const}$
 $\downarrow a = \text{const}$
 $\sum_{n=0}^{\infty} \exp(-nDw/kT)$
 $R = \frac{\rho \cdot l}{S}$
 $A^2 + B^2 + C^2$
 $\sqrt{m^2 + n^2 + p^2} \cdot \sqrt{A^2 + B^2 + C^2}$

VISION

Neural and symbolic
 modules that work
 seamlessly together
 to accomplish
 intuitive reasoning.

Every symbolic module has a language (e.g. Turing machine, memory vectors, game trees, first-order logic). The neural module learns to **speak this language**.

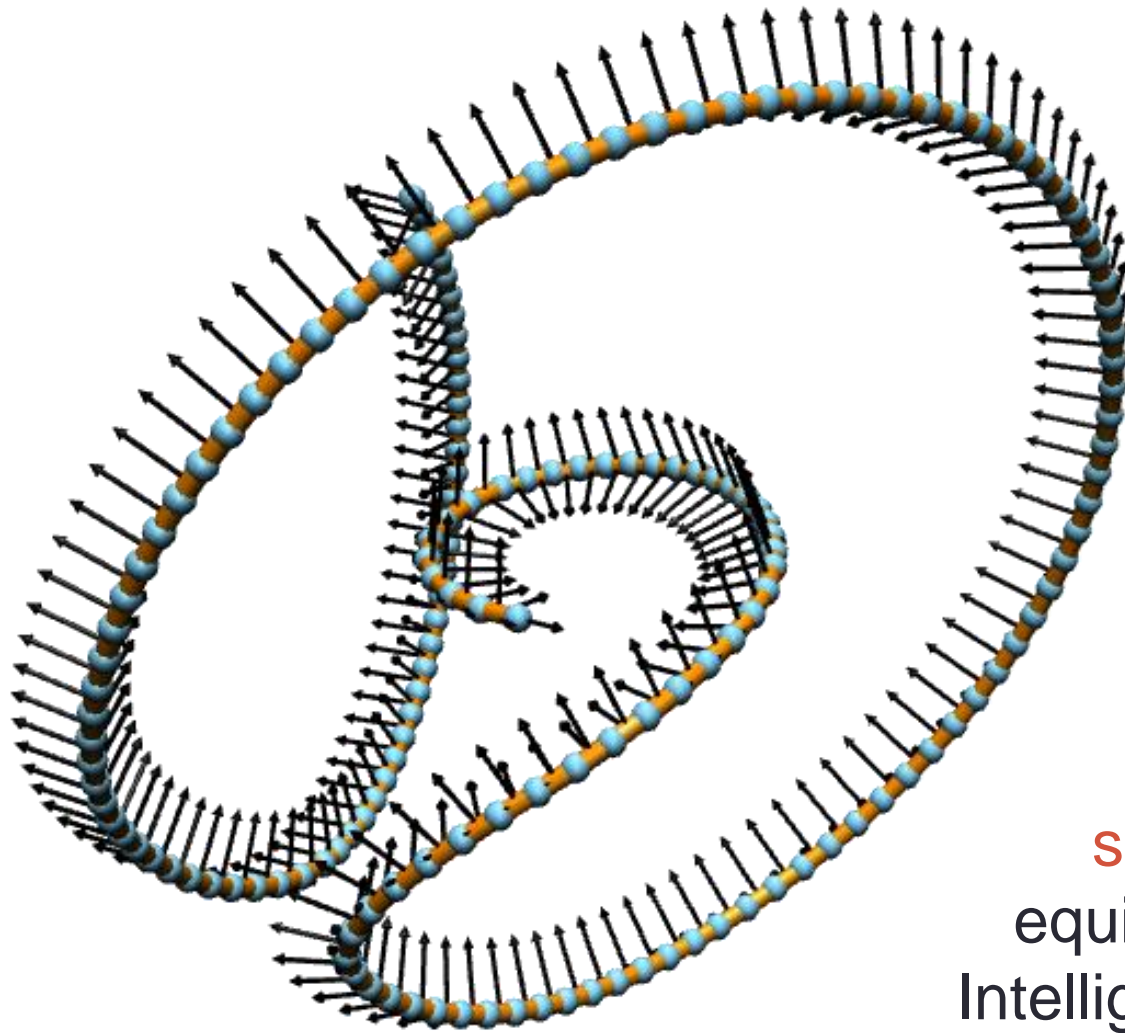


Homotopy Type Theory

Univalent Foundations of Mathematics

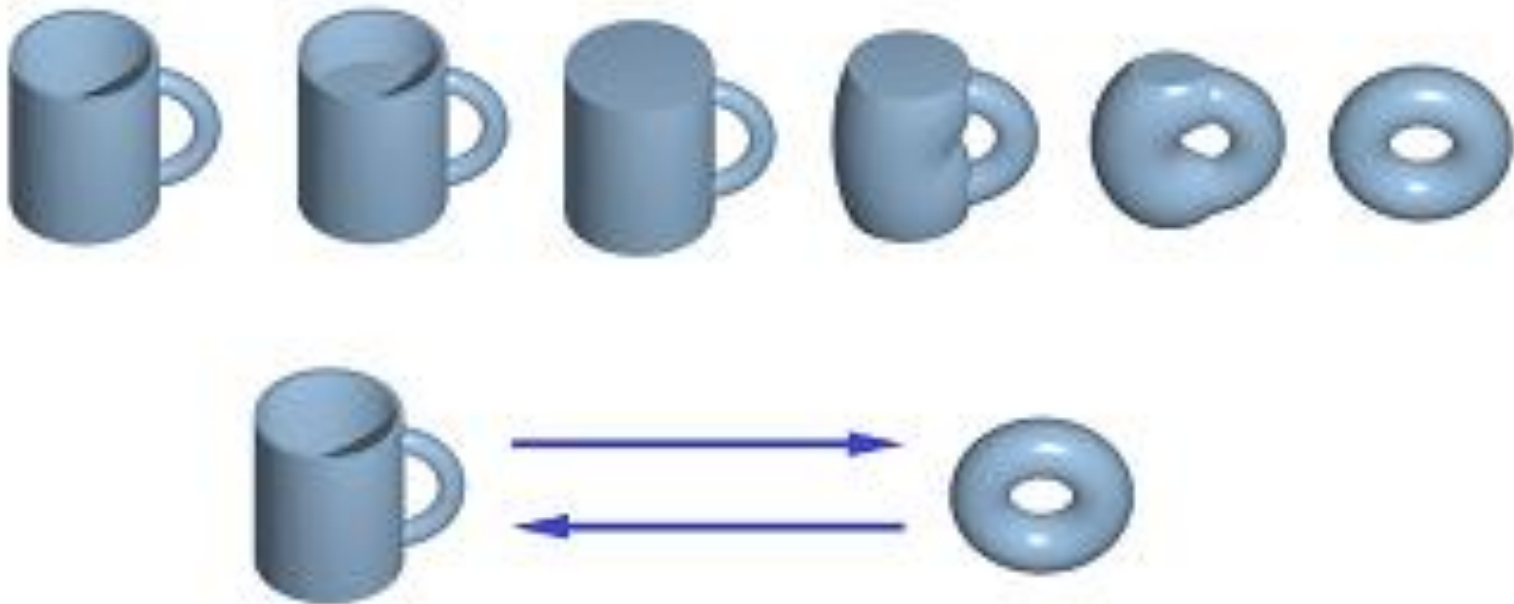
Find a language
logical enough to
describe all intents,
yet **computational**
enough to describe
all implementations.

THE UNIVALENT FOUNDATIONS PROGRAM
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Generalization
is **transporting**
solutions between
equivalent problems.
Intelligence is all about
learning equivalences.

Equivalence between terms of a type
is indistinguishable from
paths between points of a space.



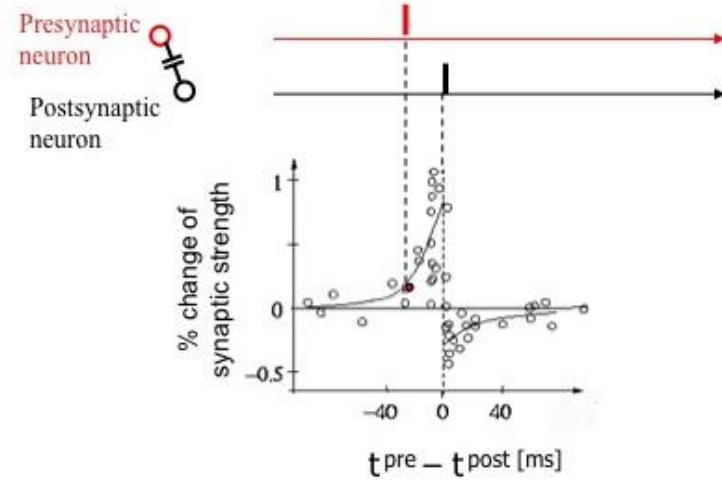
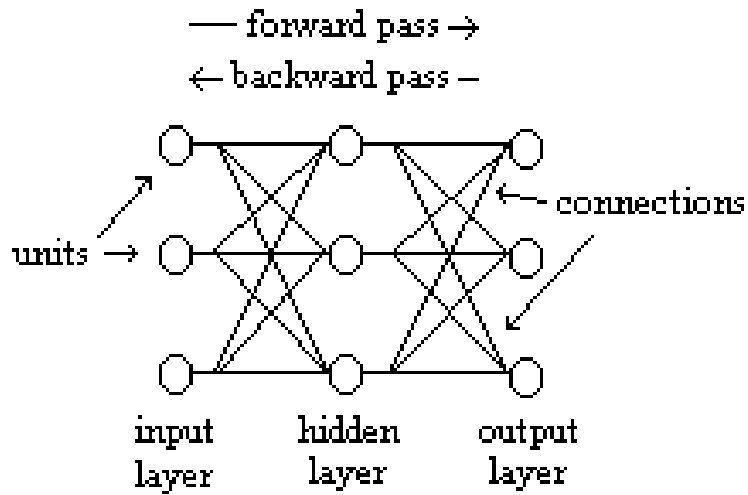


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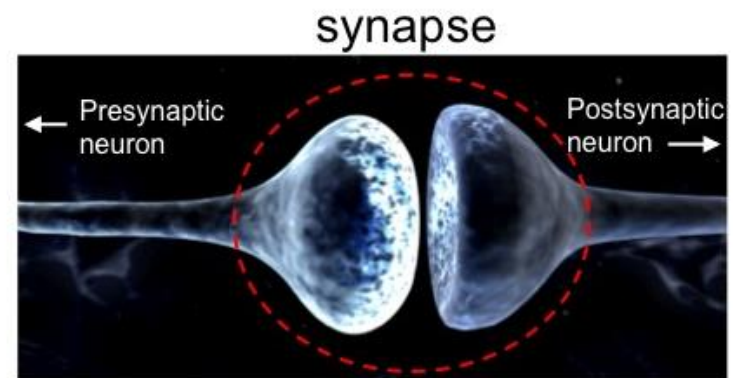
**Efficient, effective
neural chip
for every device.**

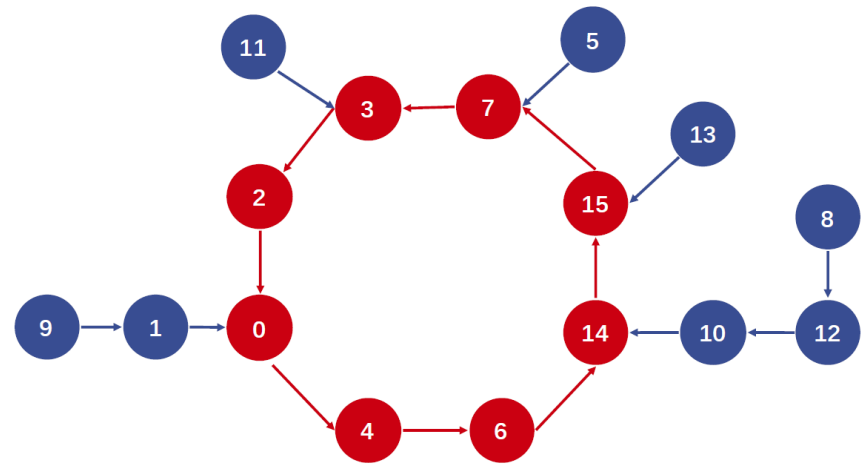
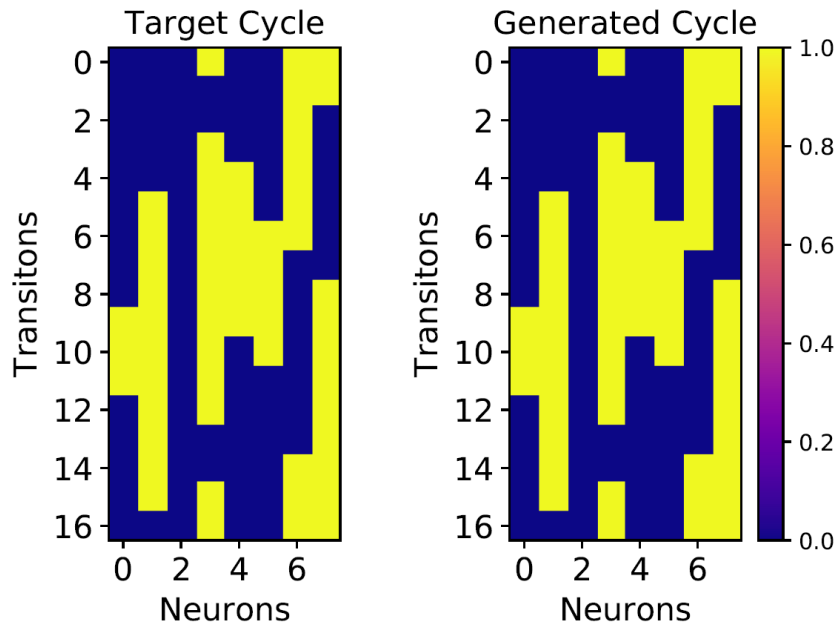
Prediction and learning should be **event-driven** for energy-efficiency.





In learning,
communication
is time-consuming,
so algorithms should depend,
not on global messages,
but on **local ones**.





Intelligence is
 equivalence-learning,
 so we should focus,
 not on learning points or states,
 but on **learning paths** or sequences.

Represent paths,
not using continuous states in discrete time,
but using **discrete states in continuous time**.

