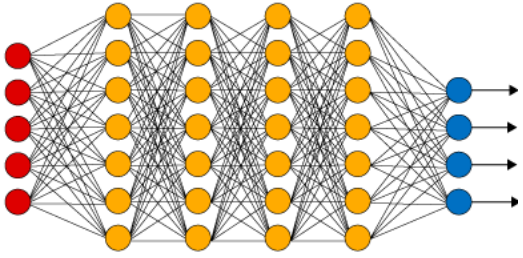
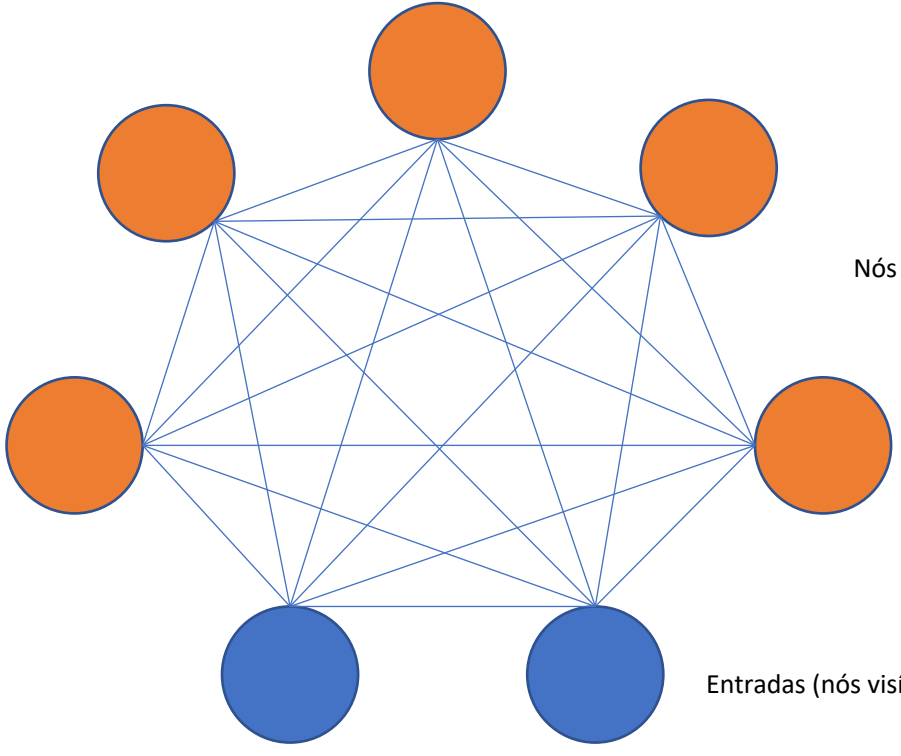
Boltzmann machines

Jones Granatyr





Nós (neurônios) escondidos

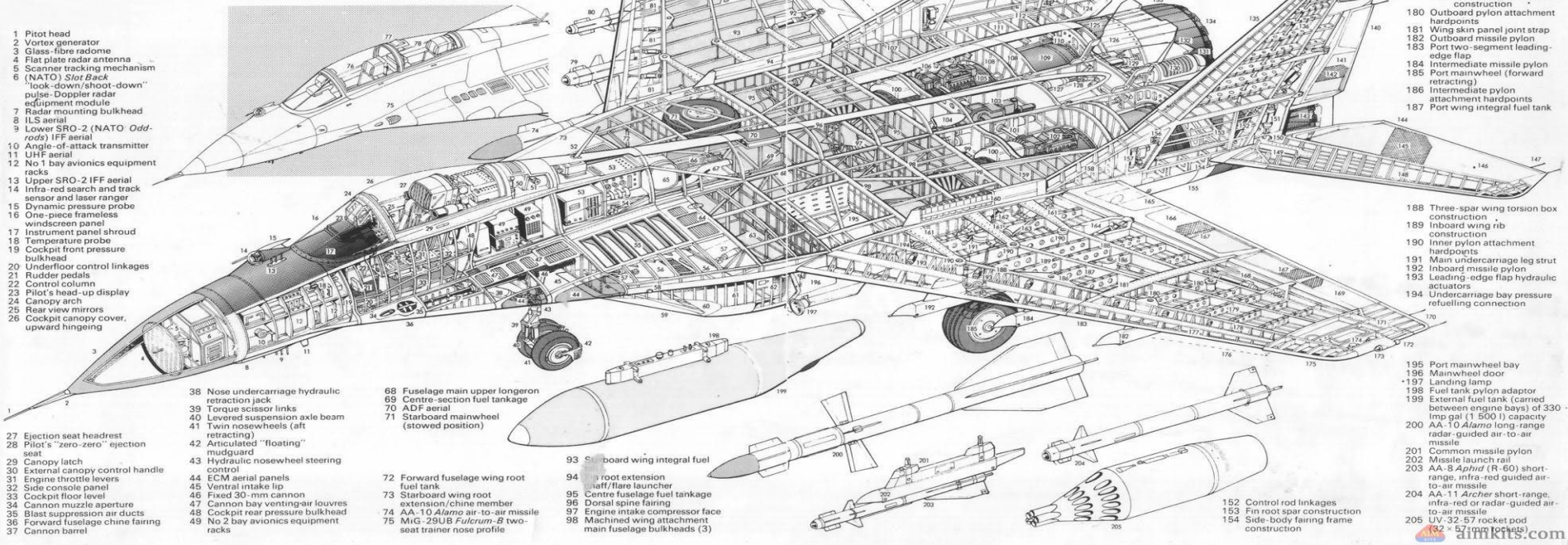
Entradas (nós visíveis)

Não possui camada de saída

A premissa é que os nós de entrada também geram dados

Descreve o estado do sistema, ajustando os pesos do sistema

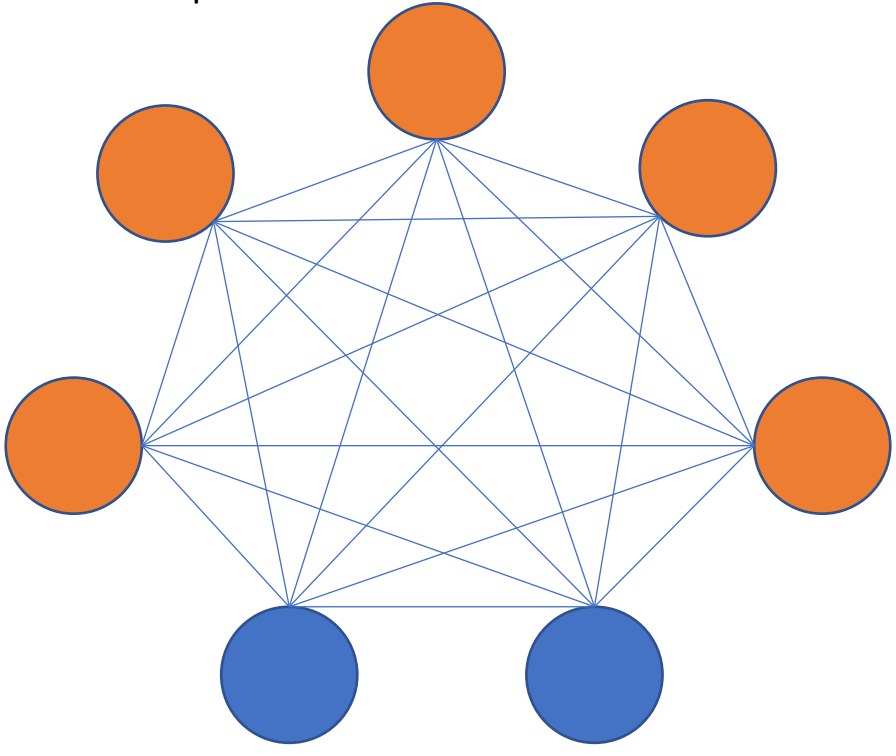
Depois do treinamento, pode monitorar o sistema

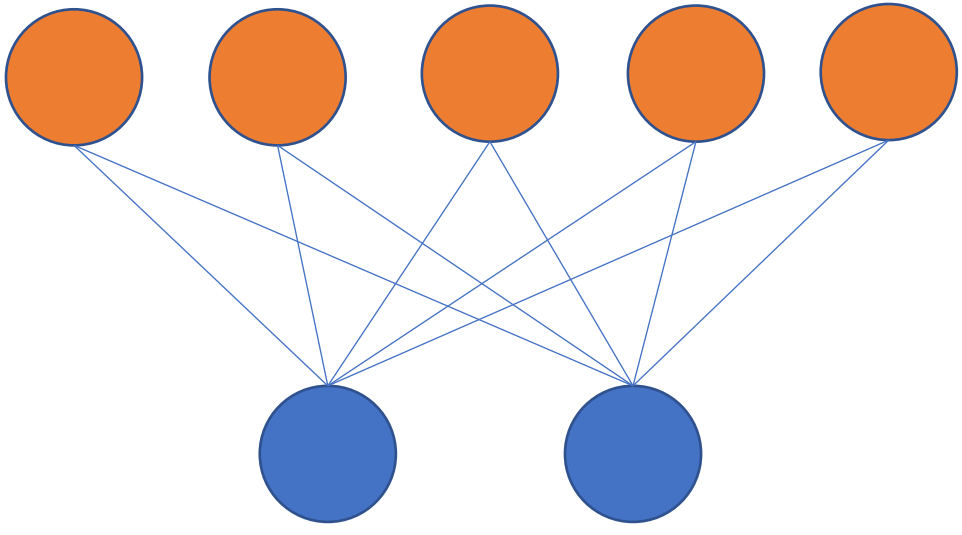


1 Pitot head
2 Vortex generator
3 Glass-fibre radome
4 Flat plate radar antenna
5 Scanner tracking mechanism
6 (NATO) *Slot Back* "look-down/shoot-down" pulse-Doppler radar equipment module
7 Radar mounting bulkhead
8 ILS aerial
9 Lower SRO-2 (NATO *Odd-rods*) IFF aerial
10 Angle-of-attack transmitter
11 UHF aerial
12 No 1 bay avionics equipment racks
13 Upper SRO-2 IFF aerial
14 Infra-red search and track sensor and laser ranger
15 Dynamic pressure probe
16 One-piece frameless windscreen panel
17 Instrument panel shroud
18 Temperature probe
19 Cockpit front pressure bulkhead
20 Underfloor control linkages
21 Rudder pedals
22 Control column
23 Pilot's head-up display
24 Canopy arch
25 Rear view mirrors
26 Cockpit canopy cover, upward hingeing
27 Ejection seat headrest
28 Pilot's "zero-zero" ejection seat
29 Canopy latch
30 External canopy control handle
31 Engine throttle levers
32 Side console panel
33 Cockpit floor level
34 Cannon muzzle aperture
35 Blast suppression air ducts
36 Forward fuselage chine fairing
37 Cannon barrel
38 Nose undercarriage hydraulic retraction jack
39 Torque scissor links
40 Levered suspension axle beam
41 Twin nosewheels (aft retracting)
42 Articulated "floating" mudguard
43 Hydraulic nosewheel steering control
44 ECM aerial panels
45 Ventral intake lip
46 Fixed 30-mm cannon
47 Cannon bay venting-air louvres
48 Cockpit rear pressure bulkhead
49 No 2 bay avionics equipment racks
50 Canopy jack
51 Canopy hinge point
52 HF aerial
53 No 3 bay avionics equipment
54 Control system linkages
55 Upper surface (ground [illegible] air intake louvres/ relief doors
[illegible] intake ramp
[illegible] antenna
[illegible] engine air intake
60 Forward intake ramp (closed ground running position)
61 Intake duct framing
62 Weapons interlock access
63 Forward fuselage integral fuel tank
64 Intake spill air louvres
65 Hydraulic reservoir
66 Control linkage and cable runs
67 Air system ducting
68 Fuselage main upper longeron
69 Centre-section fuel tankage
70 ADF aerial
71 Starboard mainwheel (stowed position)
72 Forward fuselage wing root fuel tank
73 Starboard wing root extension/chine member
74 AA-10 *Alamo* air-to-air missile
75 MiG-29UB *Fulcrum-B* two-seat trainer nose profile
76 Student pilot's cockpit enclosure
77 Periscope fairing
78 Instructor's cockpit enclosure
79 AA-11 *Archer* air-to-air missile
80 AA-8 *Aphid* (R-60) air-to-air missile
81 Starboard wing missile pylons
82 Two-segment leading-edge flap (lowered)
83 Leading-edge flap hydraulic actuators
84 Cambered wing-tip fairing
85 Downward identification lights
86 Starboard navigation light
87 Radar warning antenna
88 Static dischargers
89 Starboard aileron
90 Aileron hydraulic actuator
91 Starboard plain flap (down position)
92 Flap hydraulic jack
93 [illegible]board wing integral fuel
94 [illegible] root extension
[illegible]aff/flare launcher
95 Centre fuselage fuel tankage
96 Dorsal spine fairing
97 Engine intake compressor face
98 Machined wing attachment main fuselage bulkheads (3)
99 Forward engine mounting (inboard and outboard)
100 Engine oil tanks
101 Power take-off shaft
102 Engine fuel control equipment
103 Airframe mounted auxiliary equipment gearbox
104 Cooling air intake
105 Tumansky RD-33 afterburning turbofan engine
106 Starboard engine bay
107 Rear fuselage integral fuel tank
108 Engine bay/tailplane spar attachment machined "spectacle" bulkheads
109 Afterburner ducting
110 Rear engine mounting
111 Fuselage side-body extension fairing
112 Starboard tailplane pivot fixing
113 Fin root structure integral with side-body fairing
114 Starboard tailfin
115 Carbon-fibre skin panelling
116 Fin-tip VHF aerial fairing
117 Tail radar warning antenna
118 *Swift Rod* ILS aerial
119 Static discharger
120 Starboard rudder
121 Rudder hydraulic actuator
122 Tailplane hydraulic actuator
123 Starboard all-moving tailplane
124 Fuselage side-body end fairing
125 Nozzle-sealing flaps
126 Upper airbrake panel (open position)
127 Airbrake hydraulic jack
128 Airbrake hinge linkage
129 Afterburner nozzle control jacks
130 Brake parachute housing
131 Parachute door fairing
132 Airbrakes, upper and lower surfaces (closed position)
133 Afterburner nozzle outer fairing flaps
134 Variable-area afterburner nozzle
135 Fin leading edge
136 Port fin rib construction
137 Fin-tip VHF aerial fairing
138 Tail navigation light
139 Sirena-3 ECM aerial fairing
140 Port rudder
141 Rudder carbon-fibre skin panelling
142 Honeycomb core construction
143 Port engine afterburner nozzle
144 Port all-moving tailplane
145 Honeycomb core construction
146 Carbon-fibre trailing-edge skin panelling
147 Static dischargers
148 Tailplane spar torsion box construction
149 Tailplane pivot bearing
150 Hinge control arm
151 Tailplane hydraulic actuator
152 Control rod linkages
153 Fin root spar construction
154 Side-body fairing frame construction
155 Ventral engine cowling panels
156 Q-feel pressure sensors
157 Tailplane control valves and artificial feel units
158 Fin root fairing construction
159 Port rear fuselage integral fuel tank
160 Port upward firing chaff/flare launcher
161 Forged wing root attachment fittings
162 Skew-axis main undercarriage leg pivot fixing
163 Main undercarriage hydraulic retraction jack
164 Hydraulic flap jack
165 Port plain flap
166 Carbon-fibre skin panelling
167 Honeycomb core composite construction
168 Aileron hydraulic actuator
169 Port carbon-fibre composite aileron
170 Static dischargers
171 Wing-tip rib construction
172 Radar warning antenna
173 Port navigation light
174 Downward identification lights
175 Wing-tip cambered leading edge
176 Leading-edge flap (down position)
177 Leading-edge flap rib construction
178 Fixed leading-edge ribs
179 Outer wing panel rib construction
180 Outboard pylon attachment hardpoints
181 Wing skin panel joint strap
182 Outboard missile pylon
183 Port two-segment leading-edge flap
184 Intermediate missile pylon
185 Port mainwheel (forward retracting)
186 Intermediate pylon attachment hardpoints
187 Port wing integral fuel tank
188 Three-spar wing torsion box construction
189 Inboard wing rib construction
190 Inner pylon attachment hardpoints
191 Main undercarriage leg strut
192 Inboard missile pylon
193 Leading-edge flap hydraulic actuators
194 Undercarriage bay pressure refuelling connection
195 Port mainwheel bay
196 Mainwheel door
197 Landing lamp
198 Fuel tank pylon adaptor
199 External fuel tank (carried between engine bays) of 330 Imp gal (1 500 l) capacity
200 AA-10 *Alamo* long-range radar-guided air-to-air missile
201 Common missile pylon
202 Missile launch rail
203 AA-8 *Aphid* (R-60) short-range, infra-red guided air-to-air missile
204 AA-11 *Archer* short-range, infra-red or radar-guided air-to-air missile
205 UV-32-57 rocket pod (32 × 57 mm rockets)

Restricted Boltzmann Machines (RBM)

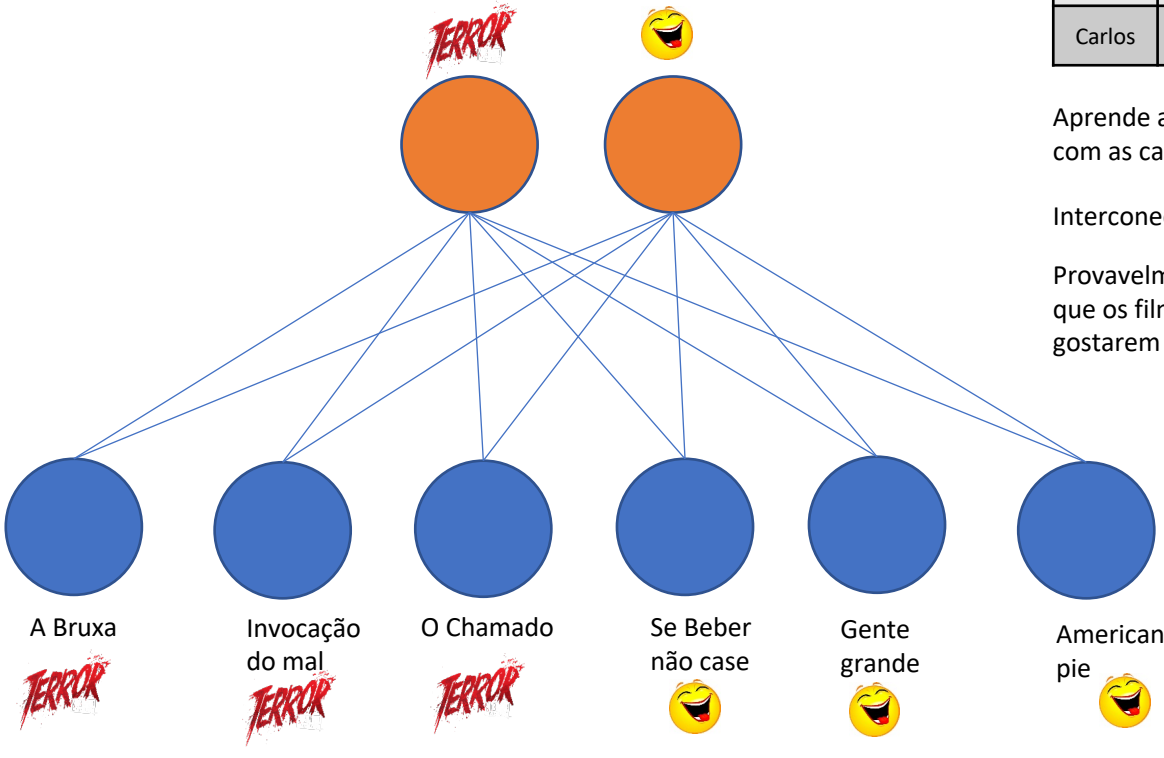
- Conforme o número de nós aumenta o número de conexões também aumenta exponencialmente





Restricted Boltzmann Machines

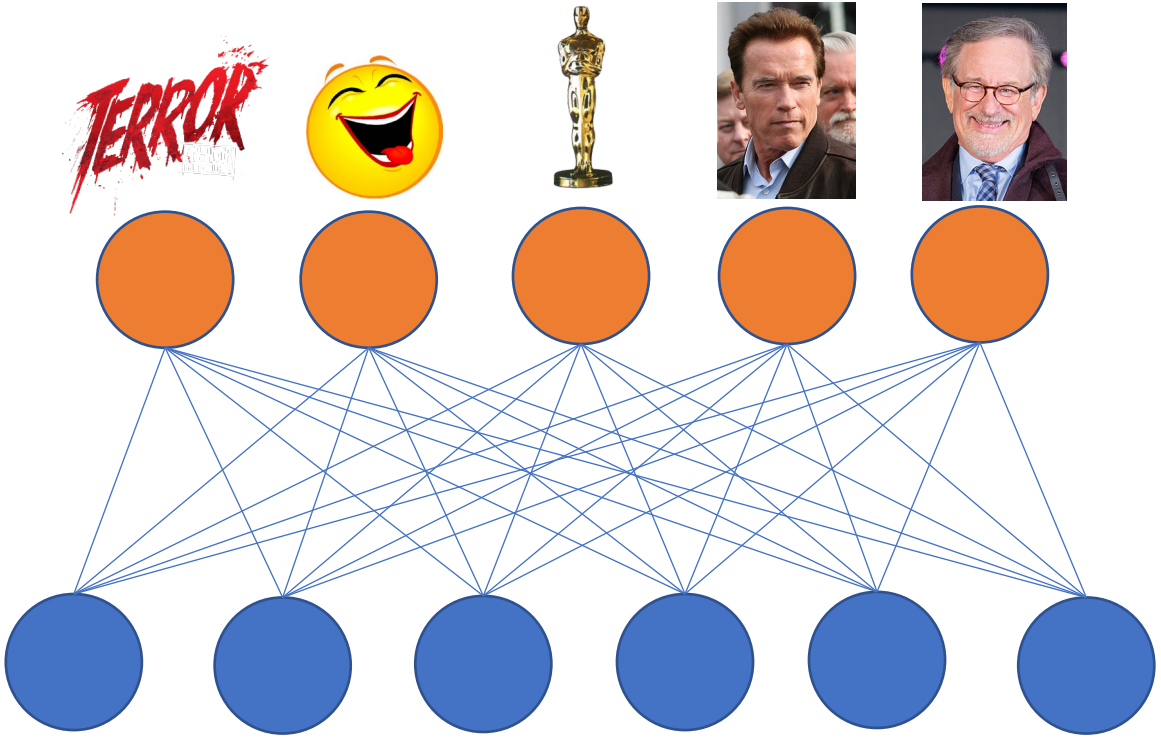
Ana	1		1	0		0
Marcos		0	1			
Paulo	1		1			0
Priscila		0			1	1
Maria	0			1	0	1
Carlos	0		1		0	1



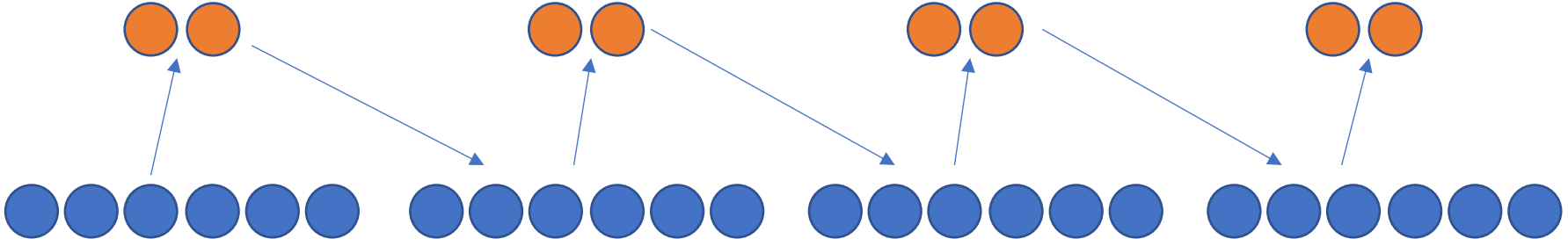
Aprende alocar os nós escondidos de acordo com as características (cada nó é um padrão)

Interconectividade entre a nota dos usuários

Provavelmente existe alguma característica que os filmes possuem que faz as pessoas gostarem (pessoas gostam das características)


TERROR

Constrative divergence (aprendizagem)



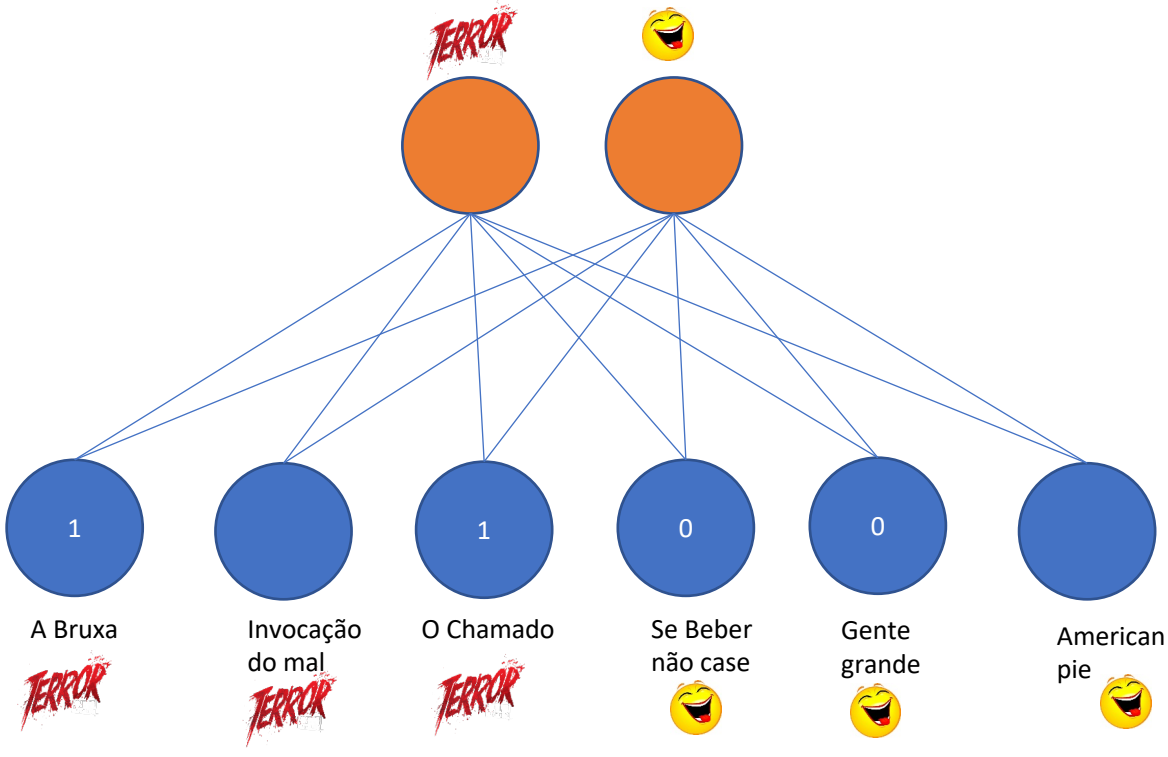
Reconstrução do nó (gibbs sampling)

A execução termina quando os valores são os mesmos (ou quando o número de épocas é atingido)

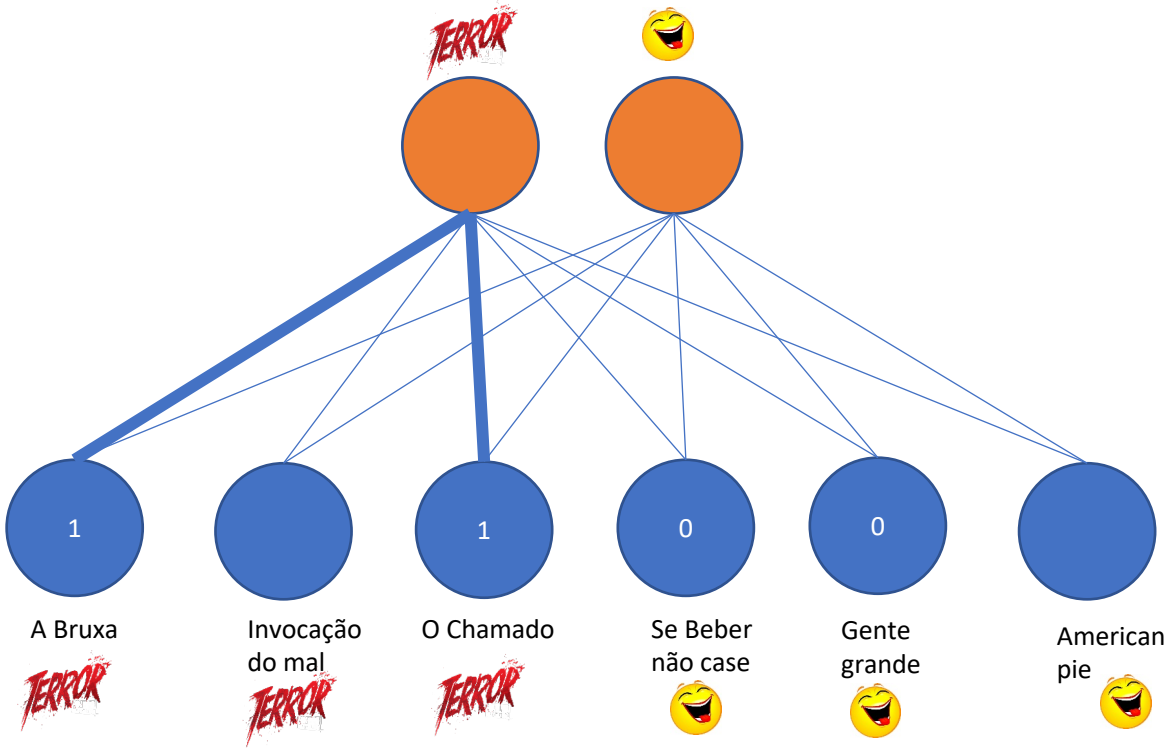
O nó é reconstruído usando todos os nós da camada oculta

Pesos não são atualizados nesse processo

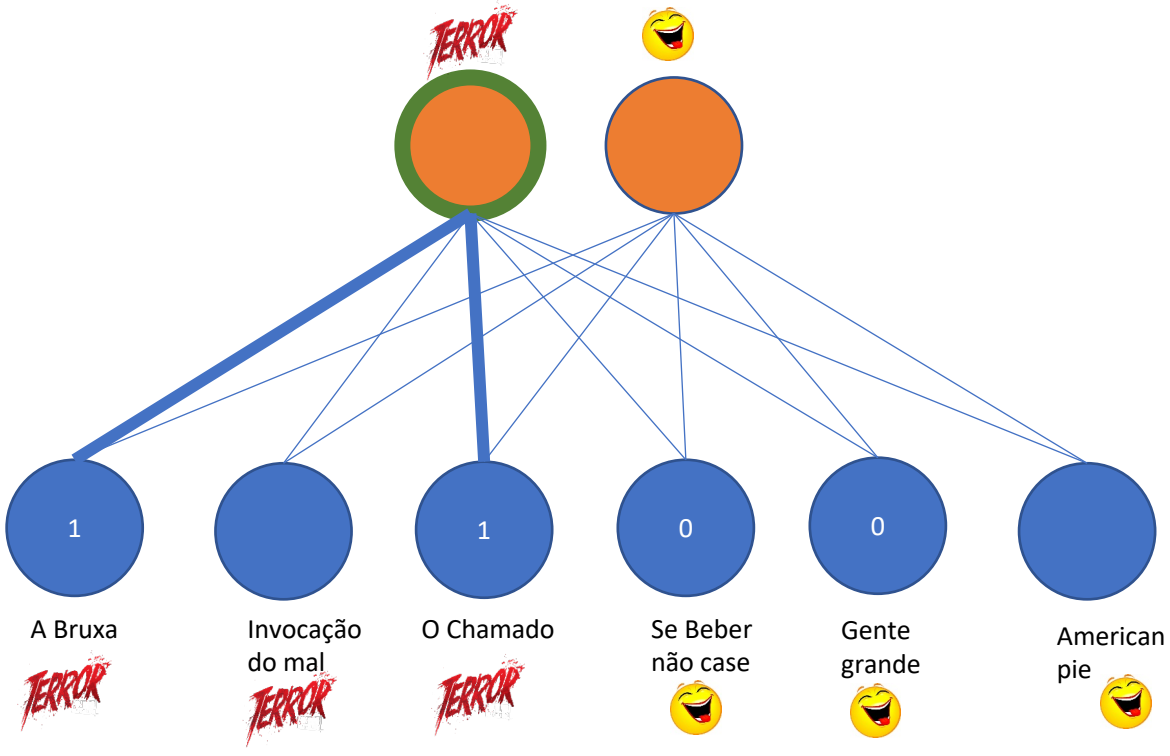
Restricted Boltzmann Machines - recomendação



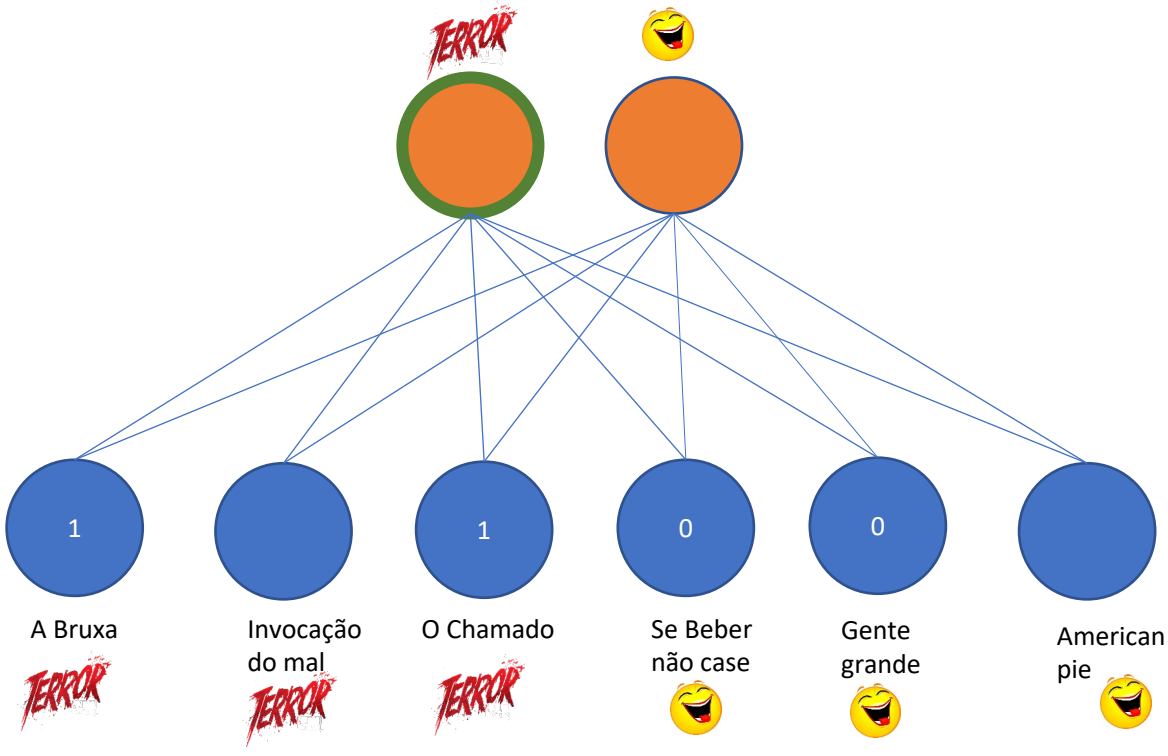
Restricted Boltzmann Machines



Restricted Boltzmann Machines



Restricted Boltzmann Machines



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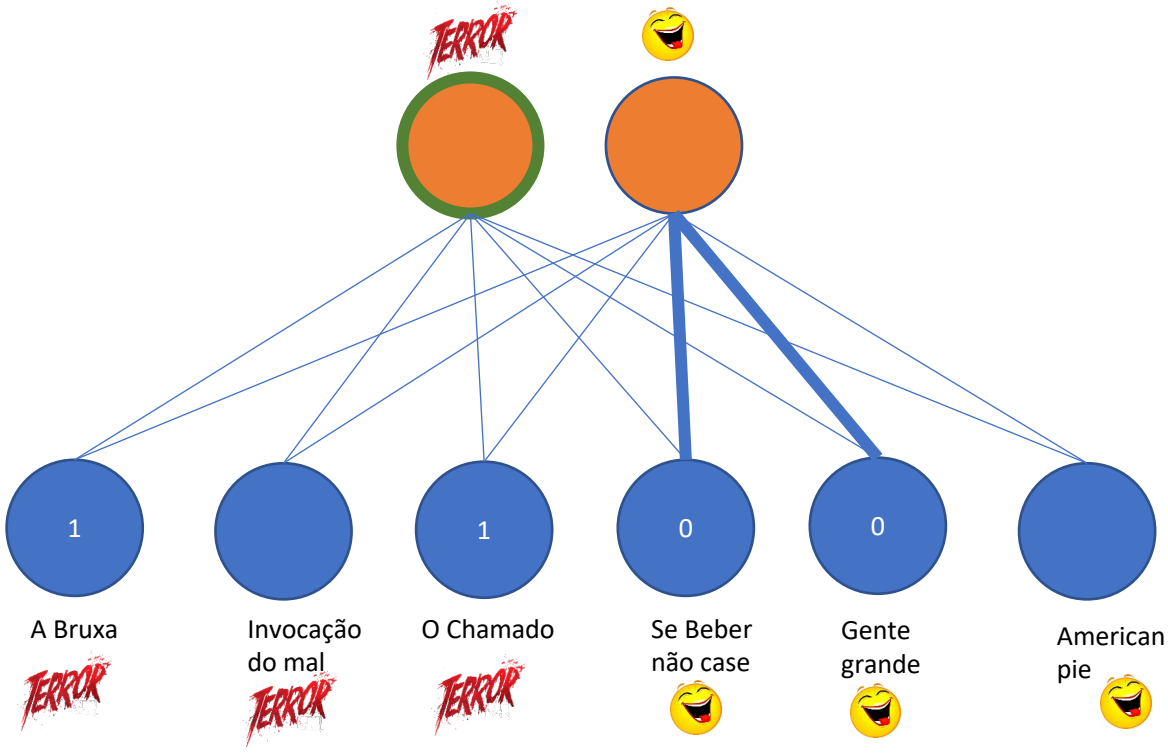

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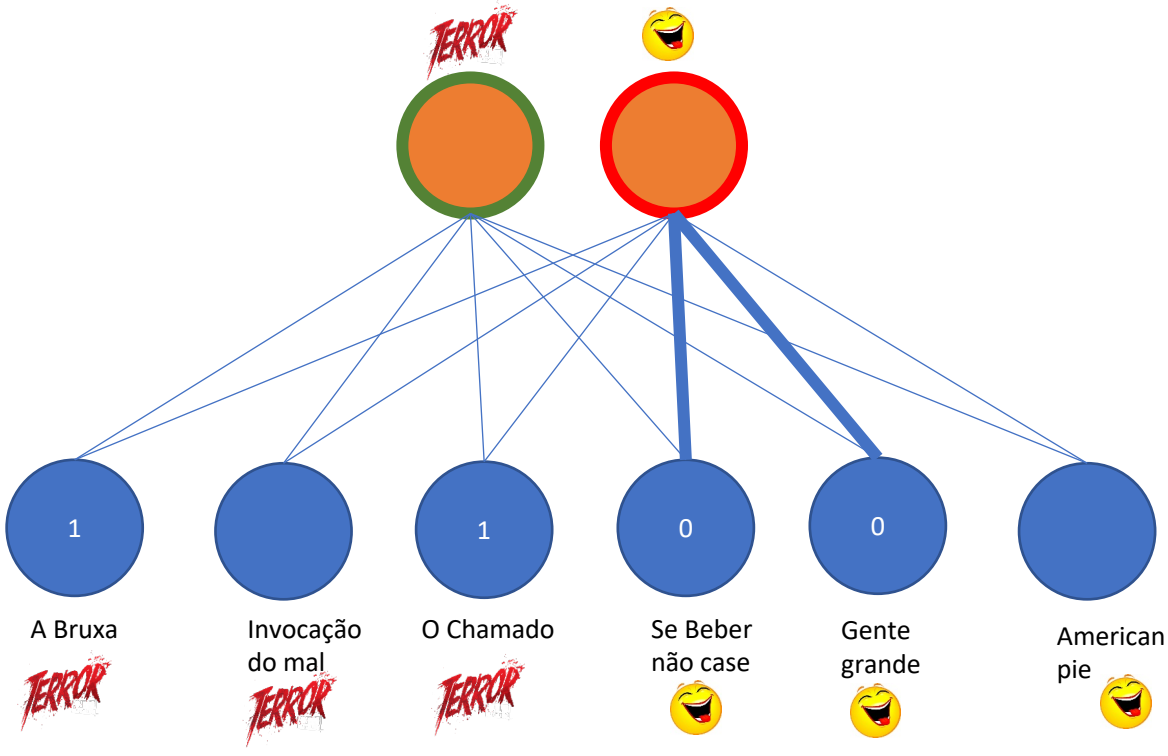

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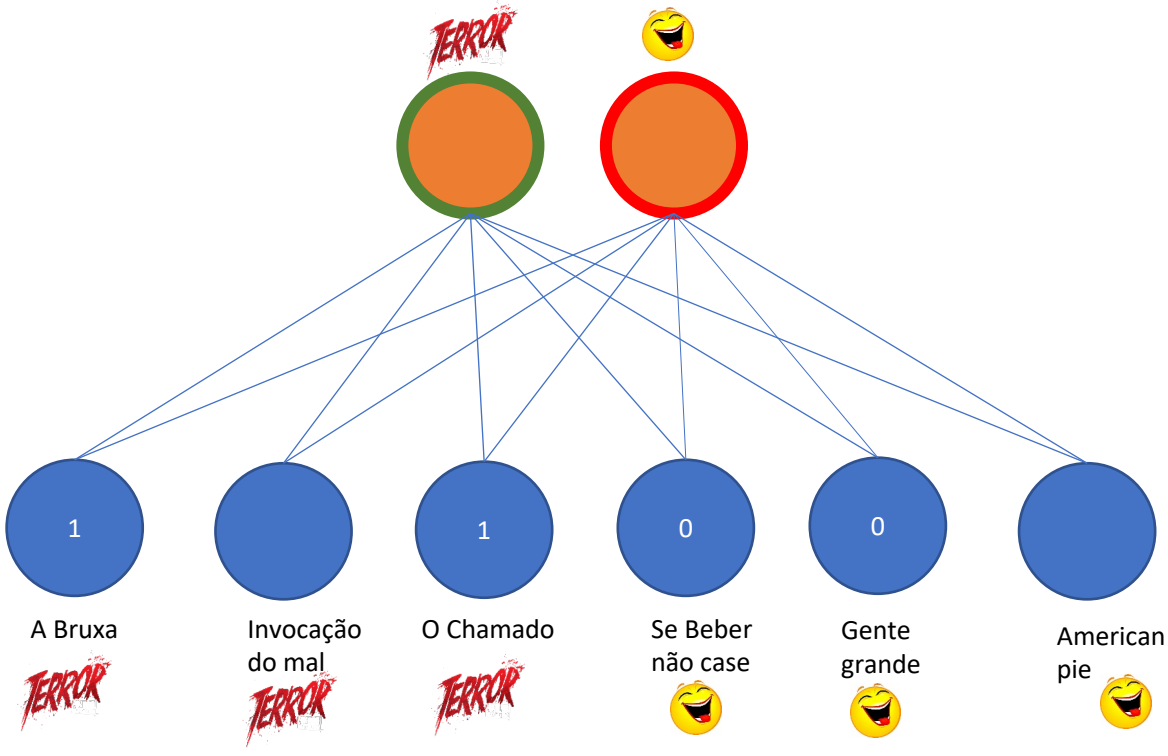
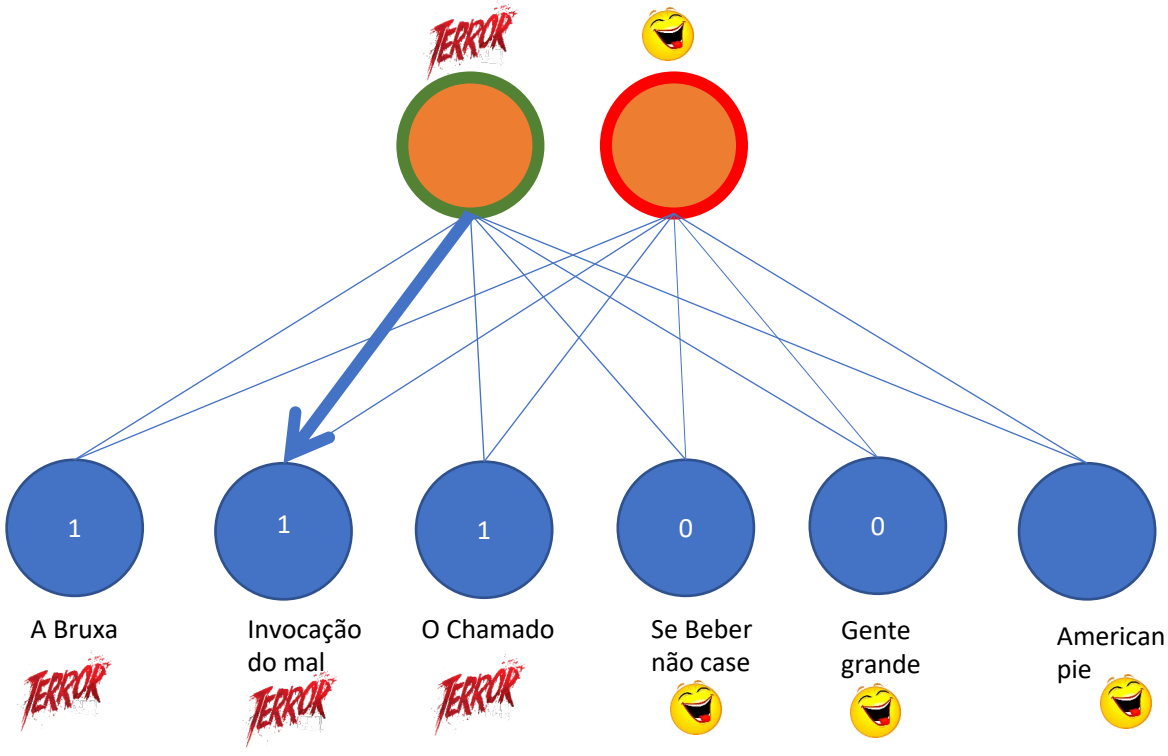
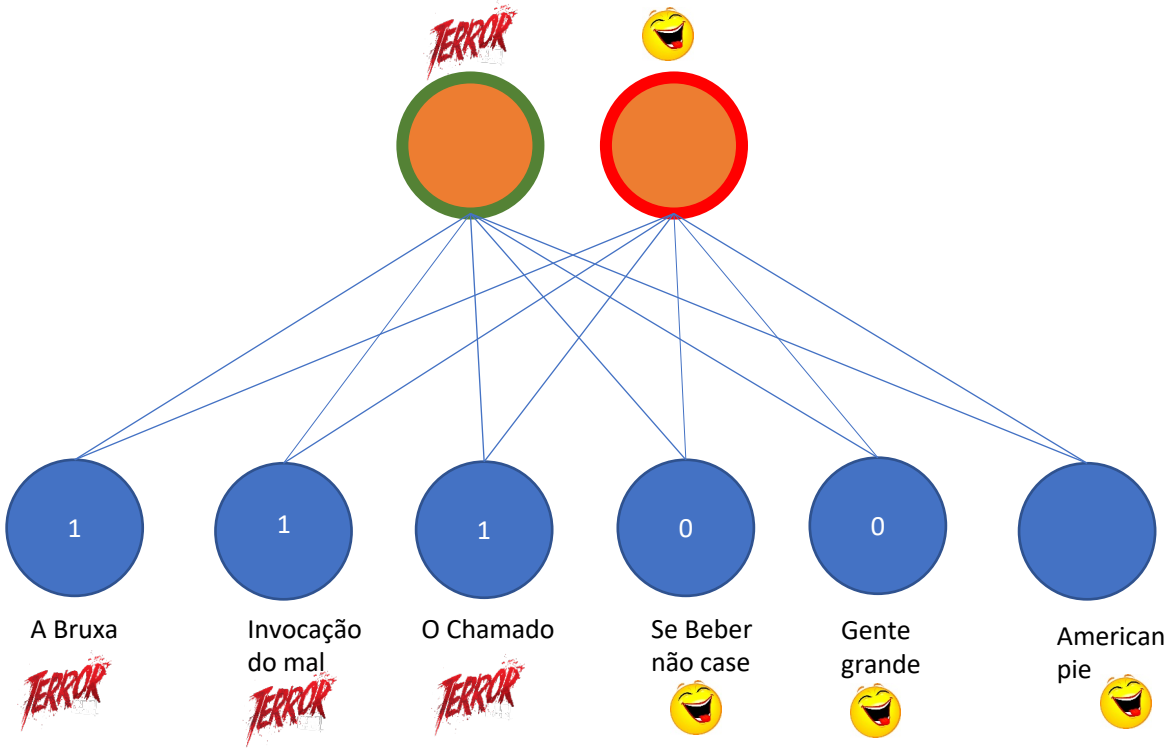


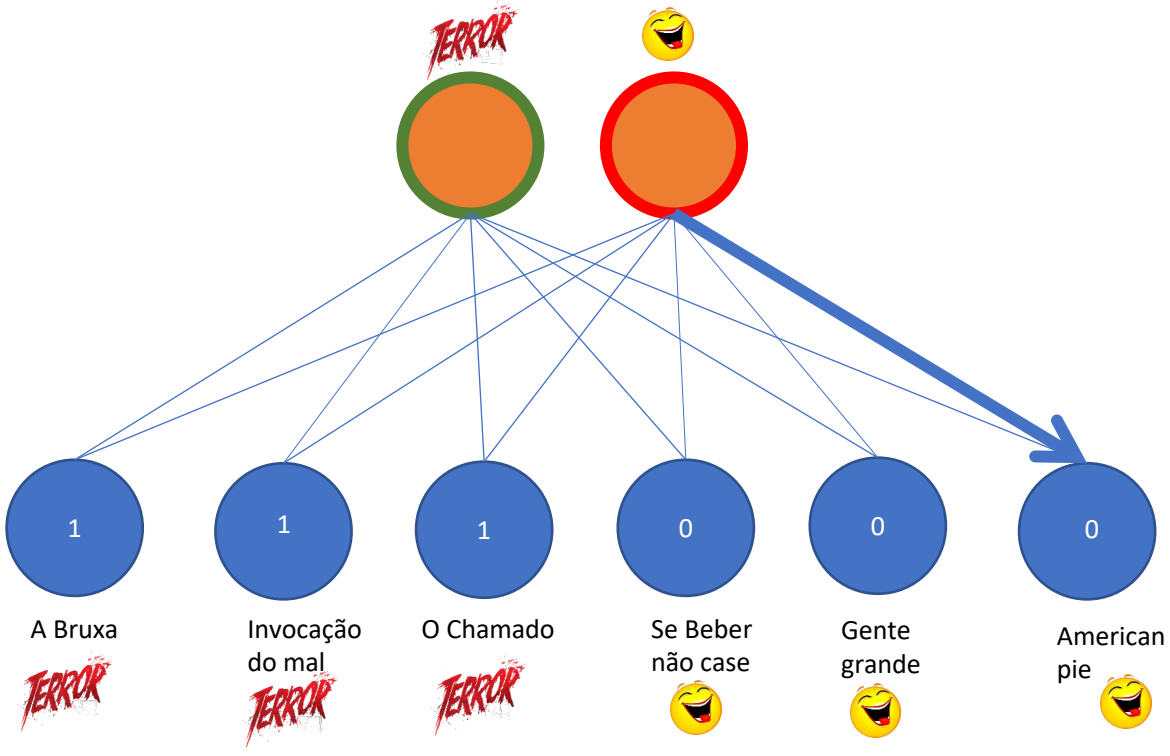
Restricted Boltzmann Machines



Restricted Boltzmann Machines



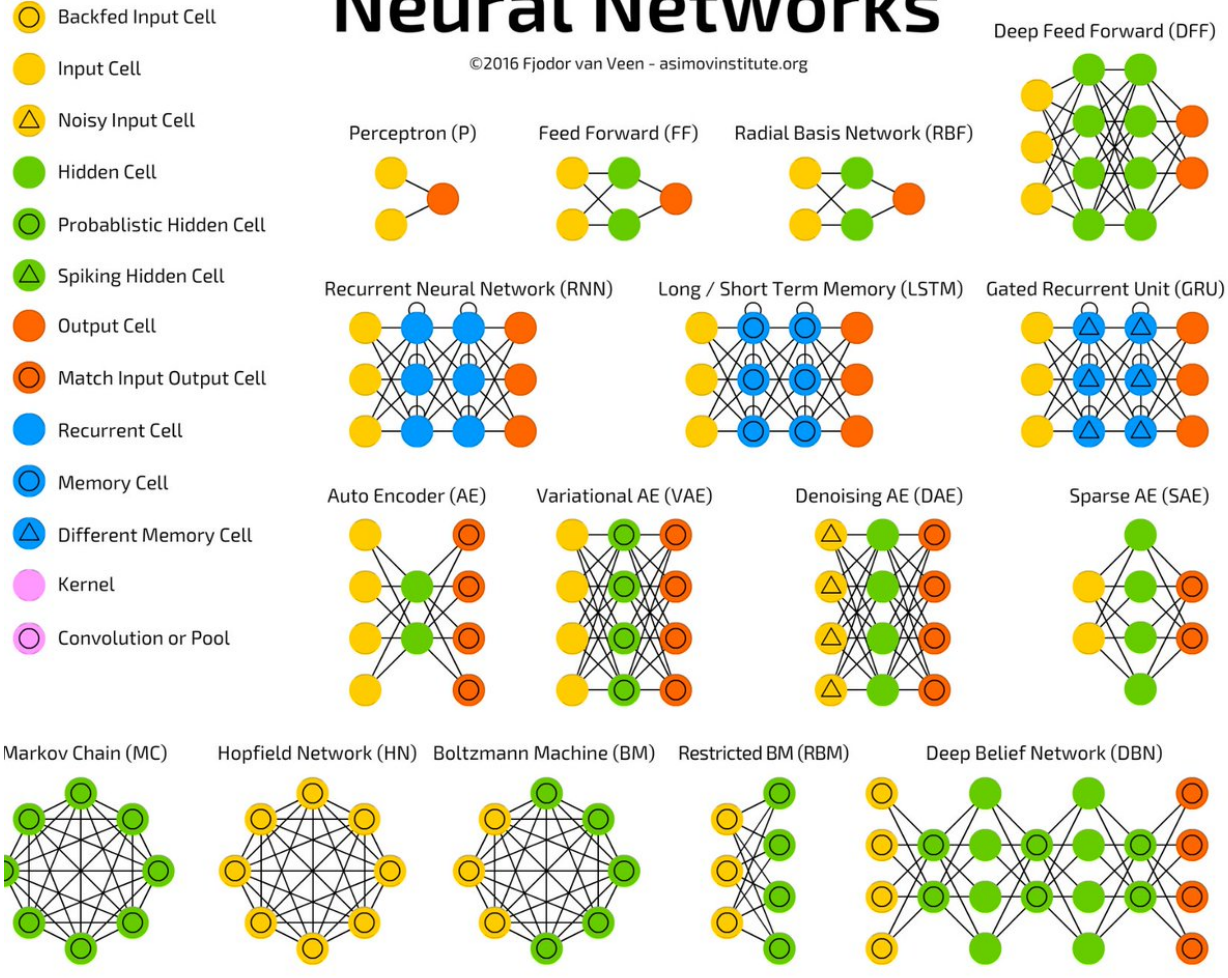
Restricted Boltzmann Machines



A mostly complete chart of

Neural Networks

- Backfed Input Cell
- Input Cell
- Noisy Input Cell
- Hidden Cell
- Probablistic Hidden Cell
- Spiking Hidden Cell
- Output Cell
- Match Input Output Cell
- Recurrent Cell
- Memory Cell
- Different Memory Cell
- Kernel
- Convolution or Pool



Conclusão