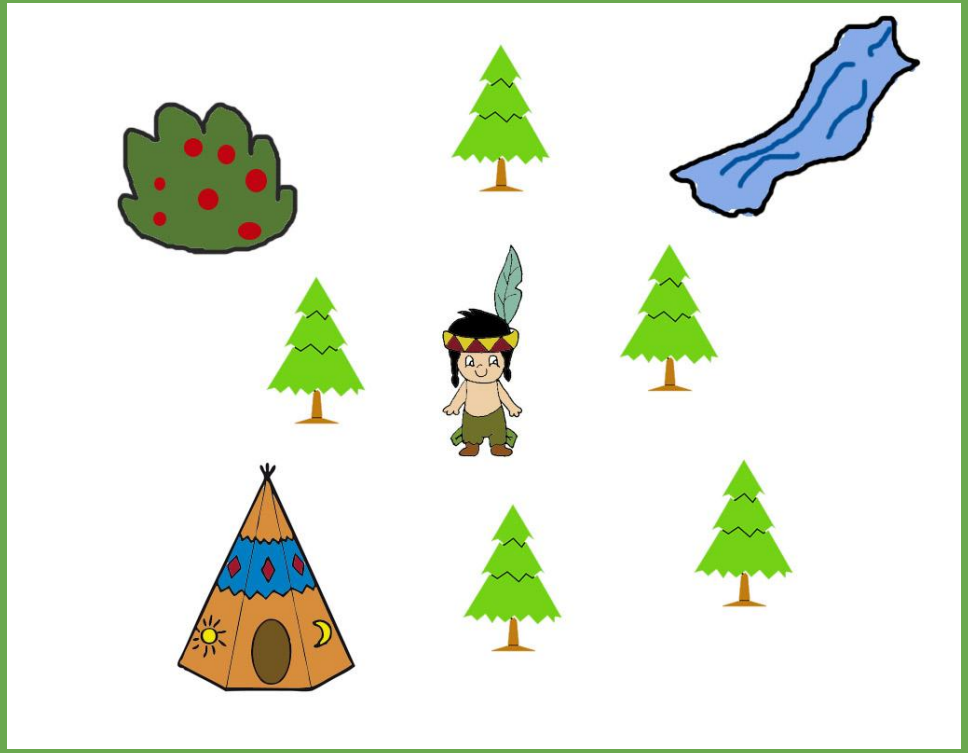
ROBOT RECOLECTOR

Alberto Benito y Patricia Ramos

Idea inicial, problema a resolver

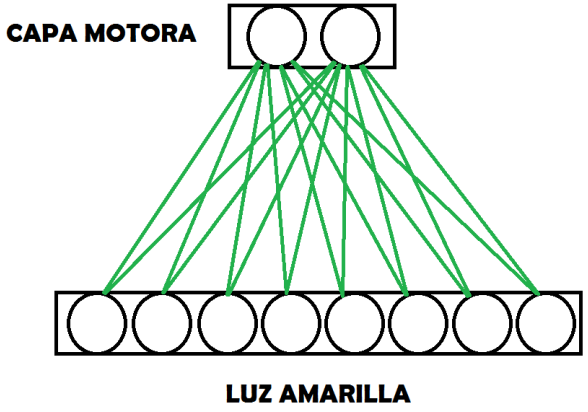


NEURONAL: Sintonización manual

- Experimento 0: Acudir a la luz
- Experimento 1: Evitar obstáculos
- Experimento 2: Acudir a la luz, evitando obstáculos
- Experimento 3: Acudir a la luz amarilla y azul, evitando obstáculos

Experimento 0

Long cromosoma: 18



$$V_0^0 = 0.1 + 0.1 * S_0^1 + 0.3 * S_1^1 + 0.6 * S_2^1 + 0.8 * S_3^1 + 0 * S_4^1 + 0 * S_5^1 + 0 * S_6^1 + 0 * S_7^1$$

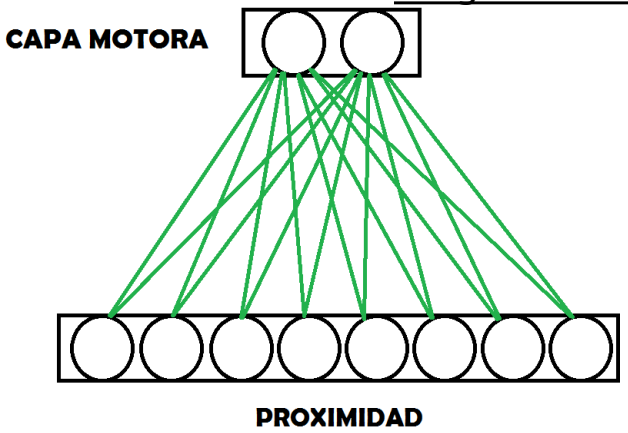
$$V_1^0 = 0.1 + 0 * S_0^1 + 0 * S_1^1 + 0 * S_2^1 + 0 * S_3^1 + 0.8 * S_4^1 + 0.6 * S_5^1 + 0.3 * S_6^1 + 0.1 * S_7^1$$

Donde las salidas:

$$y_m^i = (1 - V_m^i)$$

Experimento 1

Long cromosoma: 18



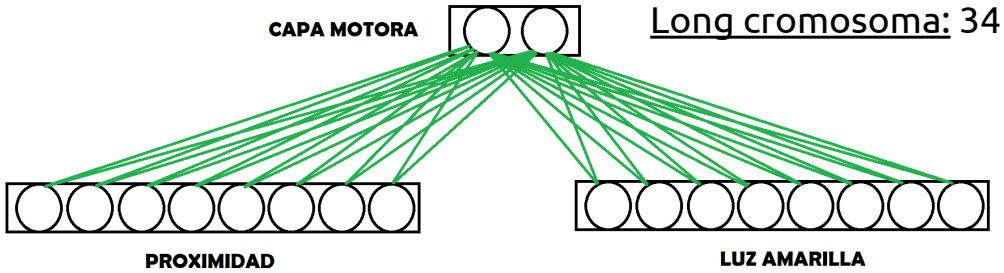
$$V_0^0 = 0.3 + 0 * S_0^1 + 0 * S_1^1 + 0 * S_2^1 + 0 * S_3^1 + 0 * S_4^1 + 0 * S_5^1 + 0.5 * S_6^1 + 0.9 * S_7^1$$

$$V_1^0 = 0.2 + 0.6 * S_0^1 + 0.4 * S_1^1 + 0 * S_2^1 + 0 * S_3^1 + 0 * S_4^1 + 0 * S_5^1 + 0 * S_6^1 + 0 * S_7^1$$

Donde las salidas:

$$y_m^i = (1 - V_m^i)$$

Experimento 2



Long cromosoma: 34

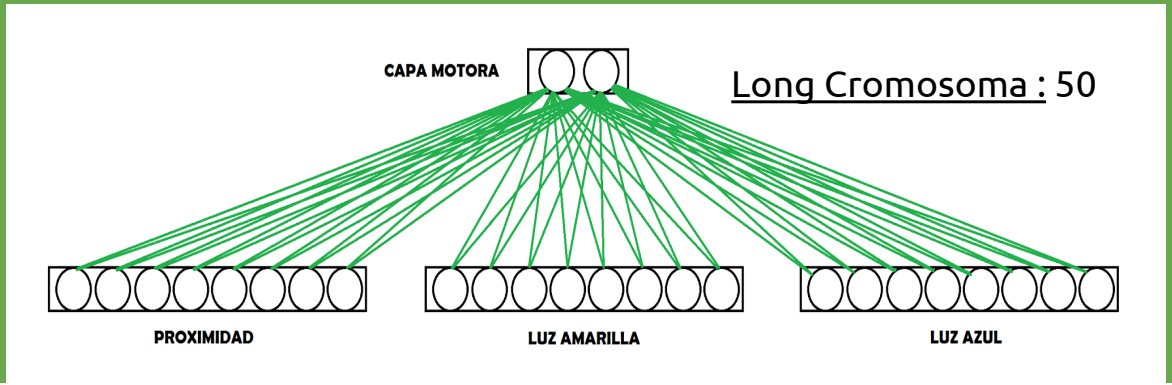
$$V_0^0 = 0.3 + 0 * S_0^1 + 0 * S_1^1 + 0 * S_2^1 + 0 * S_3^1 + 0 * S_4^1 + 0 * S_5^1 + 0.5 * S_6^1 + 0.9 * S_7^1 + 0.1 * S_0^2 + 0.3 * S_1^2 + 0.6 * S_2^2 + 0.8 * S_3^2 + 0 * S_4^2 + 0 * S_5^2 + 0 * S_6^2 + 0 * S_7^2$$

$$V_1^0 = 0.2 + 0.6 * S_0^1 + 0.4 * S_1^1 + 0 * S_2^1 + 0 * S_3^1 + 0 * S_4^1 + 0 * S_5^1 + 0 * S_6^1 + 0 * S_7^1 + 0 * S_0^2 + 0 * S_1^2 + 0 * S_2^2 + 0 * S_3^2 + 0.8 * S_4^2 + 0.6 * S_5^2 + 0.3 * S_6^2 + 0.1 * S_7^2$$

Donde las salidas:

$$y_m^i = (1 - V_m^i)$$

Experimento 3



Long Cromosoma : 50

$$V_0^0 = 0.3 + 0 * S_0^1 + 0 * S_1^1 + 0 * S_2^1 + 0 * S_3^1 + 0 * S_4^1 + 0 * S_5^1 + 0.5 * S_6^1 + 0.9 * S_7^1 +$$
$$0.1 * S_0^2 + 0.3 * S_1^2 + 0.6 * S_2^2 + 0.8 * S_3^2 + 0 * S_4^2 + 0 * S_5^2 + 0 * S_6^2 + 0 * S_7^2 +$$
$$0.1 * S_0^3 + 0.3 * S_1^3 + 0.6 * S_2^3 + 0.8 * S_3^3 + 0 * S_4^3 + 0 * S_5^3 + 0 * S_6^3 + 0 * S_7^3$$

$$V_1^0 = 0.2 + 0.6 * S_0^1 + 0.4 * S_1^1 + 0 * S_2^1 + 0 * S_3^1 + 0 * S_4^1 + 0 * S_5^1 + 0 * S_6^1 + 0 * S_7^1 +$$
$$0 * S_0^2 + 0 * S_1^2 + 0 * S_2^2 + 0 * S_3^2 + 0.8 * S_4^2 + 0.6 * S_5^2 + 0.3 * S_6^2 + 0.1 * S_7^2 +$$
$$0 * S_0^3 + 0 * S_1^3 + 0 * S_2^3 + 0 * S_3^3 + 0.8 * S_4^3 + 0.6 * S_5^3 + 0.3 * S_6^3 + 0.1 * S_7^3$$

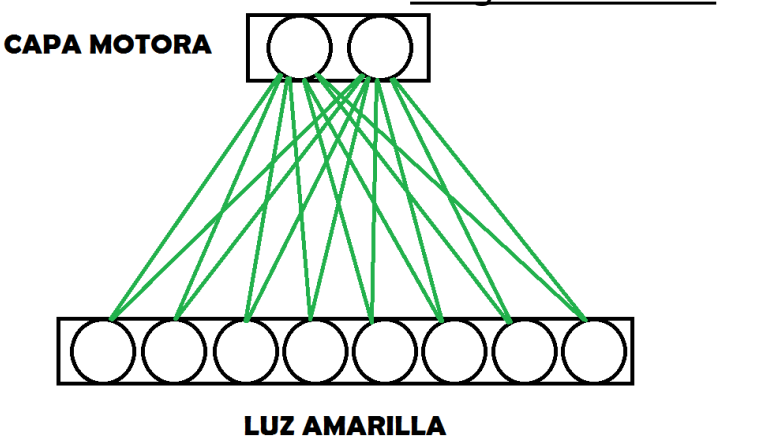
Donde las salidas:

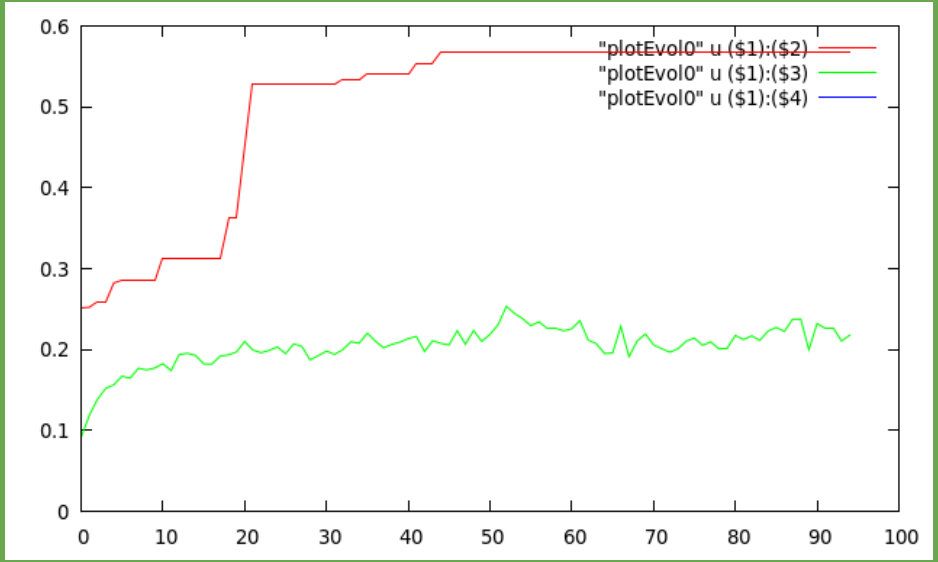
$$y_m^i = (1 - V_m^i)$$

Neuronal: Sintonización genética

- Experimento 0: Luz amarilla
- Experimento 1: Luz amarilla (cambio de coeficientes)
- Experimento 2: Luz con baterías
- Experimento 3: Evitar obstáculos (árboles) (simulando en irsim3)
- Experimento 4: En arena con árboles, luces de dos tipos, amarillas y azules, en nuestro caso comida y agua (simular en entorno1)
- Experimento 5: Dos luces en arena con árboles con baterías
- Experimento 6: Vuelta al poblado una vez no necesita alimentarse, representado con una luz roja
- Experimento 7: Dos Luces solamente con sensores de Luz Azul y Luz Amarilla, sin intermitencia de objetos
- Experimento 8: Dos Luces solamente con sensores de Luz Azul y Luz Amarilla, con intermitencia de objetos

Experimento 0



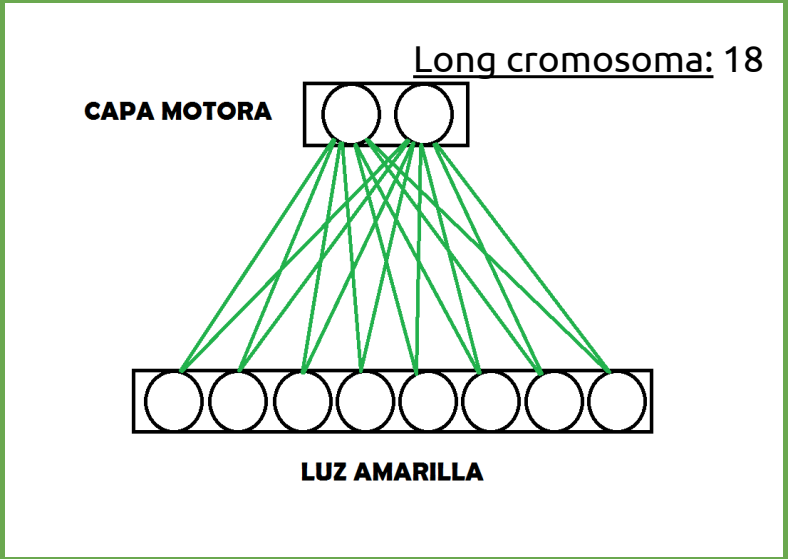


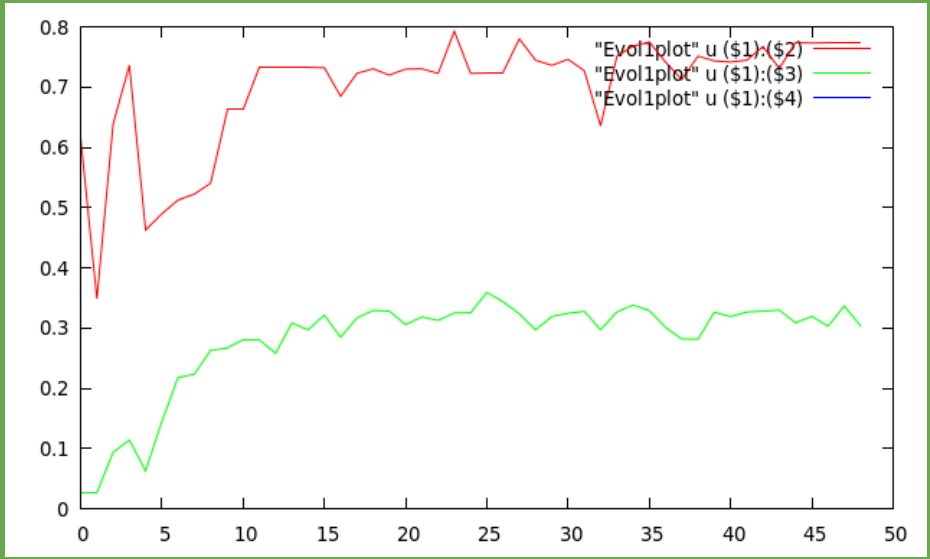
Tamaño población = 100
Número generaciones = 94
Tiempo evaluación = 100

$$Flocal = 0.25 * V * (1 - (\sqrt{M_R{}^2 + M_L{}^2})) * (1 - ProxL) + (0.75 * (L_{S0} + L_{S7}))$$

$$Ftotal = Flocal / NumberSteps$$

Experimento 1



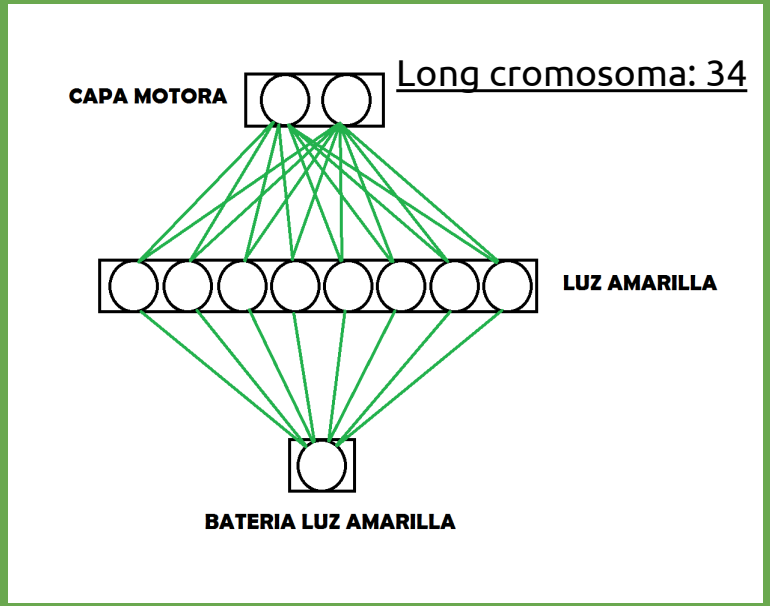


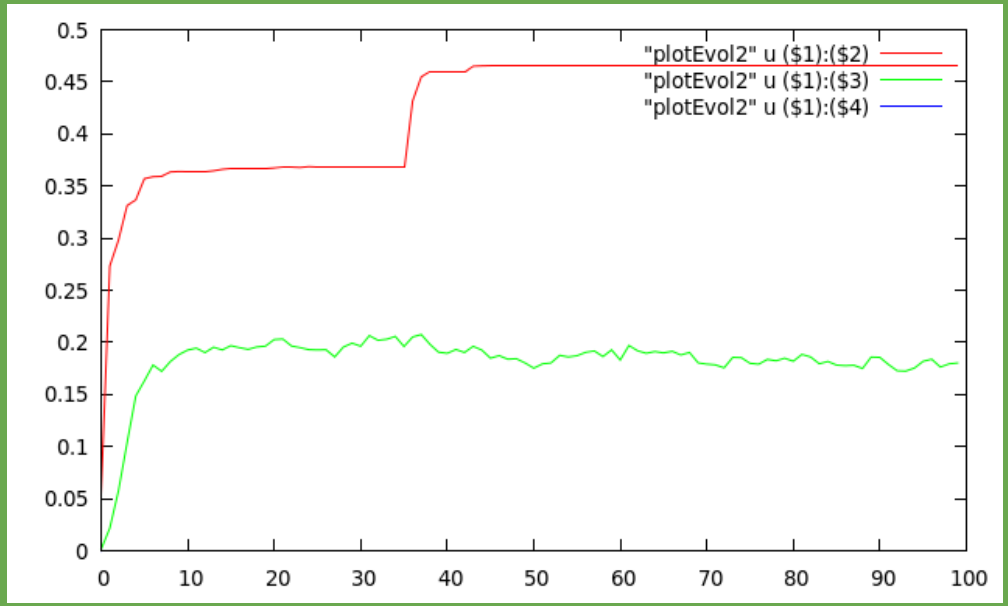
Tamaño población = 100
Número generaciones = 48
Tiempo evaluación = 100

$$Flocal = 0.45 * V * (1 - (\sqrt{M_R{}^2 + M_L{}^2})) * (1 - ProxL) + (0.55 * (L_{S0} + L_{S7}))$$

$$Ftotal = Flocal / NumberSteps$$

Experimento 2





Tamaño población = 150

Número generaciones = 100

Tiempo evaluación = 400

Para Bat < 0.3

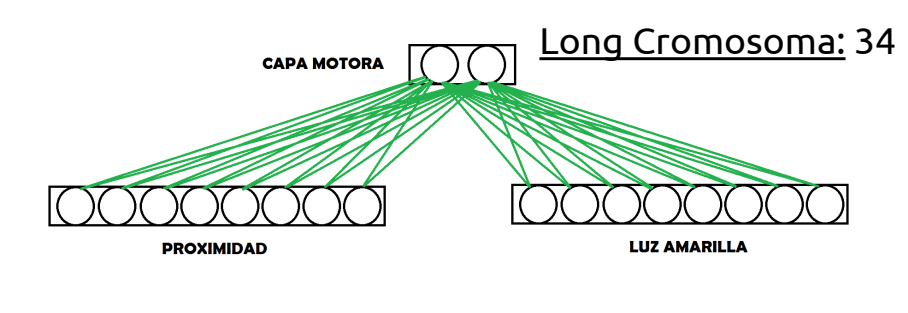
$$Flocal = 0.45 * V * (1 - (\sqrt{M_R{}^2 + M_L{}^2})) - (Bat)$$

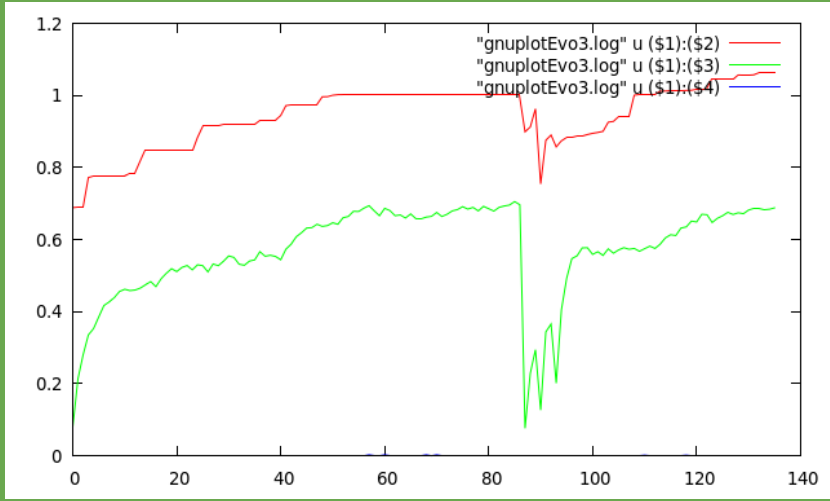
Para Bat > 0.3

$$Flocal = 0.45 * V * (1 - (\sqrt{M_R{}^2 + M_L{}^2})) + 0.1 * (M_L * M_R)$$

$$Ftotal = Flocal / NumberSteps$$

Experimento 3

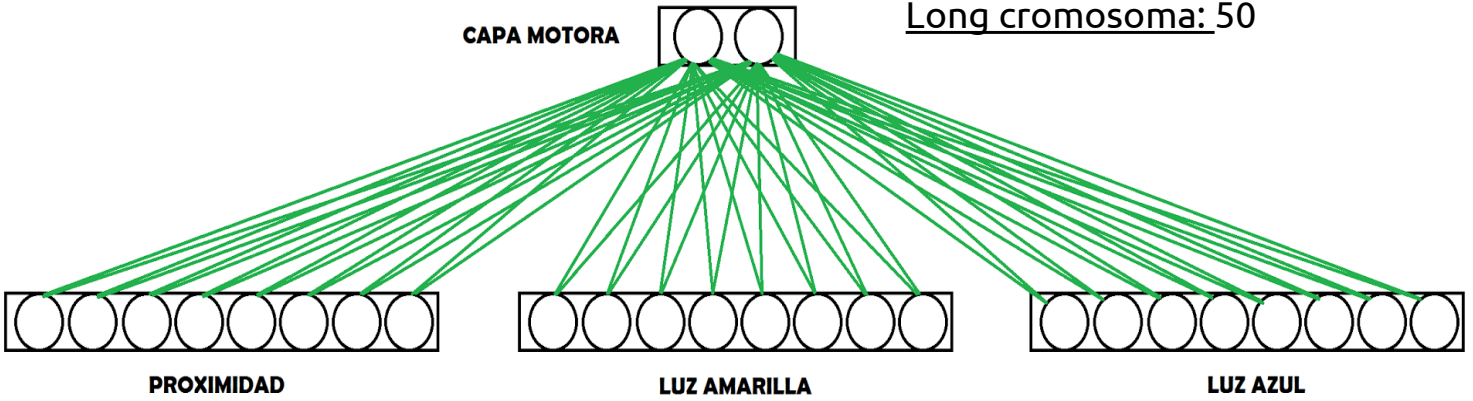




Tamaño población = 300
Número generaciones = 135
Tiempo evaluación = 200

$$Flocal = V * (1 - (\sqrt{M_R{}^2 + M_L{}^2})) + 0.3 * (L_{S0} + L_{S7})$$
$$Ftotal = Flocal/NumberSteps + (1 - min(Col, 10)/10)$$

Experimento 4



Long cromosoma: 50

Tamaño población = 150
Número generaciones = 10
Tiempo evaluación = 100

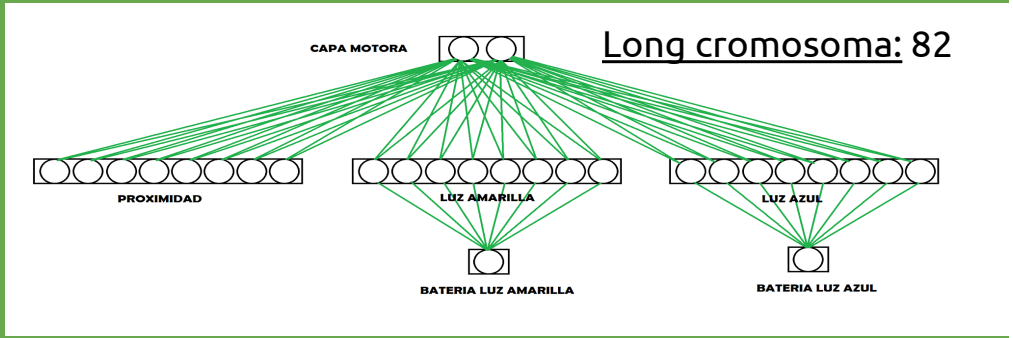
$$F\,local = MaxV * (M_R * M_L) + f_1(t)$$

Para BLS =0 f1(t) = (LS0+LS7)

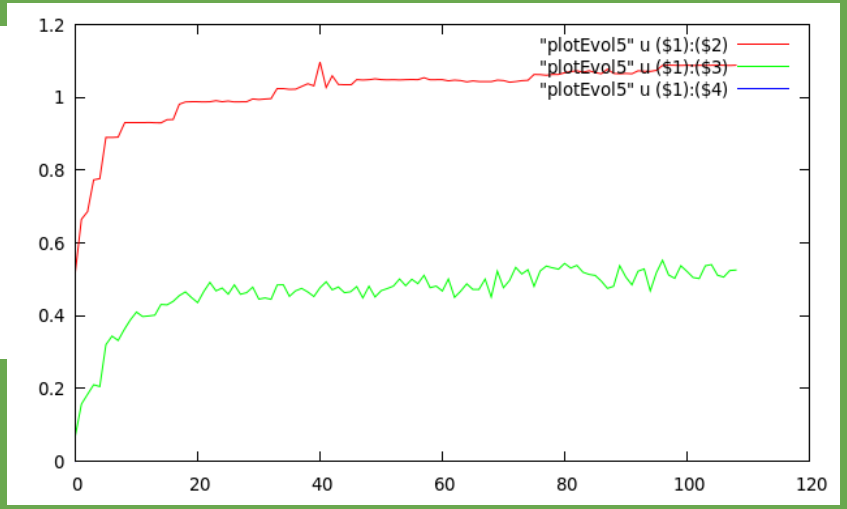
Para el resto f1(t) = (BLS0 + BLS7)

$$F\,total = F\,local/NumberSteps + (1 - min(Col,\ 10)/10)$$

Experimento 5



Long cromosoma: 82



Tamaño población = 300
Número generaciones = 108
Tiempo evaluación = 500

Para Bat < 0.5

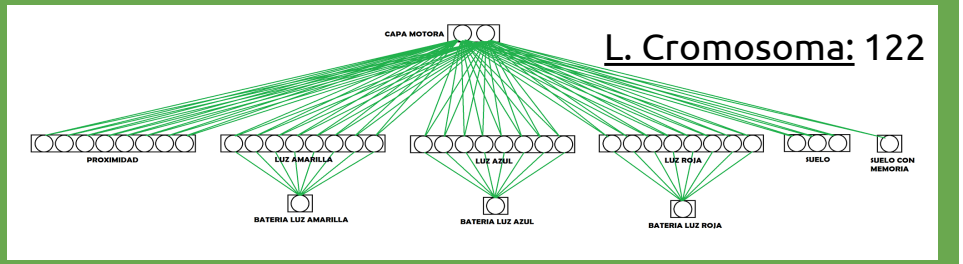
$$Flocal = V * (1 - (\sqrt{M_R{}^2 + M_L{}^2})) + (S_{L0} + S_{L7})$$

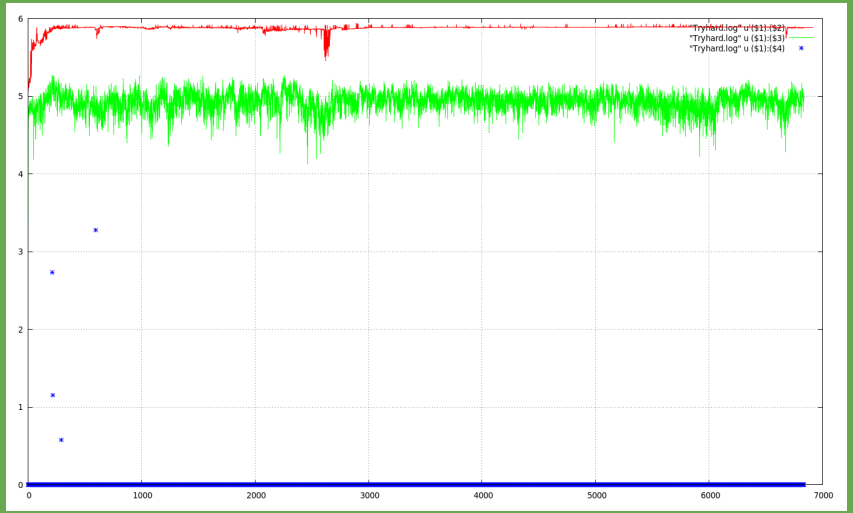
Para Bat > 0.3

$$Flocal = V * (1 - (\sqrt{M_R{}^2 + M_L{}^2})) + (BS_{L0} + BS_{L7})$$

$$Ftotal = Flocal/NumberSteps$$

Experimento 6





Tamaño población = 150

Número generaciones = 9931

Tiempo evaluación = 200

$$Flocal = MaxV * (MR * ML) * (1 - (\sqrt{M_R{}^2 + M_L{}^2})) + 0.1 * \sum_{0}^{n} x_n$$

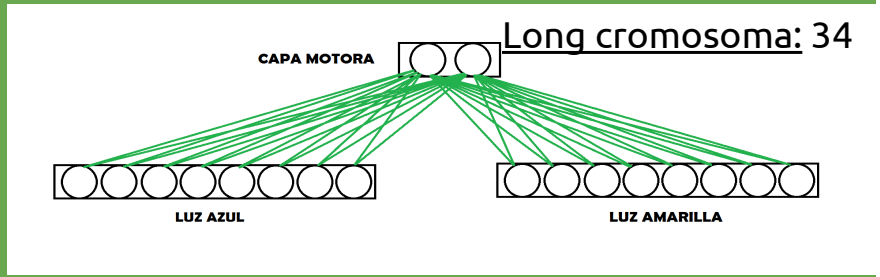
n = n⁰ de rotaciones completas máquina de estados

$$Ftotal = Flocal/NumberSteps + (1 - min(Col, 10)/10)$$ + Cambios en la máquina de Estados;

Hay problemas

Cambiamos la filosofía.

Experimento 7



Número generaciones = 327
Tiempo evaluación = 200
Muestras por cromosoma = 1

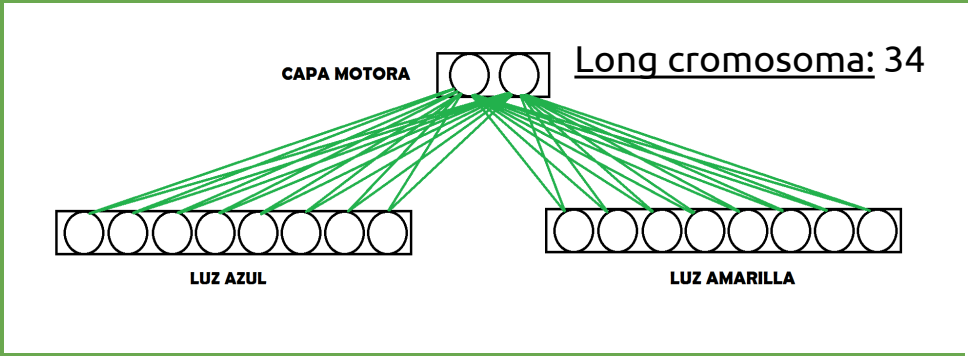
$$Flocal = MaxV * (M_R * M_L) + f_1(t)$$

Para BLS =0 f1(t) = (LS0+LS7)

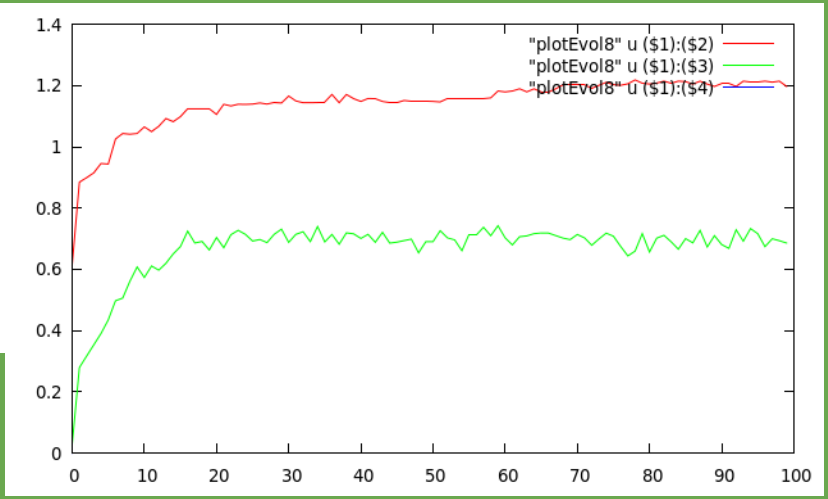
Para el resto f1(t) = (BLS0 + BLS7)

$$Ftotal = Flocal / NumberSteps$$

Experimento 8



Long cromosoma: 34



Tamaño población = 150
Número generaciones = 100
Tiempo evaluación = 500

$$Flocal = MaxV * (M_R * M_L) + f_1(t)$$

Para BLS =0 f1(t) = (LS0+LS7)

Para el resto f1(t) = (BLS0 + BLS7)

$$Ftotal = Flocal / NumberSteps$$