$$\gamma_i \frac{dx_i}{dt} = f_i\left(\sum_j w_{ij} \cdot x_j + \beta_i\right) - x_i$$

$$\frac{x_i(t+\Delta t) - x_i(t)}{\Delta t} = \frac{1}{\gamma_i}\left[f_i\left(\sum_j w_{ij} \cdot x_j(t) + \beta_i\right) - x_i(t)\right]$$

$$x_i(t+\Delta t) = \frac{\Delta t}{\gamma_i} f_i\left(\sum_j w_{ij} \cdot x_j(t) + \beta_i\right) + \left(1 - \frac{\Delta t}{\gamma_i}\right) x_i(t)$$

gene − set =

	g_1	g_2	g_3	g_4
t_1	0.5	0.3	0.2	0.5
t_2	0.6	0.52	0.45	0.48
t_3	0.7	0.54	0.4	0.46
t_4	0.8	0.56	0.35	0.44
t_5	0.9	0.58	0.3	0.42

Let $\gamma_i = \begin{bmatrix} 2 & 3 & 1 & 5 \end{bmatrix}$ $\Delta t = 1$

$\beta_i = \begin{bmatrix} 0 & 0.5 & 0.1 & 0.1 \end{bmatrix}$

$$w_{ij} = \begin{bmatrix} -1 & 0 & 0.1 & 1 \\ 0 & 0 & 0.5 & -1 \\ 0 & 0.2 & 0.1 & 0.1 \\ 0 & 0 & 0.5 & 1 \end{bmatrix}$$

predicted gene-set =

	g_1	g_2	g_3	g_4
t_1	0.5	0.3	0.2	0.5
t_2	0.5	0.23	0.23	0.54
t_3	0.54	0.42	0.29	0.54
t_4	0.96	0.54	0.57	0.50
t_5	0.6	0.55	0.57	0.48

$$x_1(t_2) = \frac{\Delta t}{\tau_1} f_1\left(\sum_j w_{1j} \cdot x_j(t_1) + \beta_1\right) + \left(1 - \frac{\Delta t}{\tau_1}\right) x_1(t_1)$$

$$= \frac{1}{2} f_1\left(\sum_j w_{1j} \cdot x_j(t_1) + 0\right) + \left(1 - \frac{1}{2}\right)(0.5) = 0.50$$

$$x_2(t_2) = \frac{\Delta t}{\tau_2} f_2\left(\sum_j w_{2j} \cdot x_j(t_1) + \beta_2\right) + \left(1 - \frac{\Delta t}{\tau_2}\right) x_2(t_1)$$

$$= \frac{1}{3} f_2\left(\sum_j w_{2j} \cdot x_j(t_1) + 0.5\right) + \left(1 - \frac{1}{3}\right)(0.3) = 0.23$$

$$x_3(t_2) = \frac{\Delta t}{\tau_3} f_3\left(\sum_j w_{3j} \cdot x_j(t_1) + \beta_3\right) + \left(1 - \frac{\Delta t}{\tau_3}\right) x_3(t_1)$$

$$= \frac{1}{1} f_3\left(\sum_j w_{3j} \cdot x_j(t_1) + 0.1\right) + \left(1 - \frac{1}{1}\right)(0.2) = 0.23$$

$$x_4(t_2) = \frac{\Delta t}{\tau_4} f_4\left(\sum_j w_{4j} \cdot x_j(t_1) + \beta_4\right) + \left(1 - \frac{\Delta t}{\tau_4}\right) x_4(t_1)$$

$$= \frac{1}{5} f_4\left(\sum_j w_{4j} \cdot x_j(t_1) + 0.1\right) + \left(1 - \frac{1}{5}\right)(0.5) = 0.54$$

$$x_1(t_3) = \frac{\Delta t}{\tau_1} f_1\left(\sum_j w_{1j} \cdot x_j(t_2) + \beta_1\right) + \left(1 - \frac{\Delta t}{\tau_1}\right) x_1(t_2)$$

$$= \frac{1}{2} f_1\left(\sum_j w_{1j} \cdot x_j(t_2) + 0\right) + \left(1 - \frac{1}{2}\right)(0.6) = 0.54$$

$$x_2(t_3) = \frac{\Delta t}{\tau_2} f_2\left(\sum_j w_{2j} \cdot x_j(t_2) + \beta_2\right) + \left(1 - \frac{\Delta t}{\tau_2}\right) x_2(t_2)$$

$$= \frac{1}{3} f_2\left(\sum_j w_{2j} \cdot x_j(t_2) + 0.5\right) + \left(1 - \frac{1}{3}\right)(0.52) = 0.42$$

$$x_3(t_3) = \frac{\Delta t}{\tau_3} f_3\left(\sum_j w_{3j} \cdot x_j(t_2) + \beta_3\right) + \left(1 - \frac{\Delta t}{\tau_3}\right) x_3(t_2)$$

$$= \frac{1}{1} f_3\left(\sum_j w_{3j} \cdot x_j(t_2) + 0.1\right) + \left(1 - \frac{1}{1}\right)(0.45) = 0.29$$

$$x_4(t_3) = \frac{\Delta t}{\tau_4} f_4\left(\sum_j w_{4j} \cdot x_j(t_2) + \beta_4\right) + \left(1 - \frac{\Delta t}{\tau_4}\right) x_4(t_2)$$

$$= \frac{1}{5} f_4\left(\sum_j w_{4j} \cdot x_j(t_2) + 0.1\right) + \left(1 - \frac{1}{5}\right)(0.48) = 0.54$$

$$x_1(t_4) = \frac{\Delta t}{\tau_1} f_1\left(\sum_j w_{1j} \cdot x_j(t_3) + \beta_1\right) + \left(1 - \frac{\Delta t}{\tau_1}\right) x_1(t_3)$$

$$= \frac{1}{2} f_1\left(\sum_j w_{1j} \cdot x_j(t_3) + 0\right) + \left(1 - \frac{1}{2}\right)(0.7) = 0.96$$

$$x_2(t_4) = \frac{\Delta t}{\tau_2} f_2\left(\sum_j w_{2j} \cdot x_j(t_3) + \beta_2\right) + \left(1 - \frac{\Delta t}{\tau_2}\right) x_2(t_3)$$

$$= \frac{1}{3} f_2\left(\sum_j w_{2j} \cdot x_j(t_3) + 0.5\right) + \left(1 - \frac{1}{3}\right)(0.54) = 0.54$$

$$x_3(t_4) = \frac{\Delta t}{\tau_3} f_3\left(\sum_j w_{3j} \cdot x_j(t_3) + \beta_3\right) + \left(1 - \frac{\Delta t}{\tau_3}\right) x_3(t_3)$$

$$= \frac{1}{1} f_3\left(\sum_j w_{3j} \cdot x_j(t_3) + 0.1\right) + \left(1 - \frac{1}{1}\right)(0.4) = 0.57$$

$$x_4(t_4) = \frac{\Delta t}{\tau_4} f_4 \left(\sum_j w_{4j} \cdot x_j(t_3) + \beta_4 \right) + \left(1 - \frac{\Delta t}{\tau_4} \right) x_4(t_3)$$

$$= \frac{1}{5} f_4 \left(\sum_j w_{4j} \cdot x_j(t_3) + 0.1 \right) + \left(1 - \frac{1}{5} \right)(0.46) = 0.50$$

$$x_1(t_5) = \frac{\Delta t}{\tau_1} f_1 \left(\sum_j w_{1j} \cdot x_j(t_4) + \beta_1 \right) + \left(1 - \frac{\Delta t}{\tau_1} \right) x_1(t_4)$$

$$= \frac{1}{2} f_1 \left(\sum_j w_{1j} \cdot x_j(t_4) + 0 \right) + \left(1 - \frac{1}{2} \right)(0.8) = 0.60$$

$$x_2(t_5) = \frac{\Delta t}{\tau_2} f_2 \left(\sum_j w_{2j} \cdot x_j(t_4) + \beta_2 \right) + \left(1 - \frac{\Delta t}{\tau_2} \right) x_2(t_4)$$

$$= \frac{1}{3} f_2 \left(\sum_j w_{2j} \cdot x_j(t_4) + 0.5 \right) + \left(1 - \frac{1}{3} \right)(0.56) = 0.55$$

$$x_3(t_5) = \frac{\Delta t}{\tau_3} f_3 \left(\sum_j w_{3j} \cdot x_j(t_4) + \beta_3 \right) + \left(1 - \frac{\Delta t}{\tau_3} \right) x_3(t_4)$$

$$= \frac{1}{1} f_3 \left(\sum_j w_{3j} \cdot x_j(t_4) + 0.1 \right) + \left(1 - \frac{1}{1} \right)(0.35) = 0.57$$

$$x_4(t_5) = \frac{\Delta t}{\tau_4} f_4 \left(\sum_j w_{4j} \cdot x_j(t_4) + \beta_4 \right) + \left(1 - \frac{\Delta t}{\tau_4} \right) x_4(t_4)$$

$$= \frac{1}{5} f_4 \left(\sum_j w_{4j} \cdot x_j(t_4) + 0.1 \right) + \left(1 - \frac{1}{5} \right)(0.44) = 0.48$$