$$V_o(t) + Q / C = V_i(t)$$

$$\frac{dV_o(t)}{dt} + i / C = \frac{dV_i(t)}{dt}$$

$$V_o = RC\left(\frac{dV_i}{dt} - \frac{dV_o}{dt}\right)$$

For discrete data use j as the index over time bins of Δt

$$V_o(t_j) = RC\left[\frac{V_i(t_j) - V_i(t_{j-1})}{\Delta t} - \frac{V_o(t_j) - V_o(t_{j-1})}{\Delta t}\right]$$

$$V_o(j) = \alpha(V_i(j) - V_i(j-1)) + \alpha V_o(j-1)$$

$$\alpha = (RC / \Delta t) / (1 + RC / \Delta t)$$