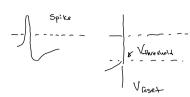
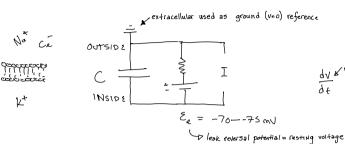
COMPUTATIONAL NEUROSCIENE TOPICS IN CS REVIEW

LIF Simple model of spiking + membrane voltage

Key approximations in LIF: - FARE The Spike - X subthreshold voltage as Unear





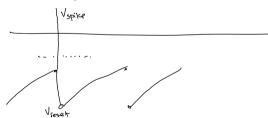
$$C\dot{v} = \frac{1}{R}(\xi_{e} - v) + I$$

$$\frac{1}{R} = g$$

if v(t) > V+nreshord:

(maybe same t in list of spike time)

- (updating postgraphic conductorices of targe)



C: CAPACITANCE

V: Membrane Voltage (polarited = negative)

 \mathcal{E}_{e} or V_{e} : leak reversal/resting potential: Where voltage goes if I=0

I: applied corrent

Inger = slower

V(t) =
$$V_{\infty}$$
 + $e^{-t/\tau}$ ($V_{0} - V_{\infty}$)

Steady Shake

AKA V_{SS} , V

has do we check if spike for given "I" Vyaccon? $V_{\infty} = V_{r} + RI > V_{thresh}$

$$C\dot{V} = gV(\xi_{e} - v) + I \quad \text{wore} \quad g = V_{R} \quad \text{let} \quad T - RC$$

$$(+ \tau \dot{v} = V_{eo} - v) \quad \text{form} \quad \text{by} \quad R \quad V_{e} = \xi_{e} + IR$$

$$(+ \tau \dot{v} = V_{eo} + e^{\frac{\tau}{c}}(V_{o} - V_{eo}) \quad RC\dot{v} = \xi_{e} - v + IR$$

$$(+ \tau \dot{v} = V_{eo} - v) \quad T$$

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Find spike period given constant I applied current Assume U(0) = V, V(+) = V+Weshold $V(t) = V_{\infty} + e^{-t/T} \left(V_{0} - V_{\infty} \right)$ V00 = V2 + P1 Vth = V = + e - + (Viaser - Vas) Vm-Voo = e (Vreset - Voo) $l\left(\frac{V_{H}-V_{\infty}}{V_{\text{cut}}-V_{\infty}}\right)=-\frac{t}{\tau}$ $t = -\tau \cdot lr \left(\frac{V_{th} - V_{co}}{V_{resot} - V_{co}} \right)$ $V_{co} = V_r + IR$ $t = -\tau \cdot h\left(\frac{V_{th} - V_r - IR}{V_{th} - V_r - IR}\right)$ PATC f (H2=5) 1

Hodgkin - Huxley

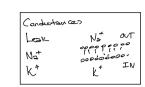
$$C_{V} = g_{\ell}(\mathcal{E}_{\ell} - v) + g_{N_{a}^{*}}^{*}(\mathcal{E}_{N_{a}^{*}} - v) + g_{\ell}^{*}(\mathcal{E}_{k}^{*} - v) + I$$

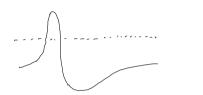
Naxital Conductance

$$g_{N2}^{+} = g_{N2}^{+} + m^3 h$$
 inactuation stop spike

gather term, "gate open" Start spike

 $g_{kt} = g_{y+1}^{+} + m^4 + cepalarizing$





$$\dot{\mathbf{M}} = \mathcal{K}_{\mathbf{M}}(\mathbf{V}) \cdot (\mathbf{1} - \mathbf{M}) + \mathcal{P}_{\mathbf{M}}(\mathbf{V}) \cdot (\mathbf{0} - \mathbf{M})$$

$$\dot{\mathbf{K}} = \mathbf{N} \cdot \mathbf{N} \cdot \mathbf{N}$$

$$\dot{\mathbf{K}} = \mathbf{N} \cdot \mathbf{N} \cdot \mathbf{N} \cdot \mathbf{N}$$

