Model Neurons (II): Conductances
and Morphology

Dayan and Abbott (2001) Chapter 6

- Multicompartment models.

Instructor: Yoonsuck Choe; CPSC 644 Cortical Networks

Modeling Morphology

- The neurons morphology is sectioned into connected compartments, where each compartment has its own membrane potential associated with it.
- Numerical methods are used to solve the membrane equations.
- Compartments can be very detailed, or as simple as a single compartment.

Multicompartment Model Equation

- Adding neighboring compartments to a compartment $\mu$, we get:

$$c_m \frac{dV_\mu}{dt} = -i_m^\mu + \frac{I_{\mu}}{A_\mu} + g_{\mu,\mu+1}(V_{\mu+1} - V_\mu) + g_{\mu,\mu-1}(V_{\mu-1} - V_\mu).$$

Simulation Tools

- NEURON: http://www.neuron.yale.edu/
- GENESIS: http://www.genesis-sim.org/