Neuron Model

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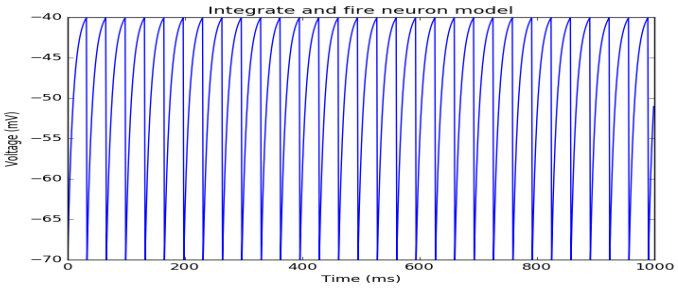
The aim of this report is to highlight different cases of neuron modelling. The analysis is largely based on graphs, and the language of implementation is Python.

Q1. Integrate and fire model



Q2. Minimum current for action potential

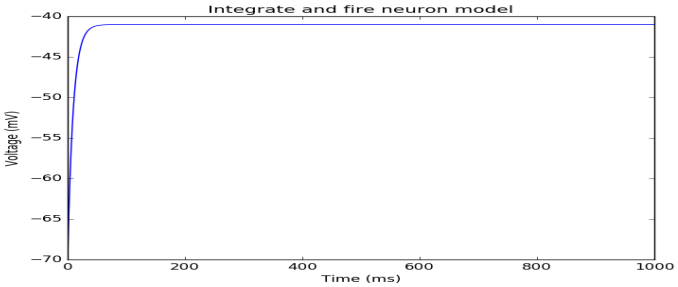
$$I_e = \frac{V_t - E_l}{R_m} \tag{1}$$

$$I_e = \frac{-40 - (-70)}{10} \tag{2}$$

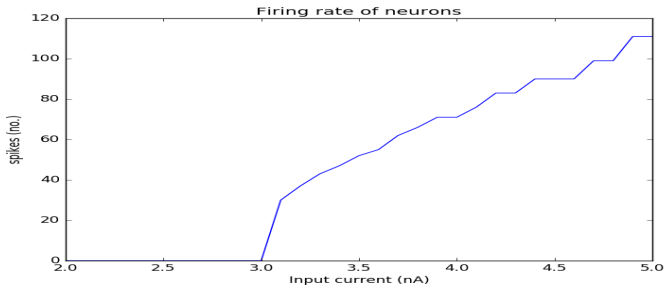
$$I_e = \frac{30}{10} = 3.0nA \tag{3}$$

Q3. Integrate and fire model with lower than the minimum current

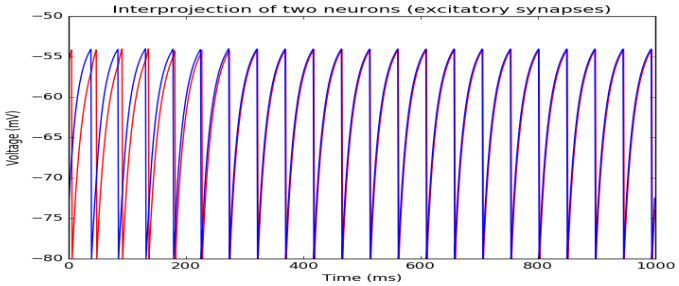
The current is lower that the current needed for a spike, hence no spikes are observed.

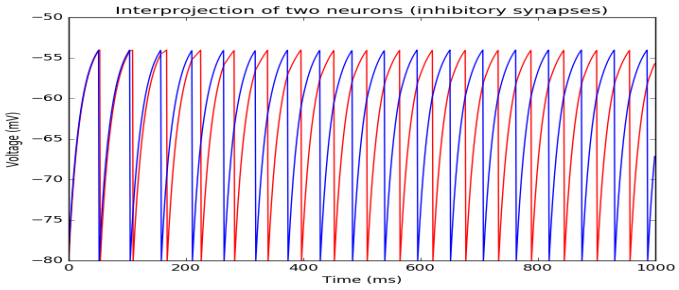


Q4. Firing rate as function of the input current

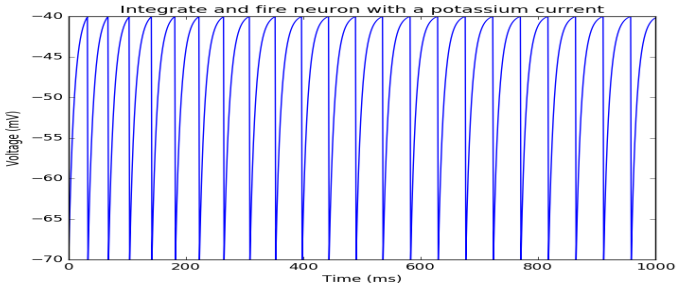


Q5. Interprojection of two neurons





Q6. Integrate and fire model with potassium current



Q7. Hodgkin-Huxley neuron