Assignment 5 - Hodgkin Huxley

Meta

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Objective

Implement the Hodgkin Huxley model of the Neuron, and evaluate respone based on different input characteristics.

Requirements

Requires a Julia environment with the following packages:

1. `Plots`.
2. `PlutoUI`.

It is recommended that you set up a Julia environment as specified in the `project.toml` on my GIT:
Git Hub

```julia
begin
    import Pkg

    # The `activate` function activates my base julia environment. Enter the path of
    YOUR environment to get this to work.
    # Alternatively, clone the github repo to get an exact clone of the environment
    as specified in `project.toml`.
    # https://github.com/parmanchaddha/compNeuroIntro420/tree/lisp/juliapsych420
    Pkg.activate("/Users/pchaddha/OneDrive - University of Waterloo/Waterloo -
    4B/psych_420_intro_to_computational_neuroscience/compNeuroIntro420/juliapsych420")

    using PlutoUI
end
```
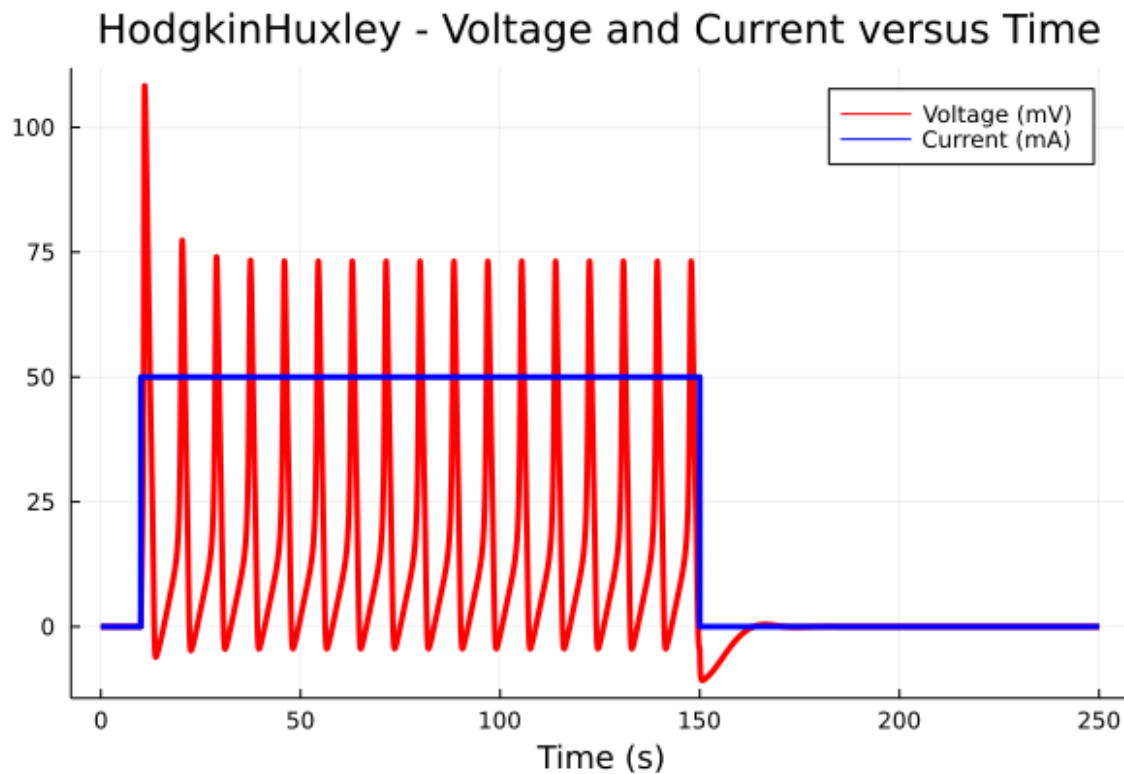
Include the `hodgkin_huxley.jl` file in the same directory as this notebook!

```
Main.workspace#3.HodgkinHuxley
```

```julia
# Include the `hodgkin_huxley.jl` file in the same directory as this notebook!
include(joinpath(@__DIR__, "hodgkin_huxley.jl"))
```

Test Case 1

Basic test case, with most values matching the HH notebook.


```
begin
    function testCase1()
        neuron = HodgkinHuxley.initializeNeuron()
        runTime = 250.0
        HodgkinHuxley.runHodgkinHuxley(neuron, runTime)
        HodgkinHuxley.plotHodgkinHuxley(neuron)
    end
    testCase1()
end
```

Test Case 2

Interactive test case using PlutoUI. Feel free to play with the numbers below and watch the plot change.

The injection current is: ▬●▬▬ .

The delta_time is `0.01` .

The initialVoltage is `0.0` .

The current start time is `10.0` .

The current stop time is `150.0` .

The capacitor value is `1.0` . Since the capacitor value is an indicater of `tao` , play with this to see the number of spikes change!

The run time of the device is `250.0` .

HodgkinHuxley - Voltage and Current versus Time