BT6270: Computational Neuroscience

The details of Assignment-1 are given below

Assignment description:

We have attached the base code, which simulates the Hodgkin-Huxley model. You need to run and modify this code so as to find and plot the following:

1. Threshold values for the external applied currents I_1, I_2, and I_3, in which shift of dynamical behaviour from one to another is seen, such as *no AP, a finite number of AP's, Continuous firing and then followed by distortion resulting in no more APs*. (Make a tabular column showing the current ranges for each region)
2. A graph which depicts the firing rate (frequency) as you change the applied external current (i.e. I_{ext} vs. Firing rate (f)).

Please note that the base code is given just to ease the simulation part for students. Feel free to make your own code in Python or MATLAB, or any other language if you feel that is helpful.

Submission link:

https://forms.gle/9ReVs1UBU5TZskWEA

General Instructions:

- Submit a PDF file containing a detailed report showing all the plots of voltage, conductance and gating parameters for different regimes (no AP, finite AP's, continuous firing, AP distortion). Label the figures clearly and label the axes of the plots properly with the required units. Write brief comments regarding the observations made for each case. You need to specify any assumptions along with justifications made in generating any of the plots or in computing the frequency. Please be very crisp and clear in the comments or the assumptions.

  Kindly name your report as follows: ROLLNO_A1.zip, **Eg:** BT22D109_A1.pdf

- A code file containing the code to simulate all the graphs (either MATLAB or Python, or any other language). Note that the code file should be clearly annotated, and you would also be graded accordingly.

  Kindly name your code as follows: ROLLNO_A1.ipynb or ROLLNO_A1.m Eg: BT22D109_A1.ipynb, BT22D109_A1.m

- Please email the TAs for any clarifications

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Please note this is an individual assignment. Please do not share your assignment with other students. Any form of plagiarism found, the assignment will be considered null, and the assignment score will be set to zero. If any references or sources are used in the assignment, kindly cite them at the end.

The deadline for Assignment-1 is 11/09/2024, 23:59. The form link gets disabled beyond the deadline.

Delay in submitting the assignment will only be accepted for valid reasons. It should be informed to all the TAs at least 3 days before the due date via email and obtain permission.