

Variation of Mutual Information With Tract Temperature

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Abstract

In this note, the author presents simulation results showing the relation between the mutual information at the output of a tract of two axons, ephaptically coupled, and the temperature variable used in the corresponding Hodgkin-Huxley formulation.

In a previous preprint [1] it was shown how the mutual information between the input and output of a tract of $N = 2$ axons could be computed; simulations were performed as well. In this note, we utilize the same setup, but investigate the relation between mutual information and temperature. We obtain Figure 1.

The figure illustrates the slight rise before the sudden dip in input-output mutual information. Various parameters would need to be verified to be physiologically sound before drawing physiological conclusions from this curve, however it illustrates the principle that the m.i. will not rise forever, but will fall beyond a certain temperature.

References

- [1] Aman Chawla. Using Mutual Information to Characterize Neural PDEs. July 2024.

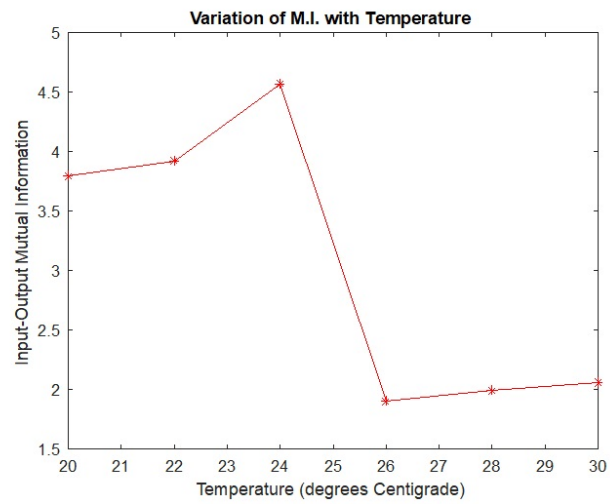


Figure 1: Variation of m.i. with temperature. The horizontal axis is temperature in degrees Centigrade and the vertical axis is the input-output mutual information in bits per symbol.