

Poster presentation

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Bayesian binning for maximising information rate of rapid serial presentation for sensory neurons

Dominik Endres* and Peter Földiák

Address: School of Psychology, University of St. Andrews, Fife, KY16 9JP, UK

Email: Dominik Endres* - dme2@st-andrews.ac.uk

* Corresponding author

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Understanding the response properties of single neurons is seriously limited by the available experimental time and the rate [bit/s] at which information can be gained from the neurons. A substantial improvement in the latter can be achieved by speeding up the presentation of stimuli.

We show how the novel technique of Bayesian Binning [1] can be used to find the optimal stimulus presentation rate of a continuous sequence of stimuli.

This method applied to neurons in high-level visual cortical area STSa gives optimal presentation rates of approximately 56 ms/stimulus (18 stimuli/s) which is significantly faster than conventional presentation rates, allowing a better sampling of stimulus space. We relate these results to findings obtained with the Bayesian Bin Classification method [2,3], which can be used to select the optimal time window for the analysis of the continuous response stream. Both methods will soon be freely available as standalone command-line applications or Matlab/Octave plugins.

The optimal window duration is equal to the stimulus duration near the best presentation rate. Interestingly, this duration also corresponds to the peak of spike efficiency [bit/spike] of a rate code whose firing rates match those found in visual neurons (area STSa).

References

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