Summary of A tutorial of the free-energy framework for modelling perception and learning

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Complex system in neuroscience, 12 December 2023

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• Predictive coding model of Rao and Ballard.

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1. Prior predictions are compared to stimuli and the model parameters are updated considering prediction errors, features corresponding to receptive fields in the the primary sensory cortex are learned.

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- Predictive coding model of Rao and Ballard.
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1. Prior predictions are compared to stimuli and the model parameters are updated considering prediction errors, features corresponding to receptive fields in the the primary sensory cortex are learned.

. Predictive coding model of Rao and Ballard

2. Weight stimuli by their noise, learn features using their covariance, implement attentional modulation changing the variance of attended features.



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- Predictive coding model of Rao and Ballard.
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- 1. Prior predictions are compared to stimuli and the model parameters are updated considering prediction errors, features corresponding to receptive fields in the the primary sensory cortex are learned.
- 2. Weight stimuli by their noise, learn features using their covariance, implement attentional modulation changing the variance of attended features.
- 3. Synaptic strenght is changed proportionally to activities of pre-synaptic and post-synaptic neurons.

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- 1. Prior predictions are compared to stimuli and the model parameters are updated considering prediction errors, features corresponding to receptive fields in the the primary sensory cortex are learned.
- 2. Weight stimuli by their noise, learn features using their covariance, implement attentional modulation changing the variance of attended features.
- 3. Synaptic strenght is changed proportionally to activities of pre-synaptic and post-synaptic neurons.
- 4. Minimization of free energy can be seen as the base of many theories of perception.

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1. The state of a neuron is determined only by the synaptic weight and the state of its input neurons.

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- Local computation.
- Local plasticity.

- 1. The state of a neuron is determined only by the synaptic weight and the state of its input neurons.
- 2. Synaptic plasticity depends only on the activities of pre-synaptic and post-synaptic neurons.

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