

UncertainPy: A Python toolbox for uncertainty quantification of computational neuroscience models

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Supervisors:

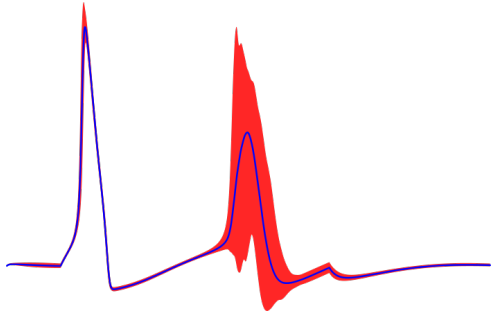
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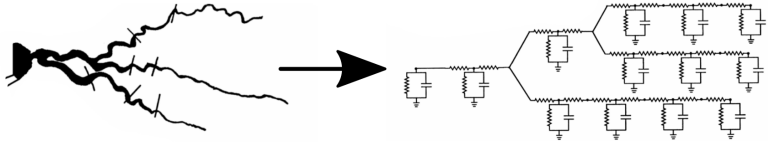
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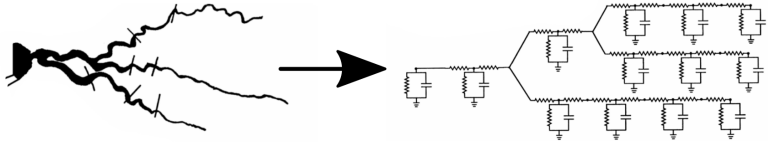
**Computational models are created from
experimental data**



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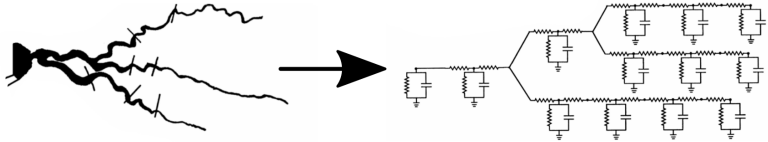


Computational models are created from experimental data



$$I = C_m \frac{dV_m}{dt} + I_K + I_{Na} + I_l$$

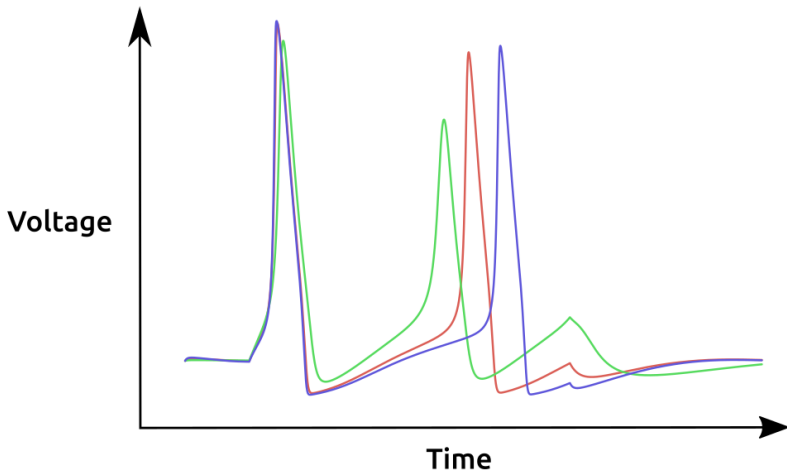
Computational models are created from experimental data



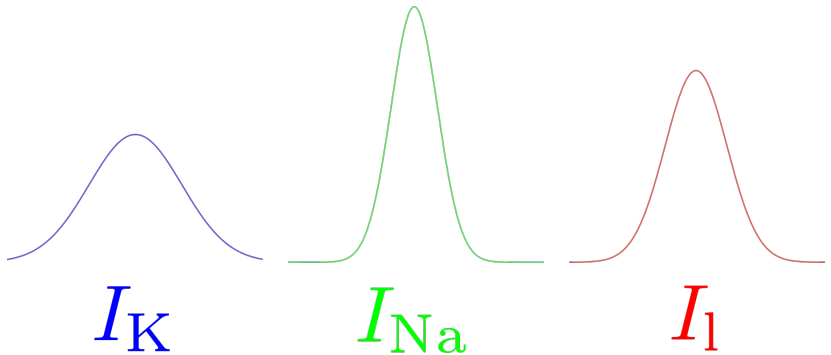
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Different parameters give different model results

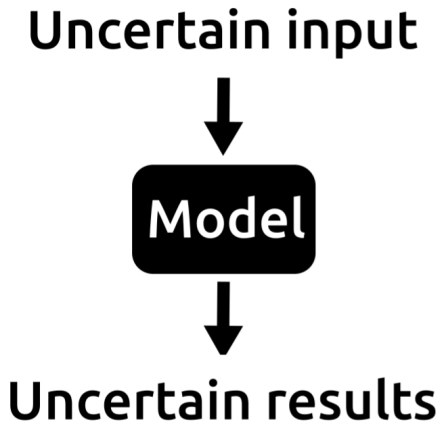
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Problem: Biological parameters are not fixed, but have inherent variability

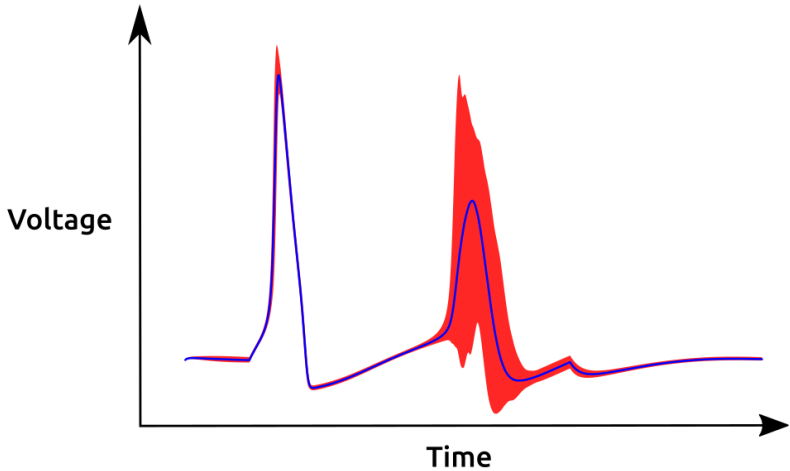


**Solution: Perform an uncertainty quantification,
which relates uncertain input to uncertain output**

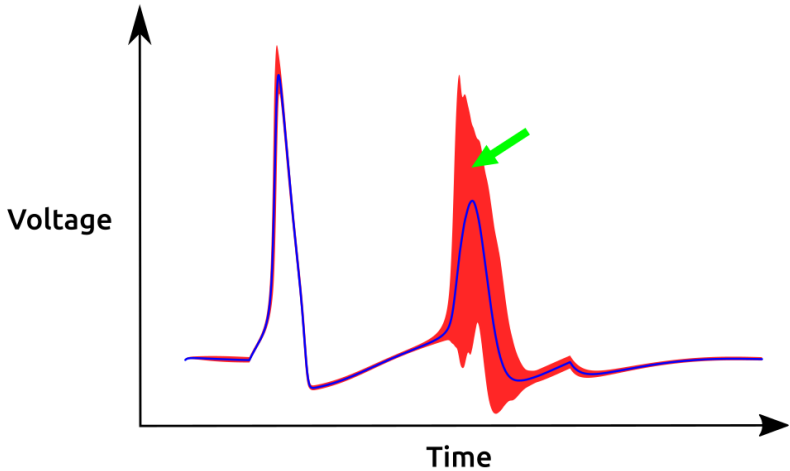


UncertainPy performs these calculations

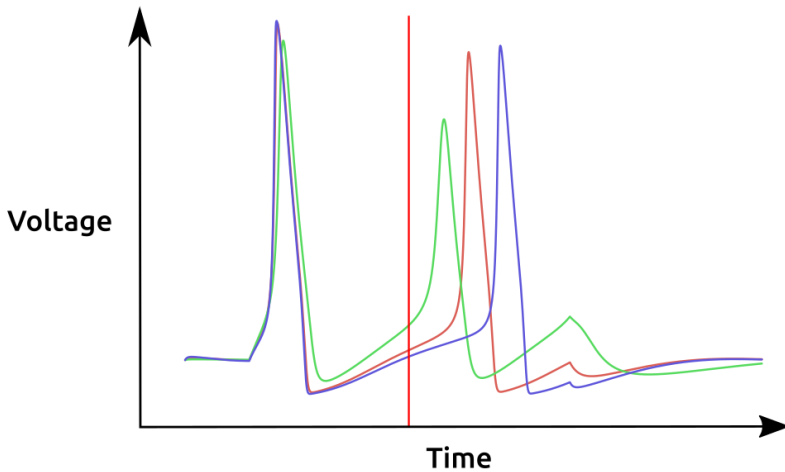
Result: Variations in an action potential (90% confidence interval)



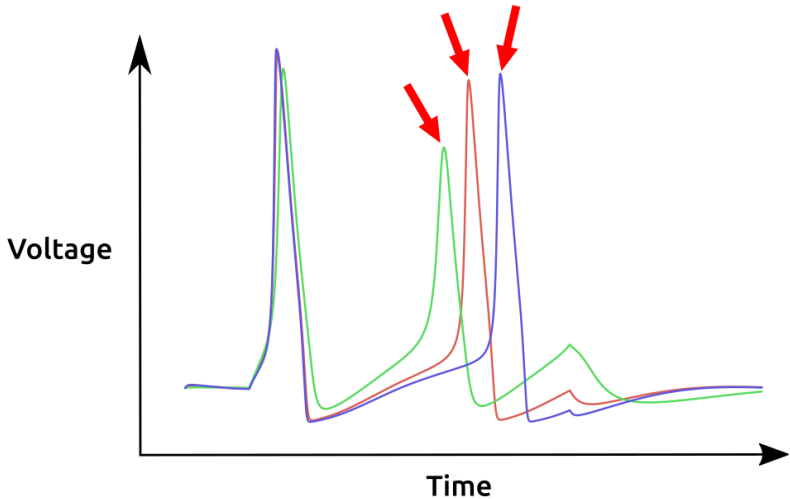
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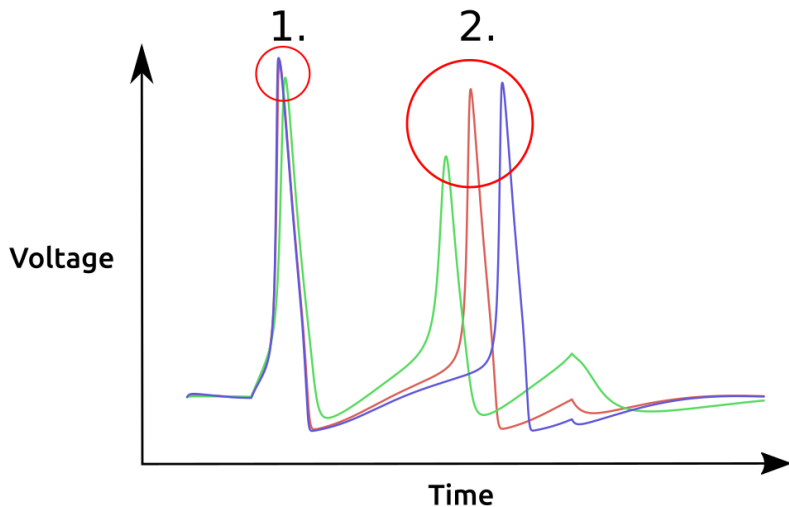
Pointwise comparison



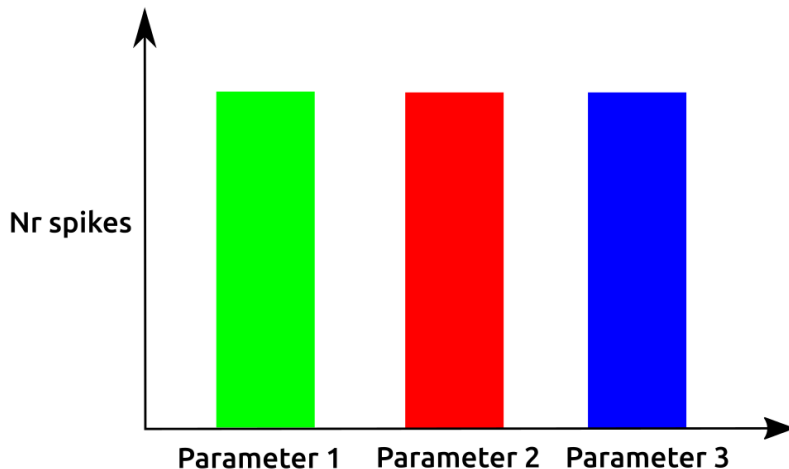
Pointwise comparison is problematic since "the same" spike can occur at different times with different parameters



Solution: Calculate the uncertainty for features such as the number of spikes

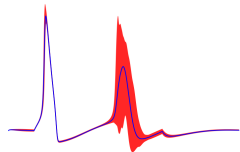


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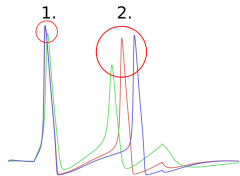


Summary: UncertainPy is a novel Python toolbox, tailored to perform uncertainty quantification in neuroscience models

UncertainPy calculates uncertainties of a model from uncertain parameters

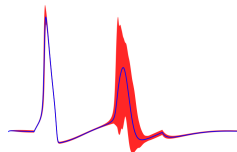


UncertainPy is feature based

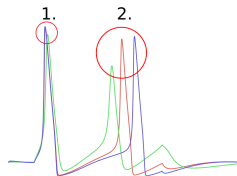


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Questions?