cases	doc_1	doc_2	decision	id
	authors: R. Ozgur Doruk; Kechen Zhang **title**: Fitting of dynamic recurrent neural network models to sensory stimulus-response data **publication_date**: 2017-09-26 08:35:35+00:00 **source**: SupportedSources.ARXIV **journal**: None **volume**: **doi**: **urls**: http://arxiv.org/pdf/1709.09541v1; http://arxiv.org/abs/1709.09541v1; http://arxiv.org/pdf/1709.09541v1 **id**: id668523198687359493 **abstract**: We present a theoretical study aiming at model fitting for sensory neurons. Conventional neural network training approaches are not applicable to this problem due to lack of continuous data. Although the stimulus can be considered as a smooth time dependent variable, the associated response will be a set of neural spike timings (roughly the instants of successive action potential peaks) which have no amplitude information. A recurrent neural network model can be fitted to such a stimulus-response data pair by using maximum likelihood estimation method where the likelihood function is derived from Poisson statistics of neural spiking. The universal approximation feature of the recurrent dynamical neuron network models allow us to describe excitatory-inhibitory characteristics of an actual sensory neural network with any desired number of neurons. The stimulus data is generated by a Phased Cosine Fourier series having fixed amplitude and frequency but a randomly shot phase. Various values of amplitude, stimulus component size and sample size are applied in order to examine the effect of stimulus to the identification process. Results are presented in tabular form at the end of this text. **versions**:	**authors**: R.Ozgur Doruk; Kechen Zhang **title**: Fitting of dynamic recurrent neural network models to sensory stimulus-response data **publication_date**: 2017-09-26 00:00:00 **source**: SupportedSources.INTERNET_ARCHIVE **journal**: **volume**: **doi**: **urls**: https://web.archive.org/web/20191013144635/https://arxiv.org/pdf/1709.09541v1.pdf **id**: id-241492810662412864 **abstract**: We present a theoretical study aiming at model fitting for sensory neurons. Conventional neural network training approaches are not applicable to this problem due to lack of continuous data. Although the stimulus can be considered as a smooth time dependent variable, the associated response will be a set of neural spike timings (roughly the instants of successive action potential peaks) which have no amplitude information. A recurrent neural network model can be fitted to such a stimulus-response data pair by using maximum likelihood estimation method where the likelihood function is derived from Poisson statistics of neural spiking. The universal approximation feature of the recurrent dynamical neuron network models allow us to describe excitatory-inhibitory characteristics of an actual sensory neural network with any desired number of neurons. The stimulus data is generated by a Phased Cosine Fourier series having fixed amplitude and frequency but a randomly shot phase. Various values of amplitude, stimulus component size and sample size are applied in order to examine the effect of stimulus to the identification process. Results are presented in tabular form at the end of this text. **versions**:	DUPLICATES	99