

# Recurrence Experiments (Review of V11 and V12; Cluster and Recur)

Thursday, April 30, 2020 9:47 AM

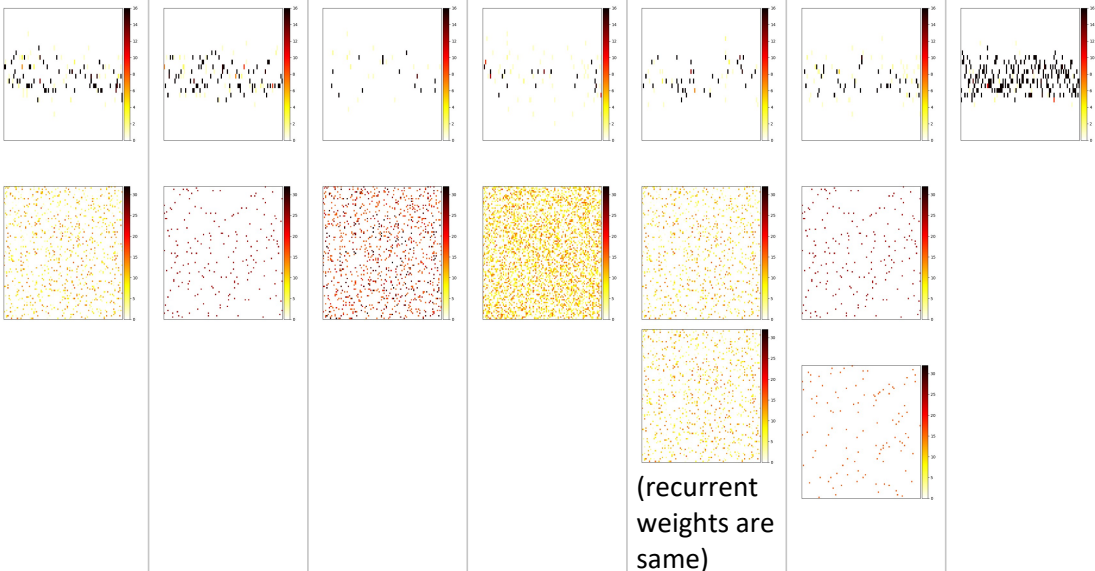
Folder: 18847-rTNN\mark\_test\_records\v11\_v12\_more\_less\_recurrence

Using variants of script V11 in parent folder.

Idea is to test the effects of stronger recurrent weights, more recurrent weights, no recurrence, and more buffers.

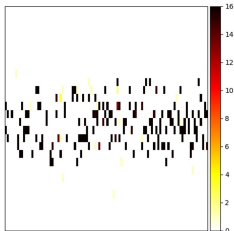
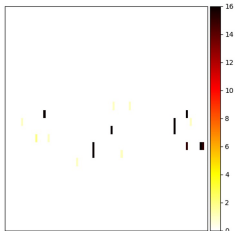
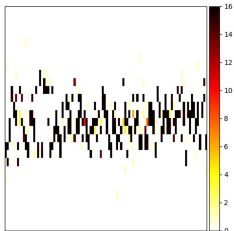
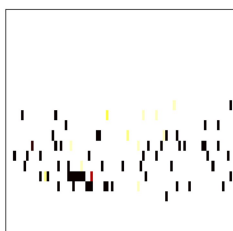
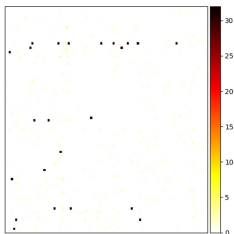
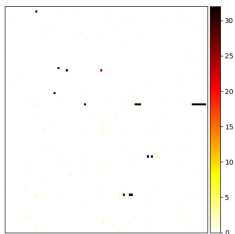
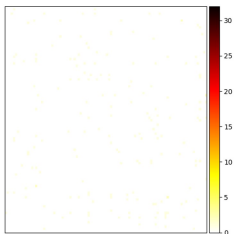
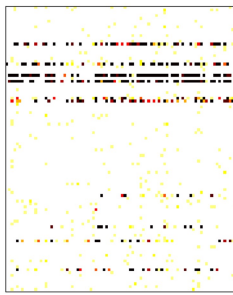

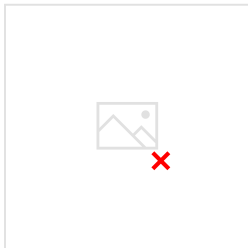

The test is performed with 1000 examples and 100 epochs for training the log reg readout.

Reservoir TNN layer is always size 100, with 10-WTA, and takes both the direct input as well as the recurrent signals from one or more buffers. Therefore it is simultaneously a clustering layer and a recurrent processing layer. Timescale is 16 time steps. Where STDP is applied to both, the recurrent connections have more aggressive STDP search, capture, and minus parameters, and a higher maximum weight.

V11	Baseline	Baseline, Sparser and Stronger	Stronger Recurrent Weights	More Recurrent Weights	More Buffers	More Buffers and Sparser and Stronger	No Recurrence
Log-Reg Loss	0.7649	0.7864	0.6170	0.6726	0.6236	0.7245	0.8261
Overall Accuracy	20.02% to 21%	17.12	17.92	14.21	22.52	20.42	20.02
Images of feedforward and recurrent weights	 <p>(recurrent weights are same)</p>						

Above are images from the recurrent weight maps as well as the feed-forward part of each . It is clear that stronger recurrent weights correspond to poorer clustering on the input slices of each MNIST image.

V12 (stdp)	Baseline	More buffers	More buffers,	Even more buffers (4)
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recurrence)			stronger STDP for feedforward connections	with tuned STDP and limited feedback (only 2 buffers actually go back, but delay is longer).
Log-Reg Loss	0.7816	0.7017	0.8106	0.7328
Overall Accuracy	20.02 %	18.42 %	19.82	18.42
Images of Weights				
				
				
				STDP enabled for recurrences

### SMALLER RECEPTIVE FIELD (8)

V11	Baseline	Baseline, Sparser and Stronger	Stronger Recurrent Weights	More Recurrent Weights		More Buffers	No Recurrence
Log-Reg Loss	0.5377					0.5843	0.6144
Overall Accuracy	27.03					23.22	27.73

Images of feedforward and recurrent weights							
							
							