$\mathcal{GP}$ Write Up 4

September 18, 2018

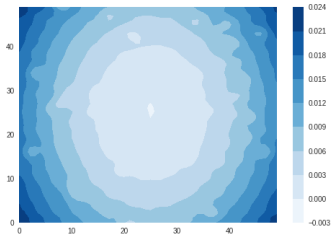
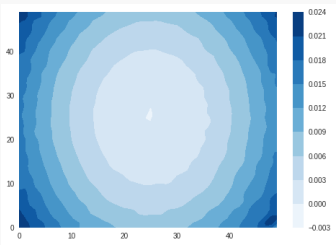
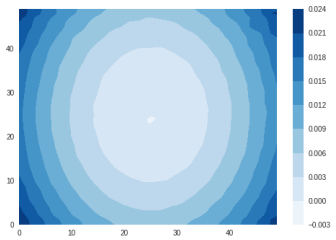
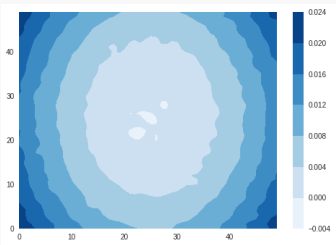
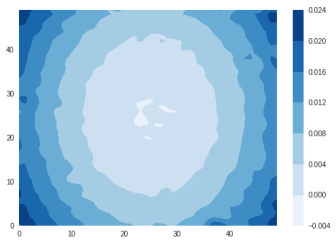
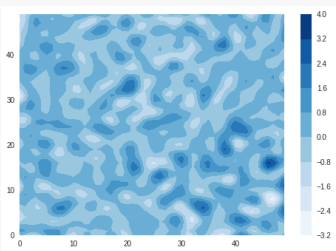
Experimental results: Convolution in Tensorflow with missing observations

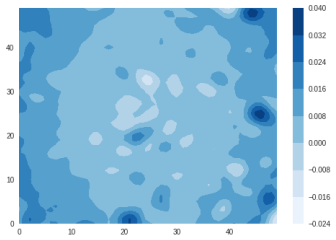
Code: https://colab.research.google.com/drive/1CJGTX0UqPs0QVPQ-6FbnhJmAA_BukxZ1

1. Missing Observations on a Smooth Surface

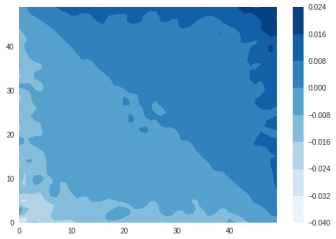
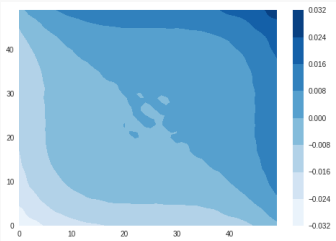
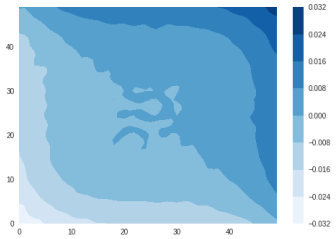
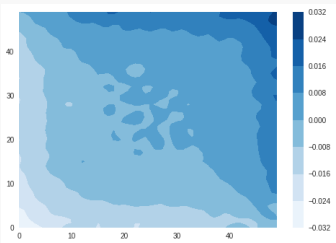
Three dimensional Smooth Surface $Z = \frac{X^2}{4} + \frac{Y^2}{8}$ with $X \in [-0.25, 0.25]$ and $Y \in [-0.25, 0.25]$.

Kernel trained using a 2D convolution layer, with a squared exponential kernel with $\theta = [\sigma_f^2, l]$ and $\sigma_f = 0.1$ and $l = 2$.

% missing Observations	iterations	variance	loss	learning rate	Image
2	3k	0	$9 * 10^{-4}$	0.01	
2	3k	1.0	$1.8 * 10^{-5}$	0.01	
2	3k	10.0	$5.6 * 10^{-5}$	0.01	
30	10k	1.0	$4.2 * 10^{-5}$	0.01	
50	15k	1.0	$3.5 * 10^{-5}$	0.01	
70	80k	1.0	230	0.1	

% missing Observations	iterations	variance	loss	learning rate	Image
70	80k	10.0	0.10	0.1	

Three dimensional Smooth Surface $Z = X^3 + Y^3$ with $X \in [-0.25, 0.25]$ and $Y \in [-0.25, 0.25]$.

% missing Observations	iterations	variance	loss	learning rate	Image
15	10k	0.0	0.08	0.01	
15	10k	1.0	$2 * 10^{-5}$	0.01	
30	10k	1.0	$5 * 10^{-5}$	0.01	
52	10k	1.0	$1.4 * 10^{-4}$	0.01	
75	10k	1.0	$3.2 * 10^{-4}$	0.01