\mathcal{GP} Write Up 4

September 18, 2018

Experimental results: Convolution in Tensorflow with missing observations

Code: https://colab.research.google.com/drive/1CIGTX0UqPs0QVPQ-6FbnhlmAA_BukxZ1_

1. Missing Observations on a Smooth Surface

Three dimensional Smooth Surface $Z=rac{X^2}{4}+rac{Y^2}{8}$ 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	0004 0021 0019 0015 0012 0099 0006 0006 0000 0000 00000 00000 00000
2	3k	1.0	$1.8*10^{-5}$	0.01	0024 0021 0018 0018 0015 0012 0009 0009 0000 0000 0000 0000
2	3k	10.0	$5.6*10^{-5}$	0.01	0024 0021 0018 0018 0015 0012 0009 0000 0000 0000
30	10k	1.0	$4.2*10^{-5}$	0.01	0.024 0.000 0.016 0.012 0.008 0.004 0.000 0.000 0.000 0.000 0.000
50	15k	1.0	$3.5*10^{-5}$	0.01	0.024 0.000 0.016 0.012 0.008 0.004 0.000 0.000 0.000 0.000 0.000
70	80k	1.0	230	0.1	40 32 24 16 08 00 -08 -16 -24 -24 -32

% missing Observations	iterations	variance	loss	learning rate	Image
70	80k	10.0	0.10	0.1	0040 0032 0024 0016 0008 0000 -0000 -0000 0 30 30 30 40 -0324

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	00024 00035 00000 0.008 0.015 0.024 0.032 0 30 20 30 400.040
15	10k	1.0	$2*10^{-5}$	0.01	0002 0024 0015 0000 -0000 -0016 -0024 0 10 20 30 40 -0032
30	10k	1.0	$5*10^{-5}$	0.01	0032 0024 0015 0000 -0000 -0000 -0016 -0024
52	10k	1.0	$1.4 * 10^{-4}$	0.01	0032 0024 0025 0000 0008 0016 0024 0 30 20 30 400032
75	10k	1.0	$3.2*10^{-4}$	0.01	0002 0024 0015 0000 -0000 -0000 -0016 -0000 -0016 -0024 -0032 -0032