



Week 6 Presentation

PHY 496

BRADEN KRONHEIM

FEBRUARY 22, 2019

Summary

- ▶ Added more visualization options for network output
- ▶ Analyzed impact of different tfp layers
- ▶ Analyzed percent error distributions

Reparameterization

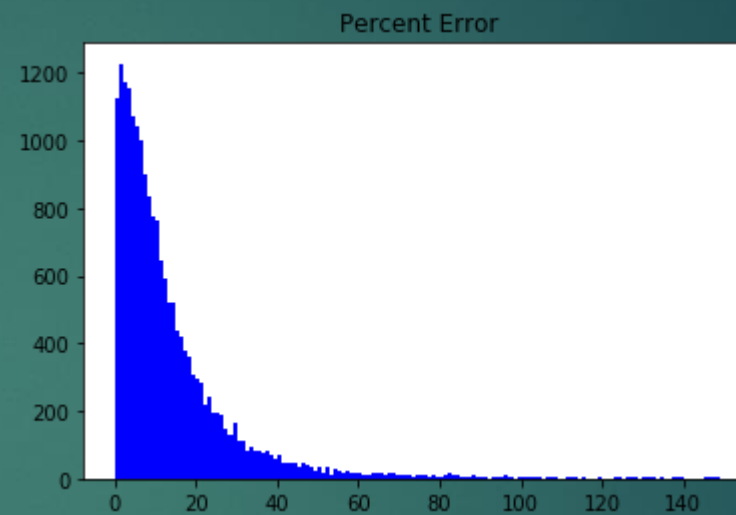
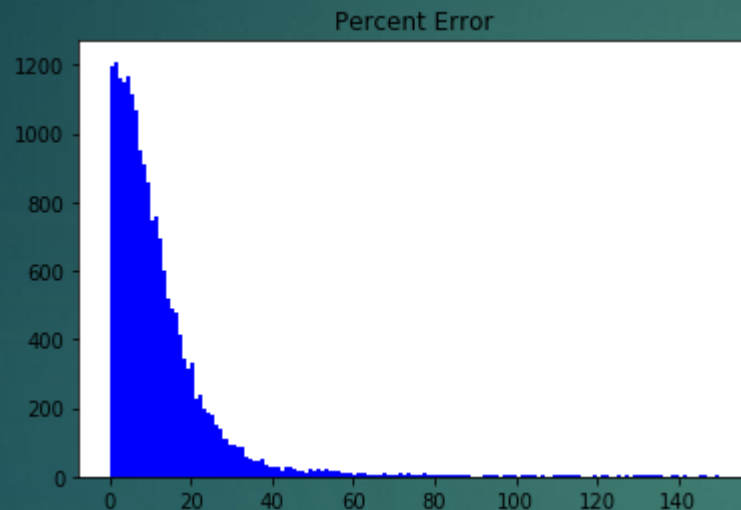
	Inside 1 SD	Inside 2 SDs	Inside 3 SD3	Outside of 3 SDs	Below min	Above max	Percent Error
Reparameterization Batched PRELU	39.31	67.16	83.00	17.00	5.02	9.65	13.21
Reparameterization Not Batched PRELU	39.48	67.22	83.24	16.76	5.09	9.90	13.20
Reparameterization Batched RELU	33.55	59.19	76.64	23.36	12.32	8.20	14.70
Reparameterization Not Batched RELU	33.76	59.40	76.68	23.32	12.44	7.91	14.72

Reparameterization % Error

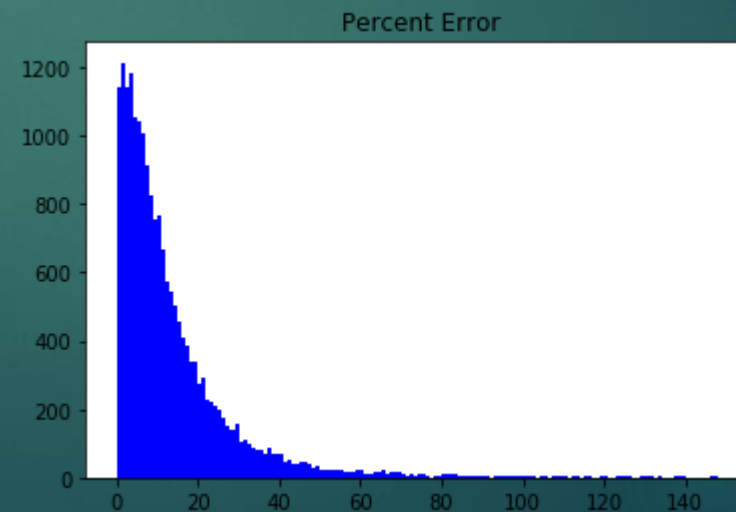
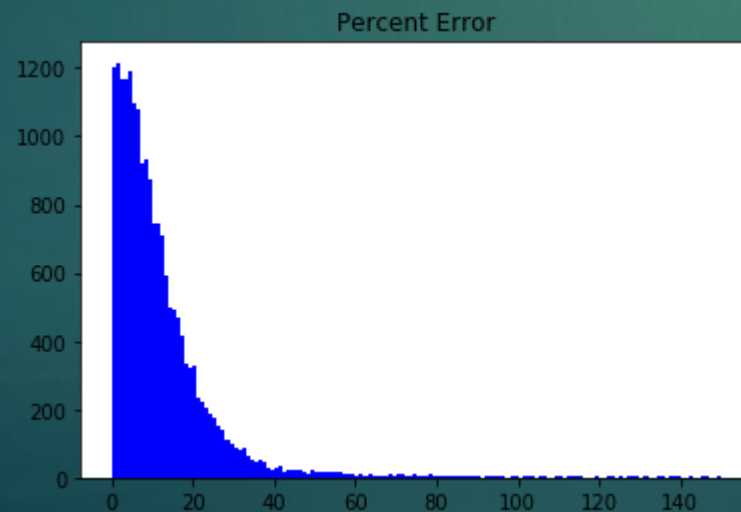
Prelu

Relu

Batched



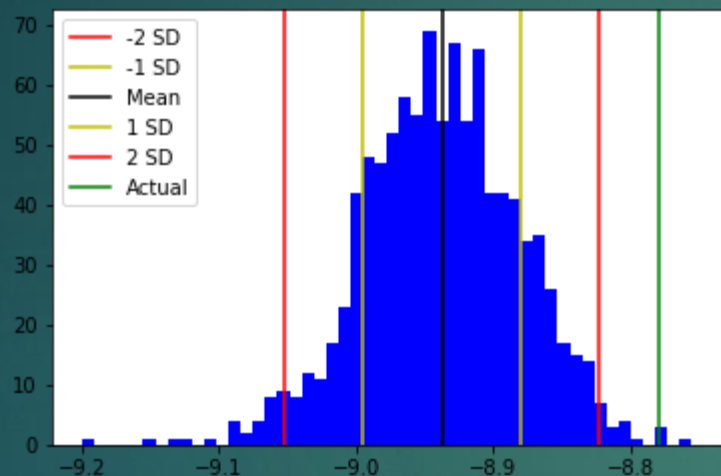
Not Batched



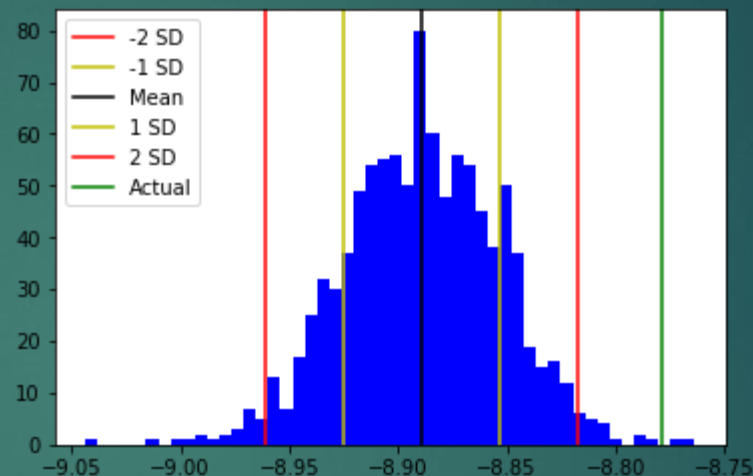
Reparameterization Output

Batched

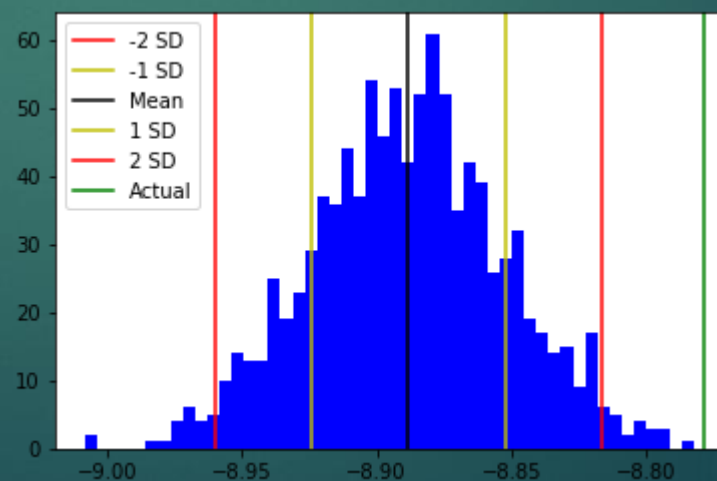
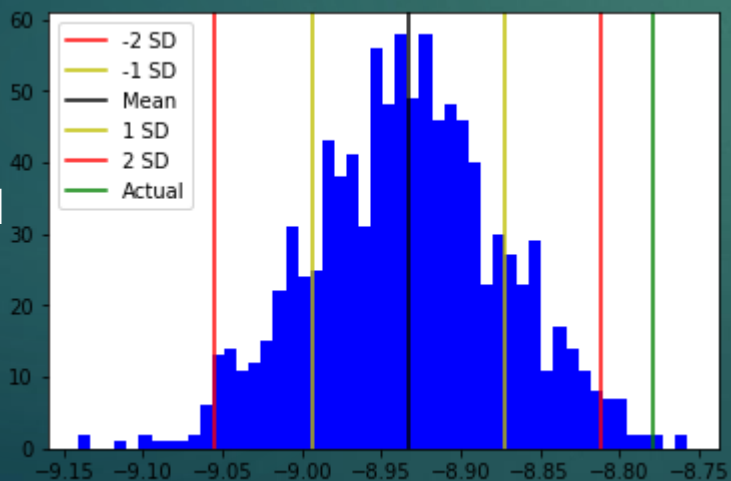
Prelu



Relu



Not Batched

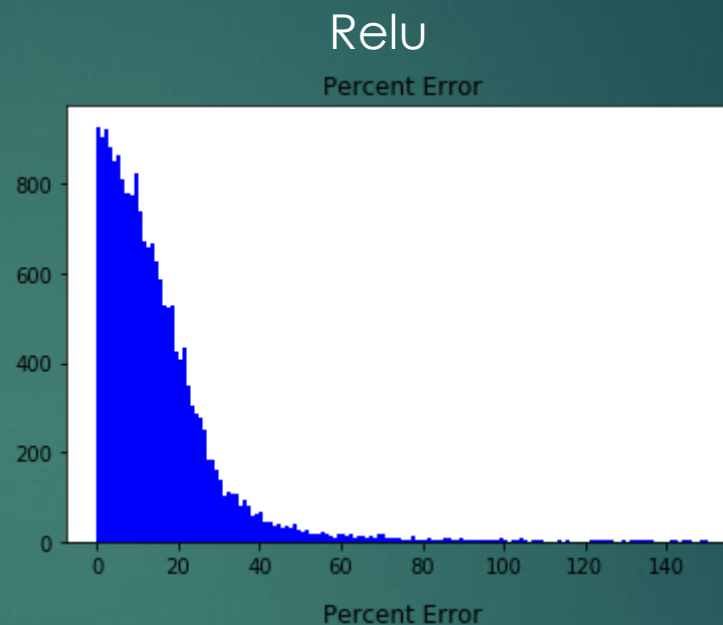
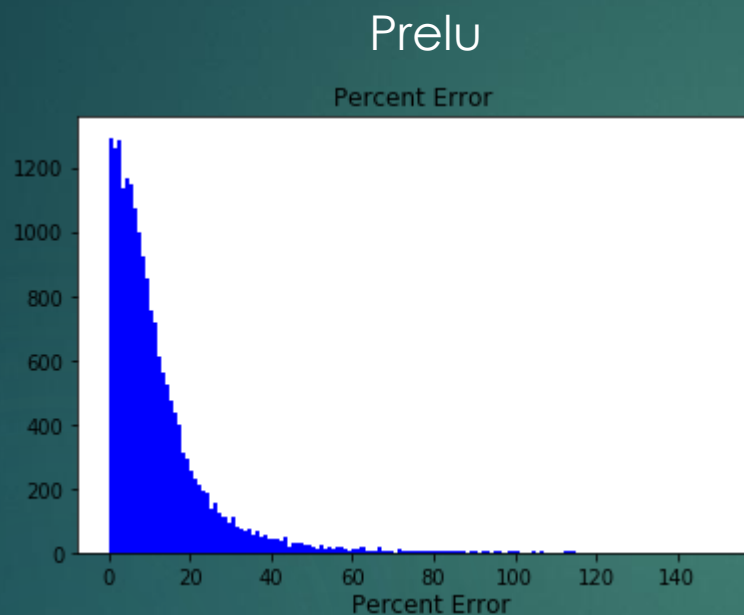


Local Reparameterization

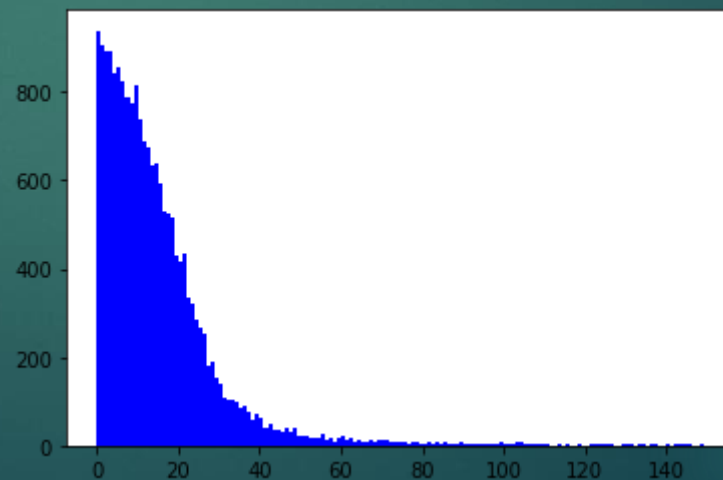
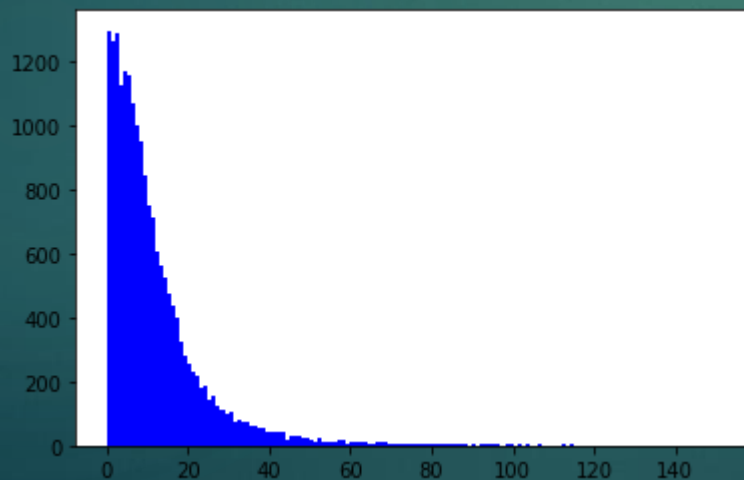
	Inside 1 SD	Inside 2 SDs	Inside 3 SD3	Outside of 3 SDs	Below min	Above max	Percent Error
Local Reparameterization Batched PRELU	12.05	23.79	34.79	65.22	41.23	20.30	12.24
Local Reparameterization Not Batched PRELU	11.96	23.86	34.90	65.10	42.05	20.27	12.24
Local Reparameterization Batched RELU	10.49	20.39	29.93	70.07	48.53	19.15	16.06
Local Reparameterization Not Batched RELU	10.44	20.37	29.95	70.05	48.43	19.03	16.05

Local Reparameterization % Error

Batched



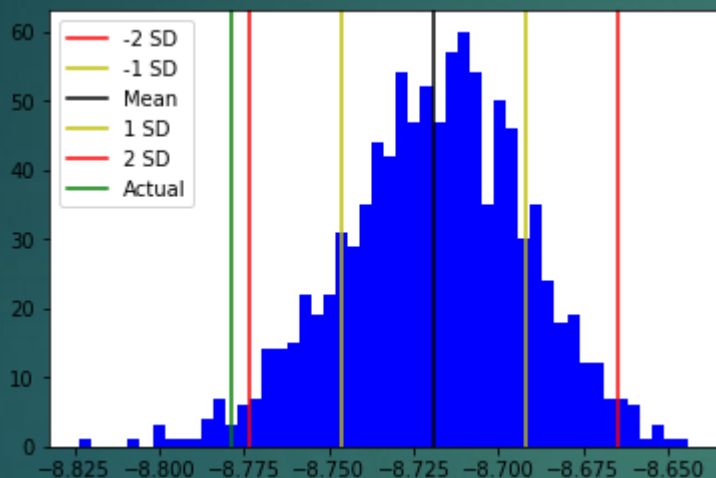
Not Batched



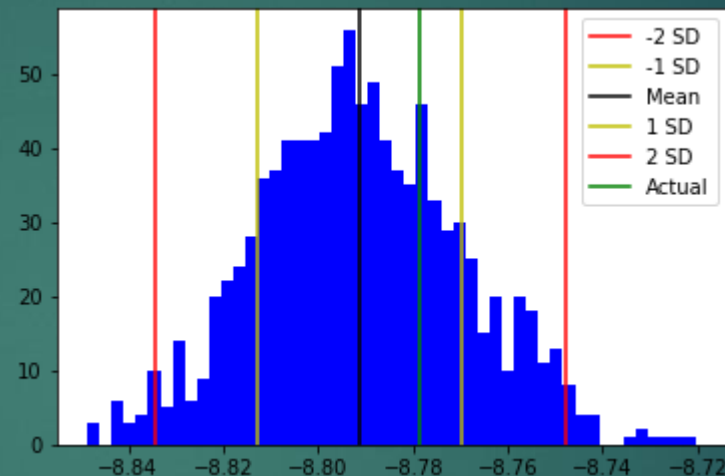
Local Reparameterization Output

Batched

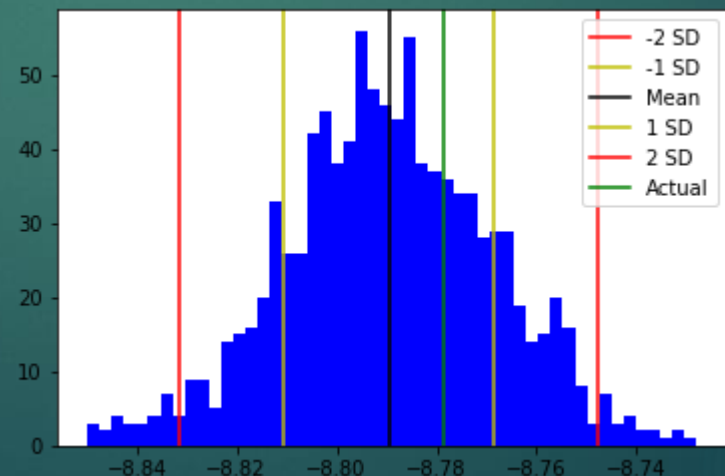
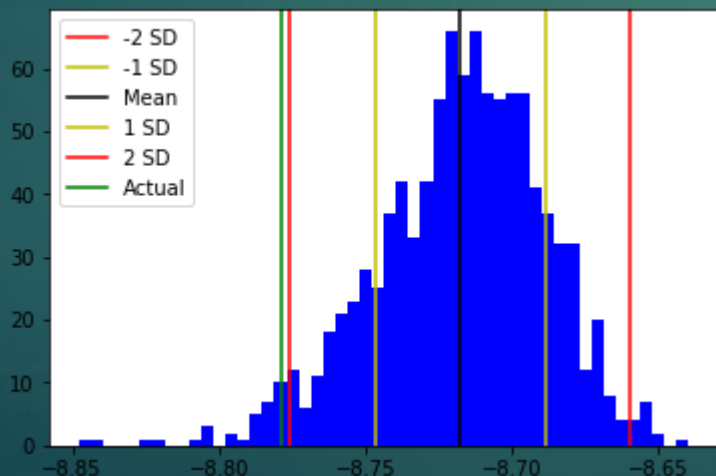
Prelu



Relu



Not Batched



Flipout

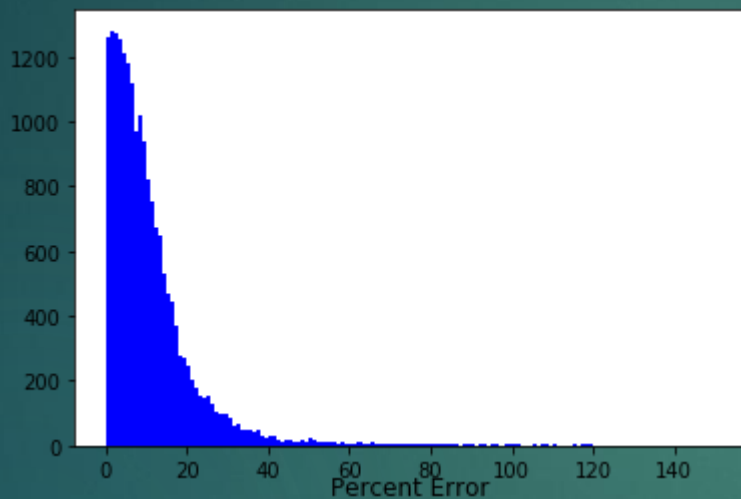
	Inside 1 SD	Inside 2 SDs	Inside 3 SD3	Outside of 3 SDs	Below min	Above max	Percent Error
Flipout Batched PRELU	25.59	48.12	65.86	34.17	9.01	22.04	11.40
Flipout Not Batched PRELU	25.41	48.07	65.65	34.35	8.99	22.08	11.40
Flipout Batched RELU	25.25	47.86	66.46	33.54	23.81	6.03	13.13
Flipout Not Batched RELU	25.22	47.98	66.61	33.39	23.77	6.17	13.11

Flipout % Error

Batched

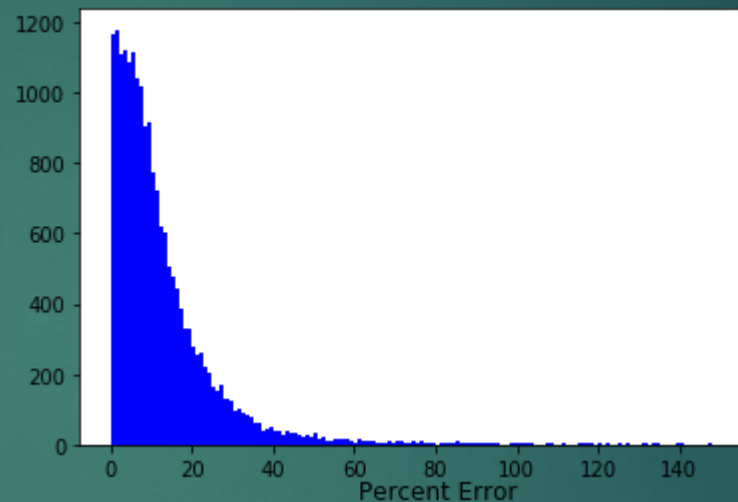
Prelu

Percent Error

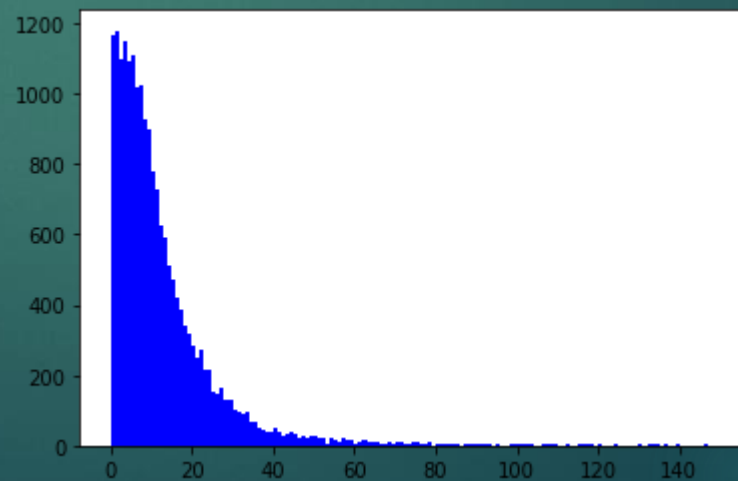
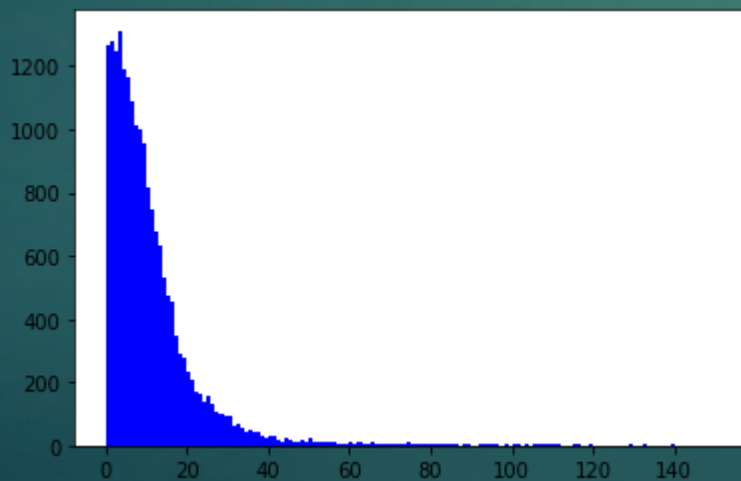


Relu

Percent Error



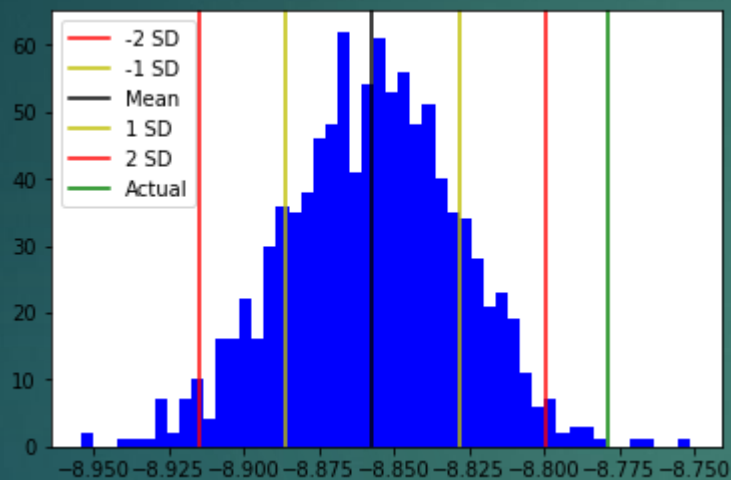
Not Batched



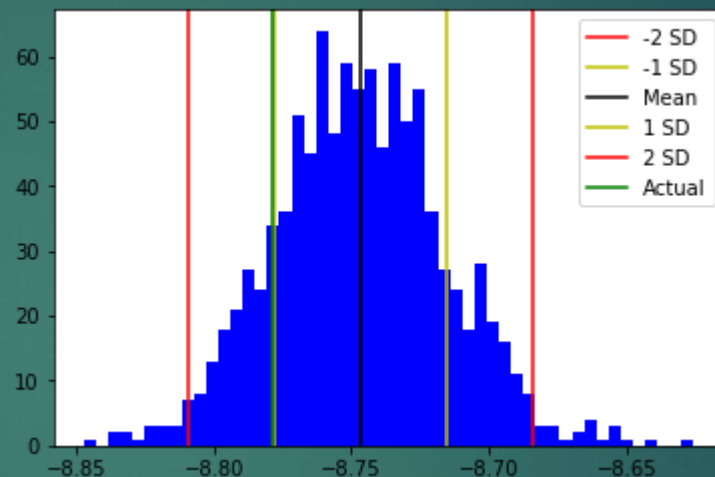
Flipout Example Output

Batched

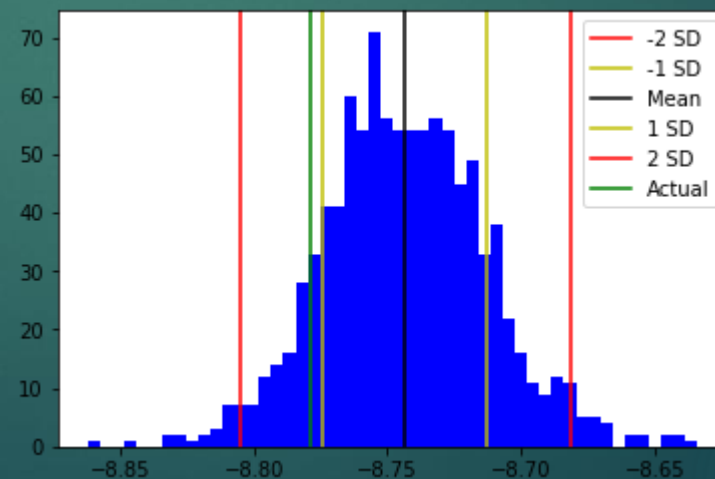
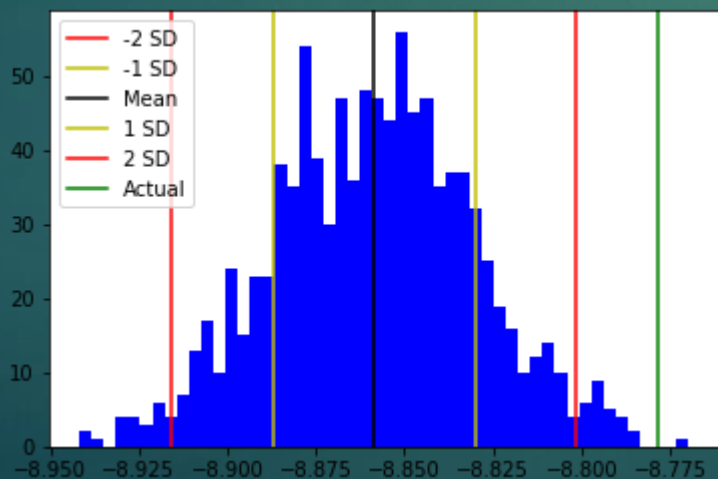
Prelu



Relu



Not Batched

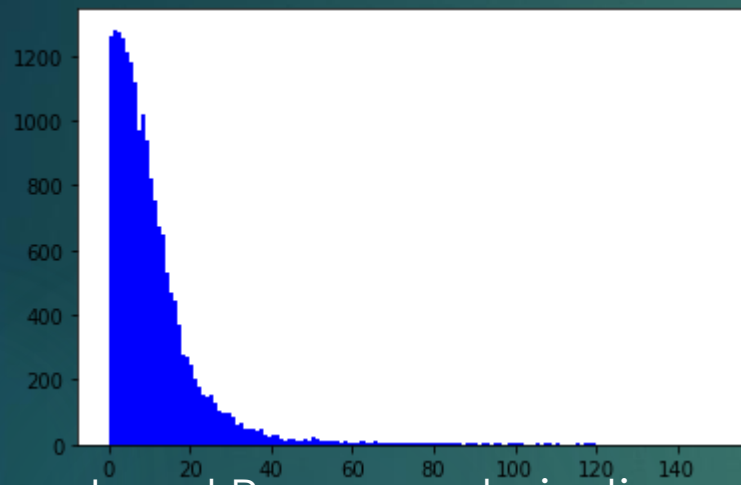


Summary

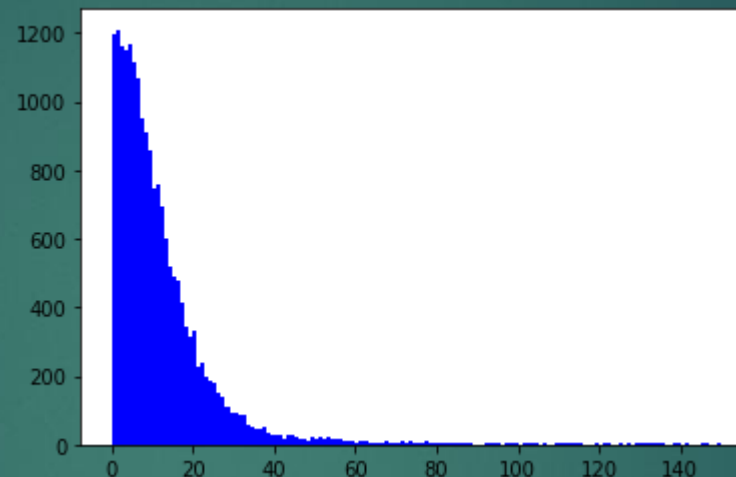
	Inside 1 SD	Inside 2 SDs	Inside 3 SD3	Outside of 3 SDs	Below min	Above max	Percent Error
Flipout Batched PRELU	25.59	48.12	65.86	34.17	9.01	22.04	11.40
Local Reparameterization Batched PRELU	11.96	23.86	34.90	65.10	42.05	20.27	12.24
Reparameterization Batched PRELU	39.31	67.16	83.00	17.00	5.02	9.65	13.21
Normal Dense PRELU	N/A	N/A	N/A	N/A	N/A	N/A	18.35

General % Error

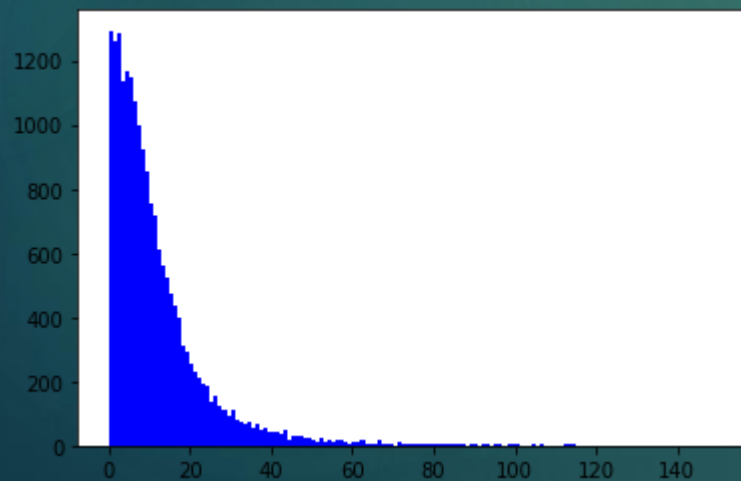
Flipout
Percent Error



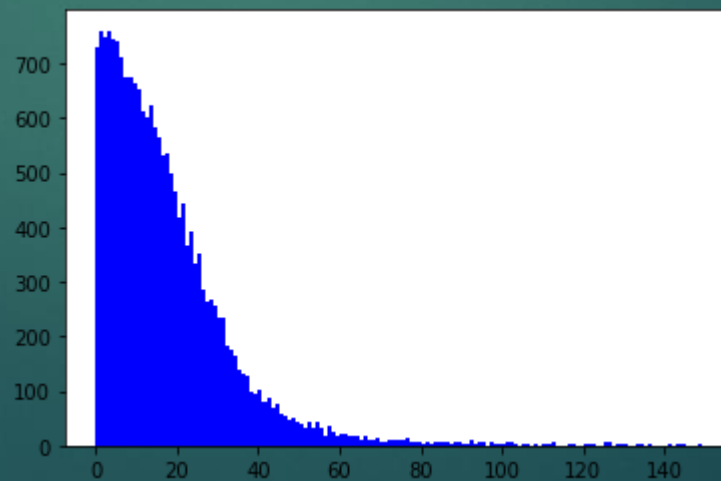
Reparameterization
Percent Error



Local Reparameterization
Percent Error



Normal
Percent Error



Goals for next week

- ▶ Investigate impact of using less training data
- ▶ Start construction of true Bayesian layers
 - ▶ The tfp layers fit the distributions for the weights and biases like they are normal parameters in a neural network, not in a Bayesian fashion