Week 7 Presentation

PHY 496

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MARCH 1, 2019

Summary

- Analyzed the impact of different numbers of iterations for prediction distributions
- Determined how the prediction quality changes when using less training data
- Measured how the prediction distributions change during the training process
- Started experimenting with the Hamiltonian Monte Carlo algorithm

Variable Iterations

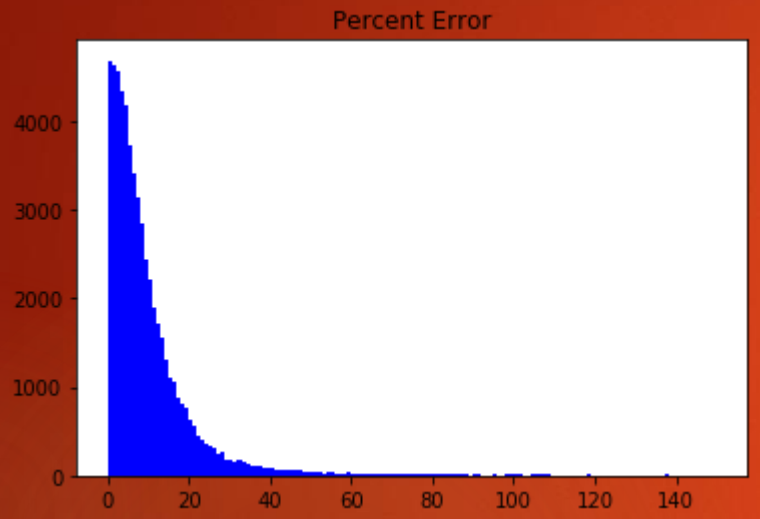
	Inside 1 SD	Inside 2 SDs	Inside 3 SD3	Outside of 3 SDs	Below min	Above max	Percent Error
100 Iterations	25.17	47.43	65.23	34.77	12.41	30.67	11.43
1000 Iterations	25.41	48.07	65.65	34.35	8.99	22.08	11.40
10,000 Iterations	25.48	48.08	65.86	34.14	7.04	16.75	11.40

Variable Training Data

Training Percent	Inside 1 SD	Inside 2 SDs	Inside 3 SD3	Outside of 3 SDs	Below min	Above max	Percent Error
40	14.13	27.94	40.67	59.33	19.57	36.97	10.88
50	11.38	22.51	33.19	66.81	33.88	30.41	10.3
60	9.29	18.67	27.81	72.19	37.30	32.69	10.9
70	7.66	15.24	22.53	77.47	42.80	32.88	10.56
80	7.02	13.70	20.63	79.37	26.30	51.56	10.56
90	5.92	11.57	17.49	82.51	48.77	32.38	10.55

Variable Training Data % Error

40%



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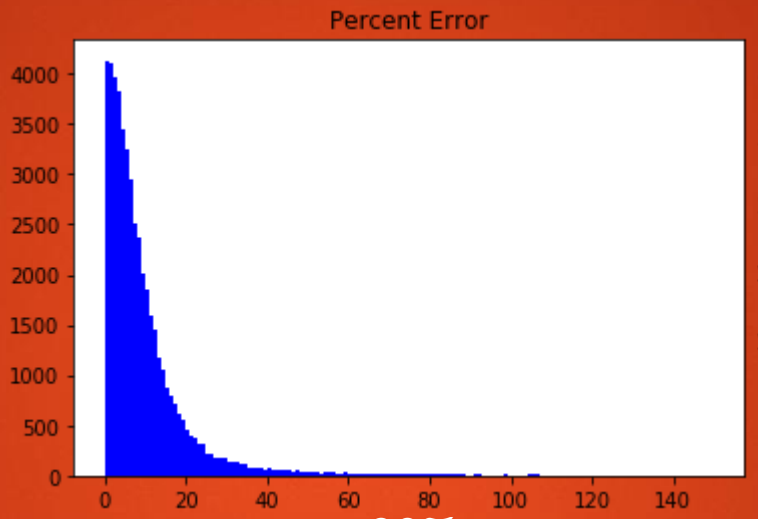

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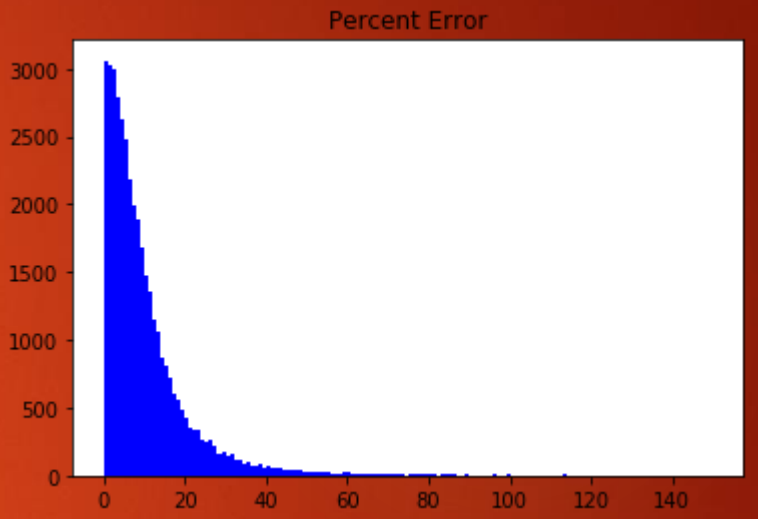

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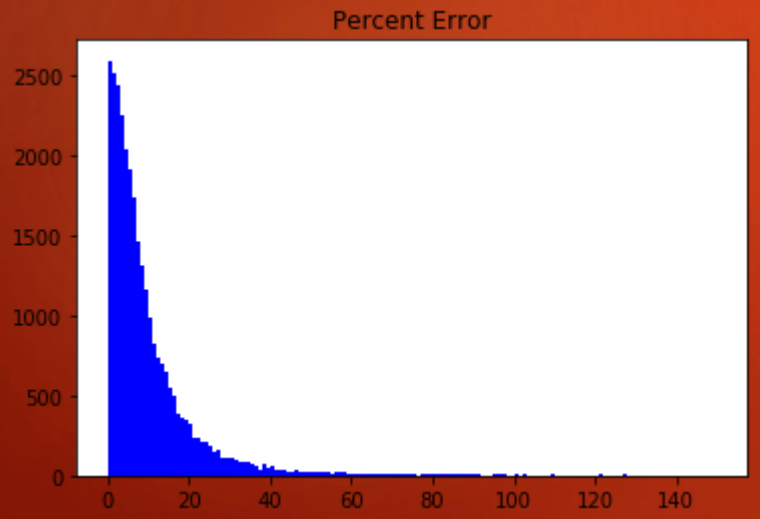

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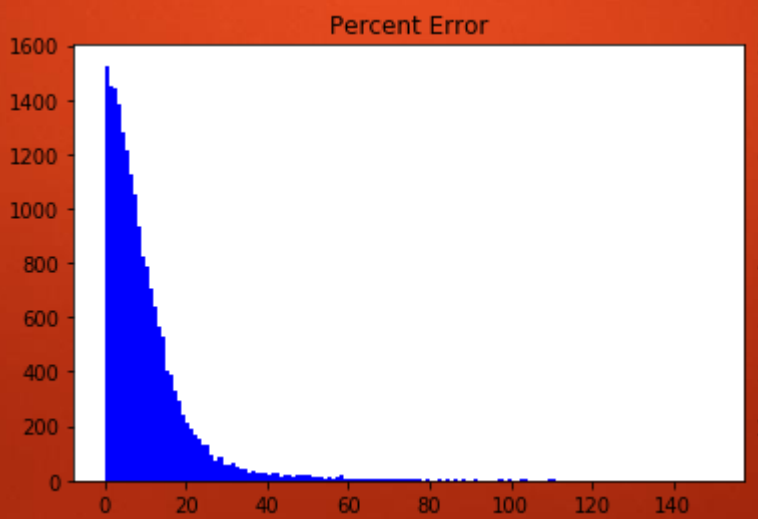

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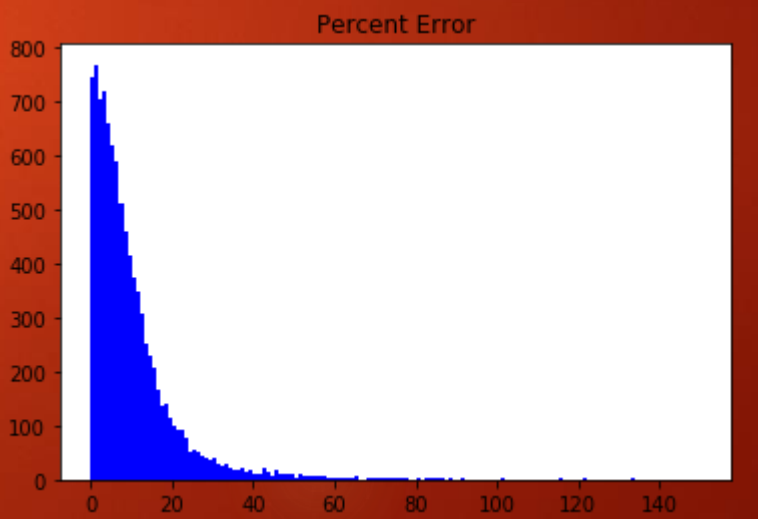

Variable Epochs

Epoch	Inside 1 SD	Inside 2 SDs	Inside 3 SD3	Outside of 3 SDs	Below min	Above max	Percent Error
20	81.19	96.11	98.75	1.25	0.45	0.70	29.97
40	56.44	84.14	93.70	6.30	2.68	2.80	20.35
60	41.10	70.03	86.02	13.98	4.72	7.40	16.21
80	30.10	55.11	73.32	26.68	7.95	15.74	14.71
100	24.07	45.18	61.63	38.37	11.90	23.34	14.22
200	11.46	23.00	3362	66.38	43.26	20.73	12.94

Variable Epochs % Error

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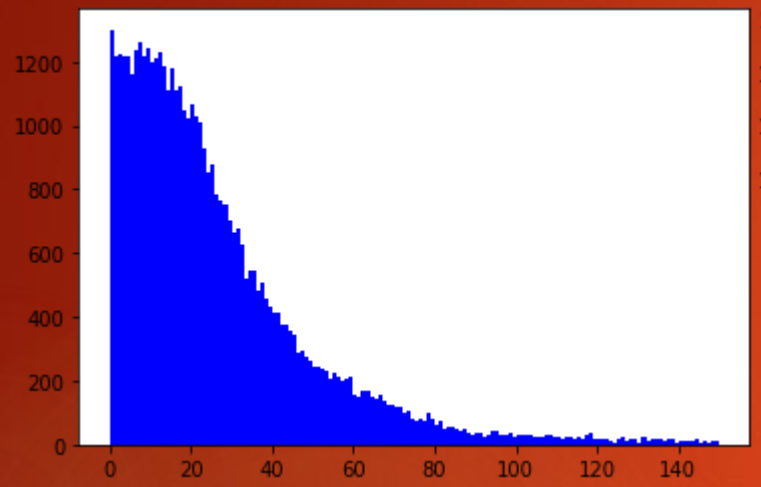

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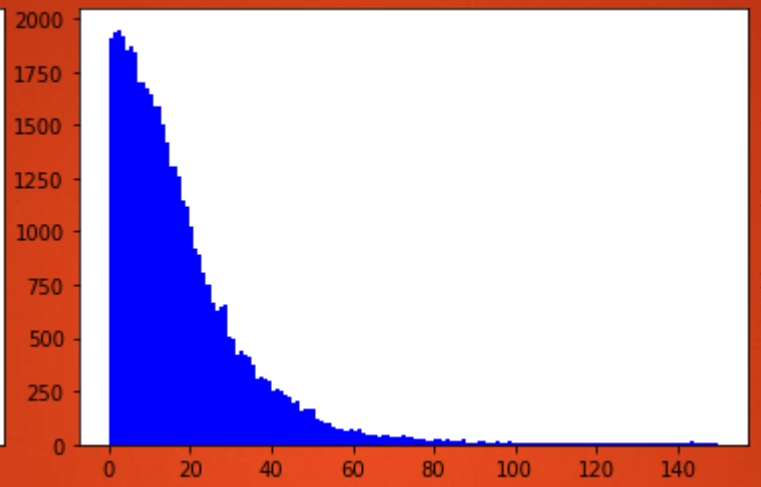

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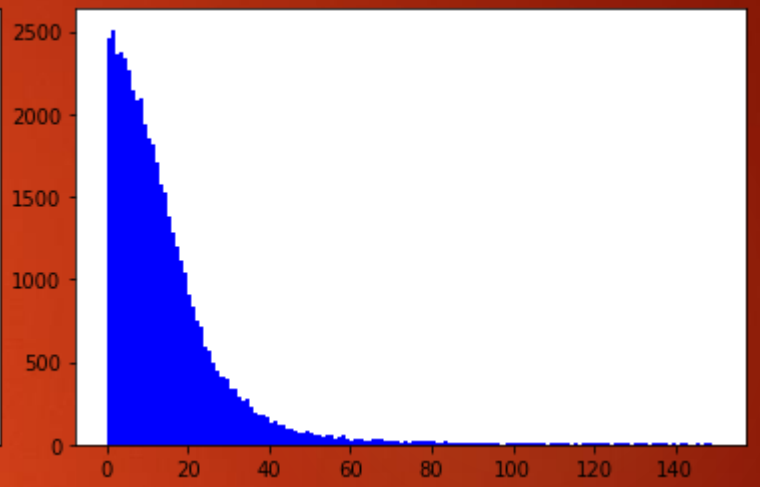

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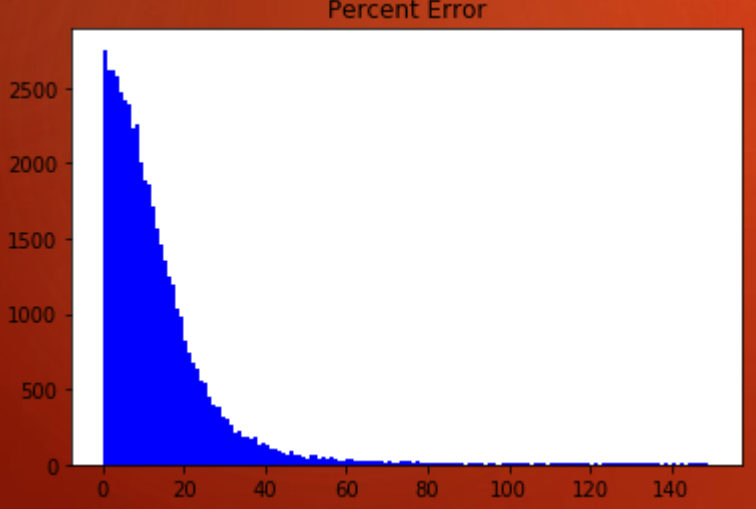

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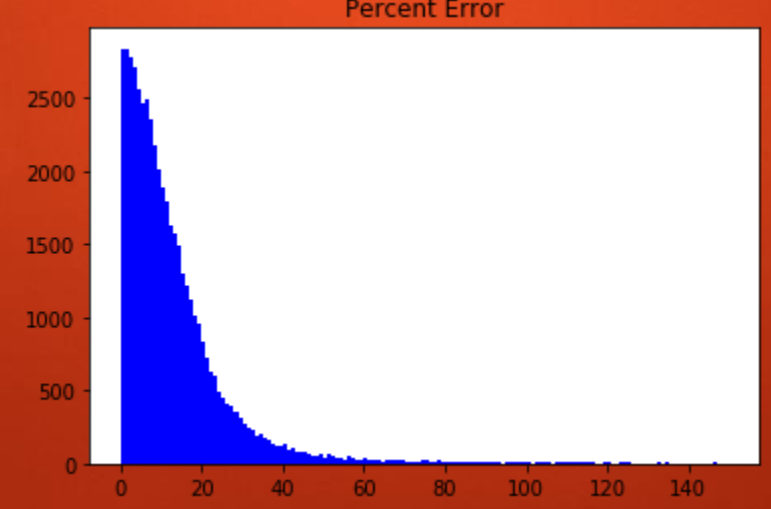

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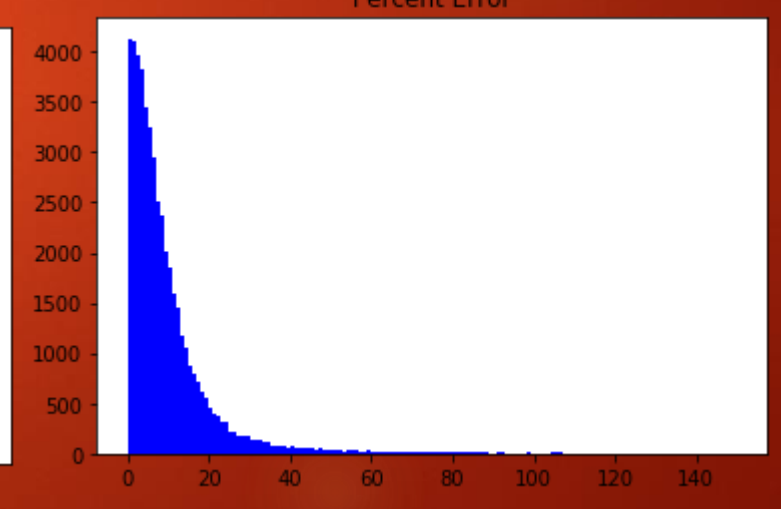

Variable Epochs Sample Output

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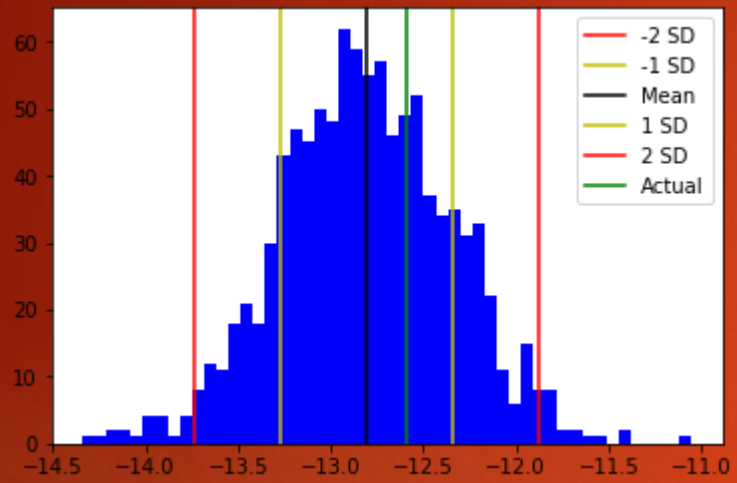

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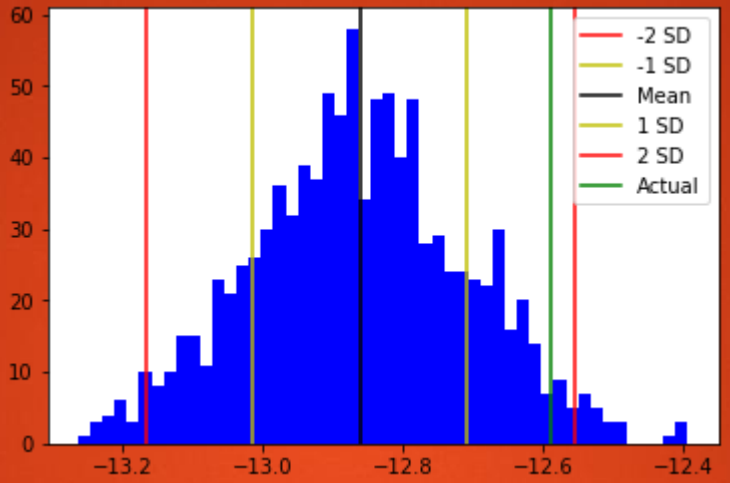

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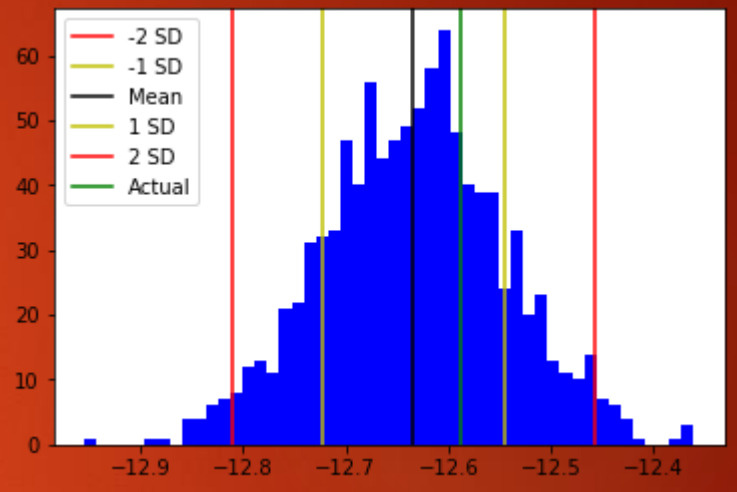

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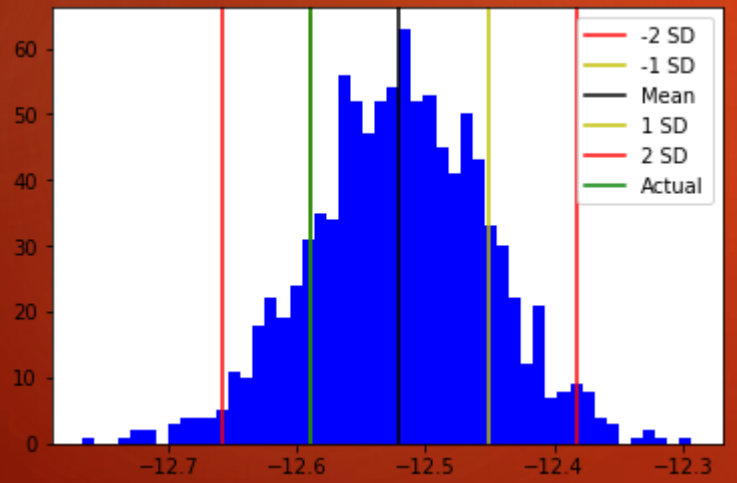

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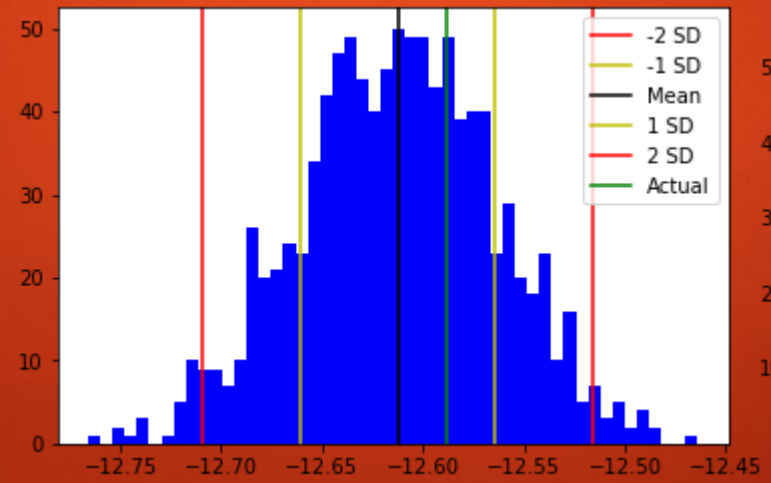

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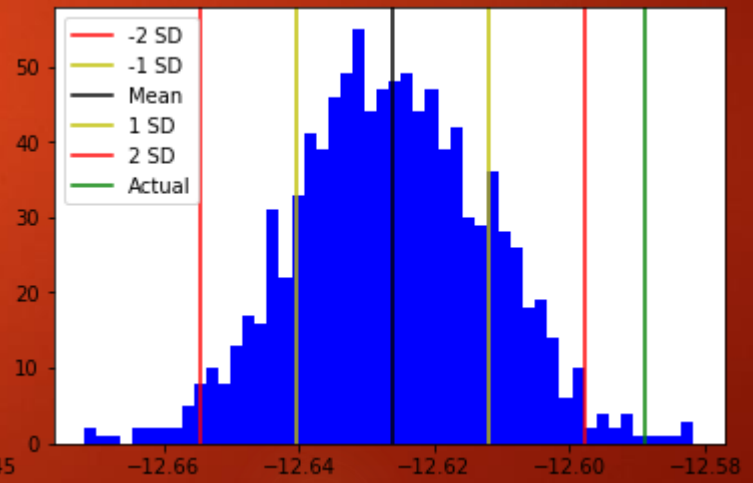

Goals for next week

- Read all of Radford Neal's thesis on Bayesian Neural Networks
- Construct a basic network from Hamiltonian Monte Carlo
  - Possibly compare predictions made from this network with the other networks that have been made