Recurrent Neural Networks

Advanced Machine Learning

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In this exercise you are asked to generate an Auto Regressive model and then create an RNN that predicts it. Generate samples of an Auto Regressive model of the following form:

$$X_t = a_1 X_{t-1} + a_2 X_{t-2} + a_3 X_{t-3} + U_t$$

where a_1 = 0.6, a_2 = -0.5, a_3 = -0.2 and U_t is i.i.d from `Uniform(0, 0.1)`. Now train an RNN that predicts the next value of the sequence. Apply the training algorithm on new samples and calculate the averaged cost square error cost function.

- Generate samples of length 10
- Initial values for each sample should be i.i.d from `Uniform(0,1)`
- `tf.contrib.rnn.BasicRNNCell` should suffice for this task
- For every epoch print the cost you are getting and error rate calculated as a percentage of incorrect predictions, where incorrect prediction means that the absolute value of the difference between prediction and target is greater than 0.001. Both cost and error rate should be calculated on a test set.
- Initially you can set bigger difference and then as your model improves decrease it.