Perceptron

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Do the Data Appear to be Linearly Separable?

Yes, they appear separable. (See Data.png)

How many updates to a are required for various a?

My algorithm chooses random floats between 0 and 1 for its starting weights. I set the learning rate to .1 and it usually gets to 0 error between 7 and 11 training iterations on the data.

Lines over Training Iterations

See lines_over_time.png to see the separating lines my algorithm draws at every iteration. The red line is the final iterations and the yellow lines are incremental iterations.

Non-Linearly Separable Data

I moved 5 of the upper right points to the lower-left section, making the data non-linearly separable. (See nonseparabledata.png)

How does your linear classifier work now?

It works fairly well, drawing almost the same separation line as before. The 5 points are misclassified, but overall the error is still low. (See nonseparabledata.png)

What would be a good termination criterion for your algorithm?

I have 2 independent conditions for the end of training: Either the error must be below a certain threshold, or the maximum training iterations must be passed. I think these are good conditions because it sets a maximum training iteration count while not hitting that if not necessary. If you think it needs more training time, you can simply bump up the maximum iterations.