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Homework 3

I built upon part three of the second homework to implement error correction. I implemented this error checking via while loop. Until the error gets reduced to be within a threshold specified by the errorThreshold variable, the loop continues to iterate. I built an empty vector to keep track of which pairs have been corrected, and then then determined the error vector, the error scalar, and g' for the current iteration. I then checked to see if the error is within the error threshold, and if not, I built a new A matrix by adding the error into the current A matrix.

```
>> hw4

Number of pairs: 20
Error: 0.000000
Error threshold: 0.000100
Number of trials: 432

Number of pairs: 40
Error: 0.000052
Error threshold: 0.000100
Number of trials: 996

Number of pairs: 60
Error: 0.000077
Error threshold: 0.000100
Number of trials: 3655

Number of pairs: 80
Error: 0.000079
Error threshold: 0.000100
Number of trials: 5424
```

b) As threshold decreases, it takes longer and longer to converge. However, there appears to be a fair amount of variance between trials due to the randomness present. Pair being close to each other when randomly generated helps reduce the number of iterations before convergence.

c) As dimensionality increases, the likelihood of matrix orthogonality decreases. Hence, there will reach a high enough dimension at which the network will perform no better than chance.

d) I tried replacing the random associations in the error correction algorithm with sequential associations. It looks like this sequential association doesn't converge in any reasonable (< 1 minute) amount of time.