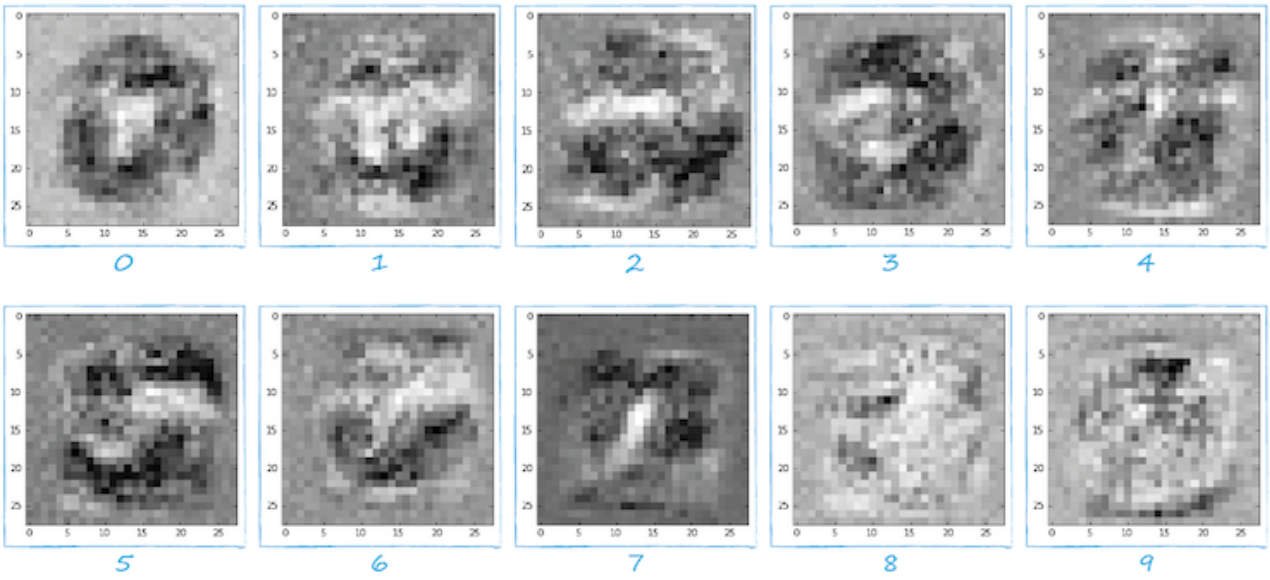
More Brain Scans

Some more results of back querying of the rest of digits.

The following shows the results of back querying the rest of the digits.



Wow! Again some really interesting images. They're like ultrasound scans into the brain of the neural network.

Some notes about these images:

- The 7 is really clear. You can see the dark bits which, if marked in the query image, strongly suggest a label 7. You can also see the additional "white" area which must be clear of any marking. Together these two characteristics indicate a 7.
- The same applies to the 3 — there are dark areas which, if marked, indicate a 3, and there are white areas which must be clear.
- The 2 and 5 are similarly clear too.
- The 4 is interesting in that there is a shape which appears to have 4 quadrants and excluded areas too.

- The 8 is largely made up of a “snowman” shaped white areas suggesting that an eight is characterized by markings kept out of these *head* and *body* regions.
- The 1 is rather puzzling. It seems to focus more on areas which much be kept clear than on areas which must be marked. That’s ok. It’s what the network happens to have learned from the examples.
- The 9 is not very clear at all. It does have a definite dark area and some finer shapes for the white areas. This is what the network has learned, and overall, when combined with what it has learned for the rest of the digits, allows the network to perform really well with 97.5% accuracy. We might look at this image and conclude that more training examples might help the network learn a clearer template for 9.

So there you have it — a rare insight into the workings of the mind of a neural network.