

Barrel Columns

How many neurons in a barrel column?

- 2550 neurons were measured, located in the C2 barrel column
- mouse C2 barrel column is ~300 micro meters in diameter
- the number of neurons per barrel column varies substantially, even within individual animals

Excitatory vs Inhibitory neurons

- depending on the layer of the C2 barrel column, anywhere between 500 and 1500 cells were found to be excitatory

Excitatory vs Inhibitory synaptic connectivity

- 254 excitatory synaptic connections were found among 1046 tested connections -> 24.3%

Sources

- The Excitatory Neuronal Network of the C2 Barrel Column in Mouse Primary Somatosensory Cortex (<https://www.sciencedirect.com/science/article/pii/S0896627308010921>)
- Microcolumns in the cerebral cortex (<https://www.pnas.org/content/97/10/5019>)
- Functionally Independent Columns of Rat Somatosensory Barrel Cortex Revealed with Voltage-Sensitive Dye Imaging (<http://www.jneurosci.org/content/21/21/8435>)

Hypercolumns

Neurons

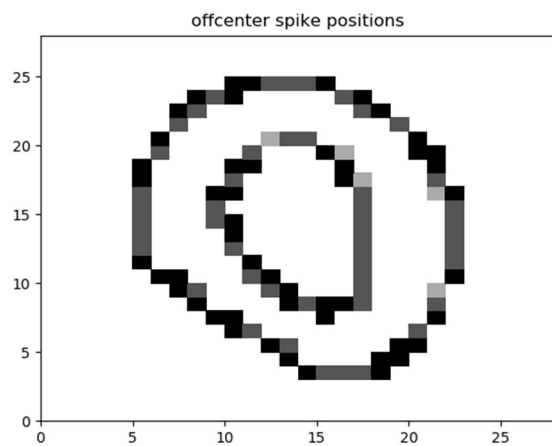
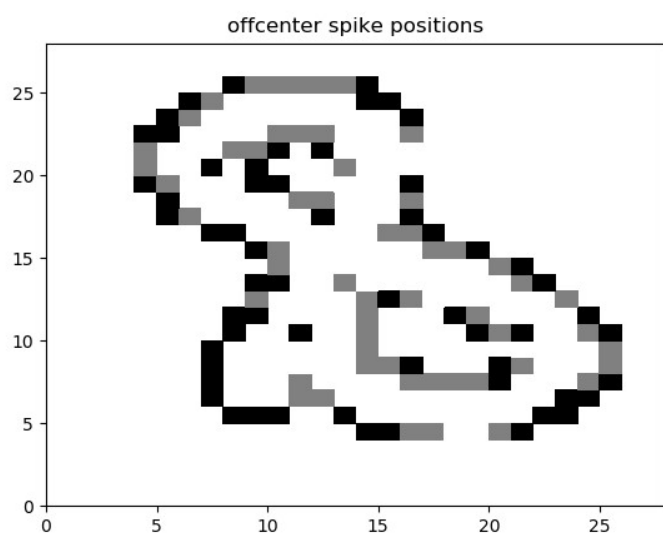
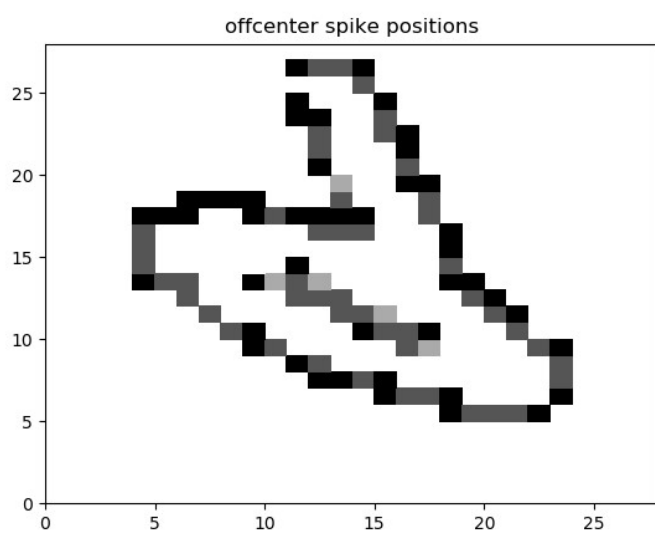
- hypercolumns consist of two populations of neurons
- one inhibitory and one excitatory
- hypercolumns are ~1mm in width

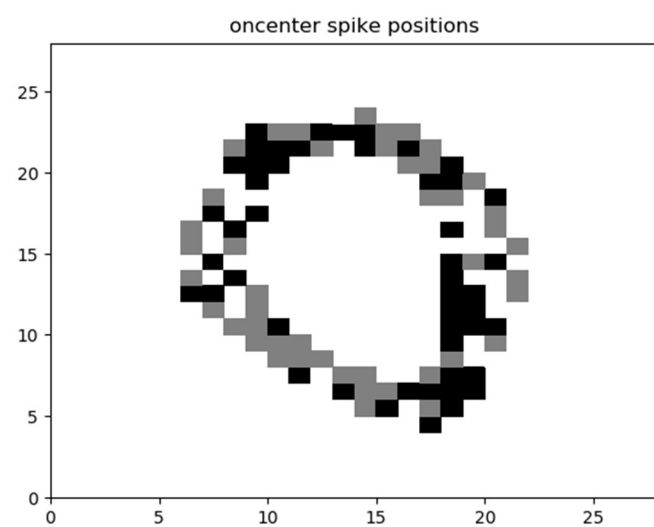
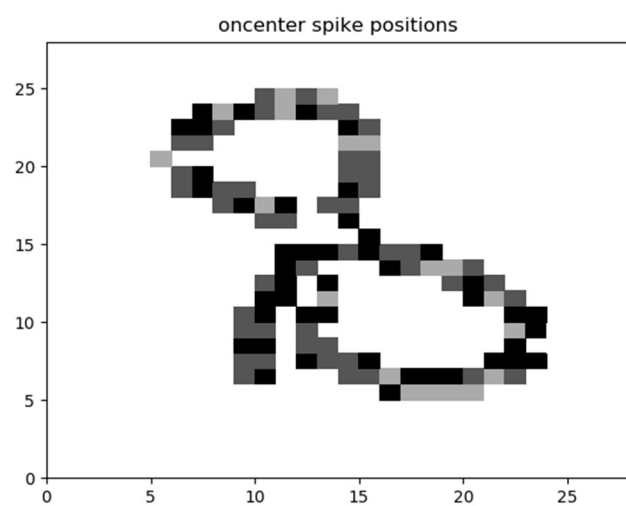
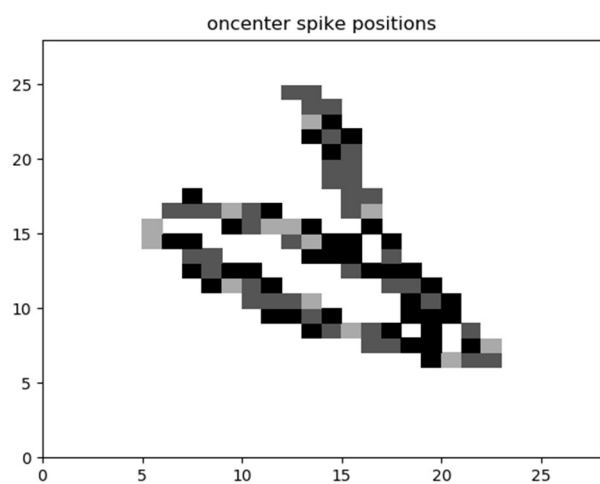
Microcolumns

- ~100 microcolumns are estimated to be in a hypercolumn

Sources

- Chaos and synchrony in a model of a hypercolumn in visual cortex (<https://link.springer.com/article/10.1007/BF00158335>)
- The functional geometry of local and horizontal connections in a model of V1 (<http://www.math.utah.edu/~bressloff/publications/03-3.pdf>)





For my third filter, I decided to implement a sobel-like algorithm. I thought it would be interesting because it is essentially a combination between the on and off filters.

