Neuron Specificity

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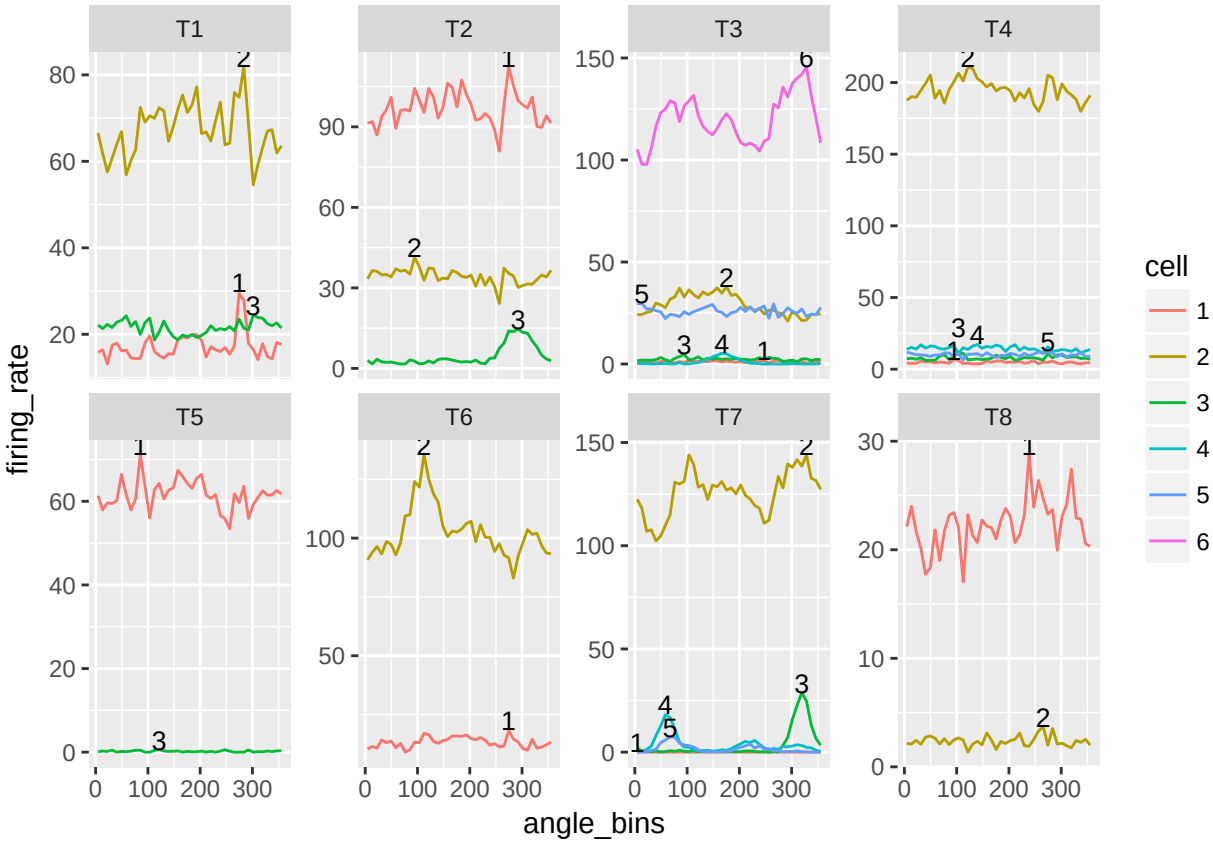
Project 1

The goal of this project was to look for a relation between neuron firing and the head angle of a mouse. The dataset consists of finished data from tetrodes in a mouse brain and has been preprocessed to extract the activations of individual neurons. To constrain the data amount the following subset of data was used:

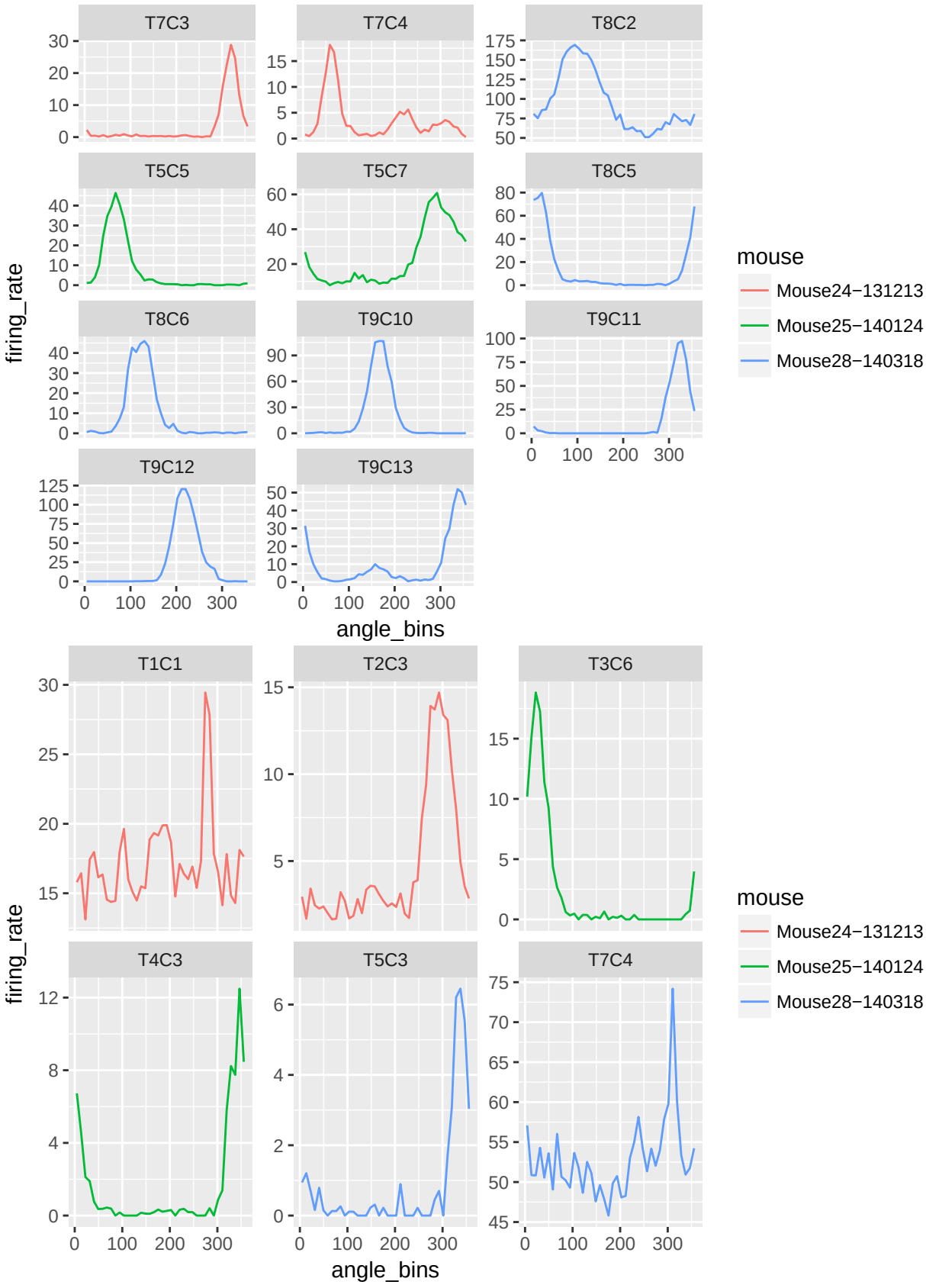
- Session 131213 on mouse 24
- Session 140124 on mouse 25
- Session 140318 on mouse 38

The mouse head angle was binned into 40 bins giving bins of length 9. To find neurons with a relation the binned angle was plotted against the corresponding average firing rate. Then, manually, any neurons that seemed to have a bump in activity that clearly stood out among the firing activity noise was noted. An example of the plots used to find these follows.

Visualising cells



The following cells were found to have distinct peaks.

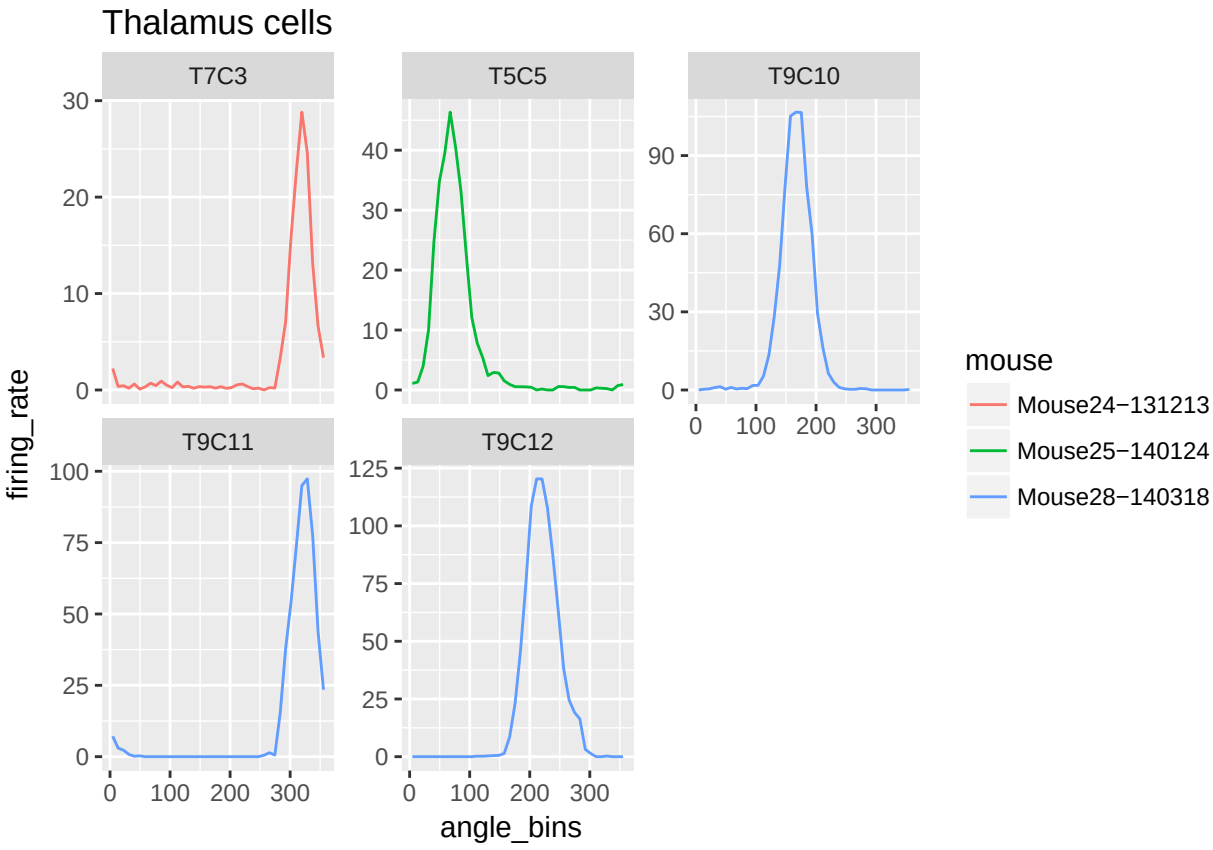


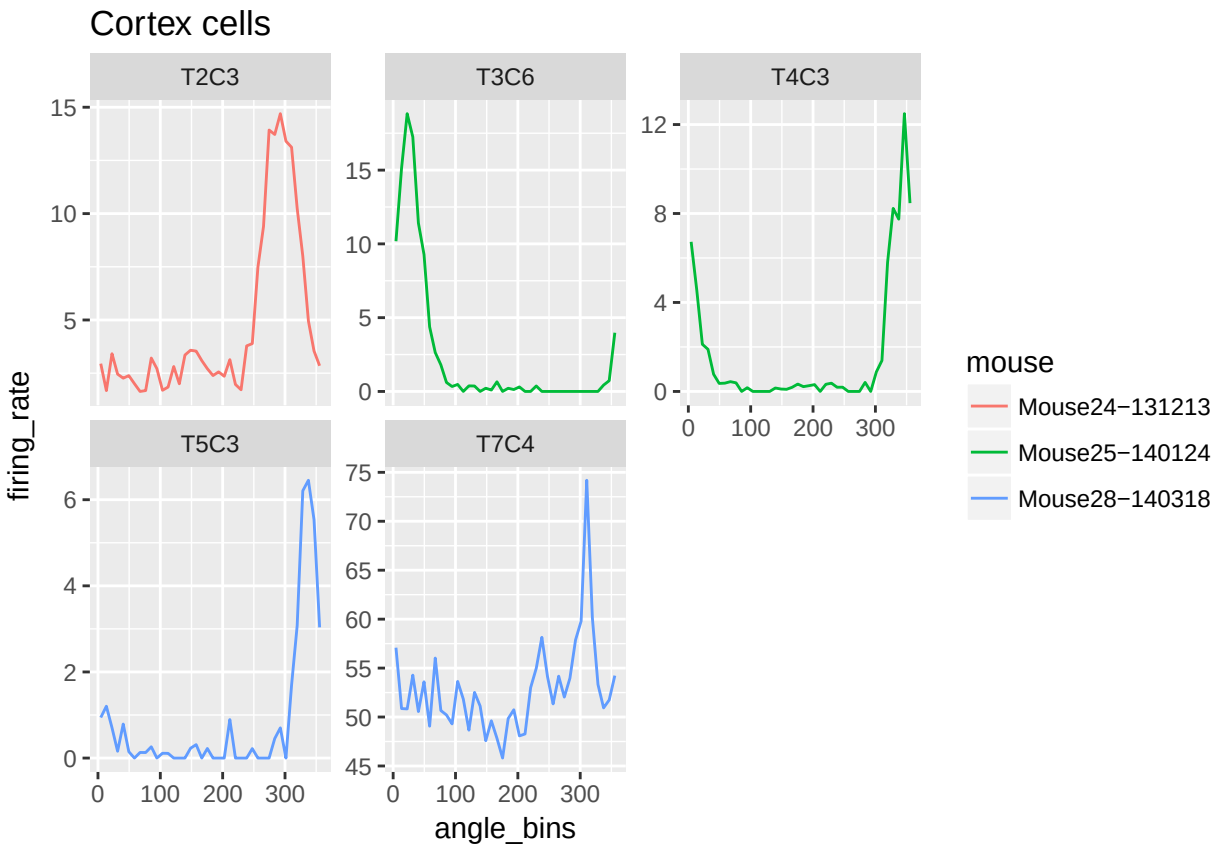
In the thalamus there were relatively many neurons with distinct peaks. This is to be expected as the

thalamus is an area known to have head direction cells and head direction cells are known to have distinct peaks. The subiculum is also supposed to have head direction cells but in general these had more background noise and sharper peaks.

%% Page 290 in the book

For use in further projects the total number of neurons had to be restricted to 10 neurons. The following neurons were chosen from the thalamus and cortex respectively.




Cortex cells
T2C3
T3C6
T4C3
T5C3
T7C4
firing_rate
angle_bins
mouse
Mouse24−131213
Mouse25−140124
Mouse28−140318