First decoding of a rat locations from hippocampal spiking activity

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1 Behavior

A rat was run in the three-arm mazed depicted in Figure 1.

2 Neural recordings

We used recordings from 104 hippocampal units of rat. Data provided by Dr. Denovellis. Figure 2 marks with dots positions were spikes ocurred.

3 Results

We used the decoding algorithm by (Denovellis et al., 2021)[1] on sorted spikes.

This algorithm first estimates the place fields of the neurons (Figure 3) and then use them to decode subject positions from spiking neural activity (Figure 4).

References

Denovellis, E. L., Gillespie, A. K., Coulter, M. E., Sosa, M., Chung, J. E., Eden, U. T., and Frank, L. M. (2021). Hippocampal replay of experience at real-world speeds. *Elife*, 10:e64505.

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[1] `https://github.com/Eden-Kramer-Lab/replay_trajectory_classification`

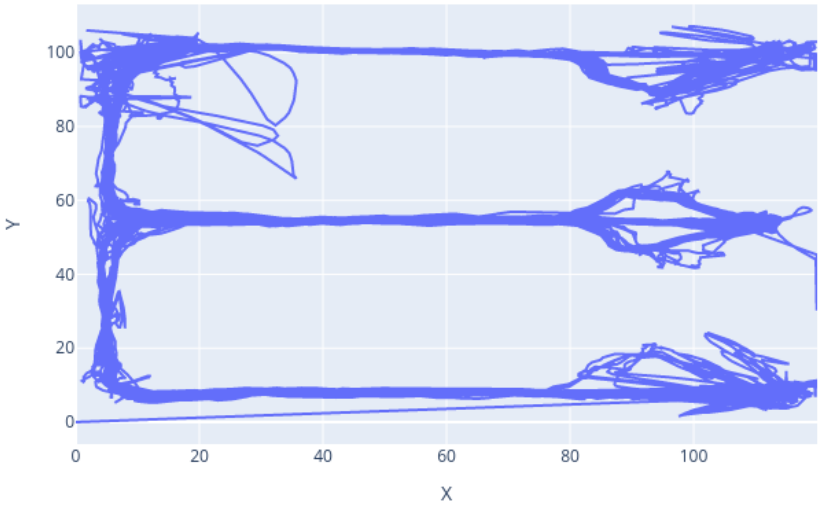

Figure 1: Positions occupied by the subject rat. Click on the figure to access its interactive version.

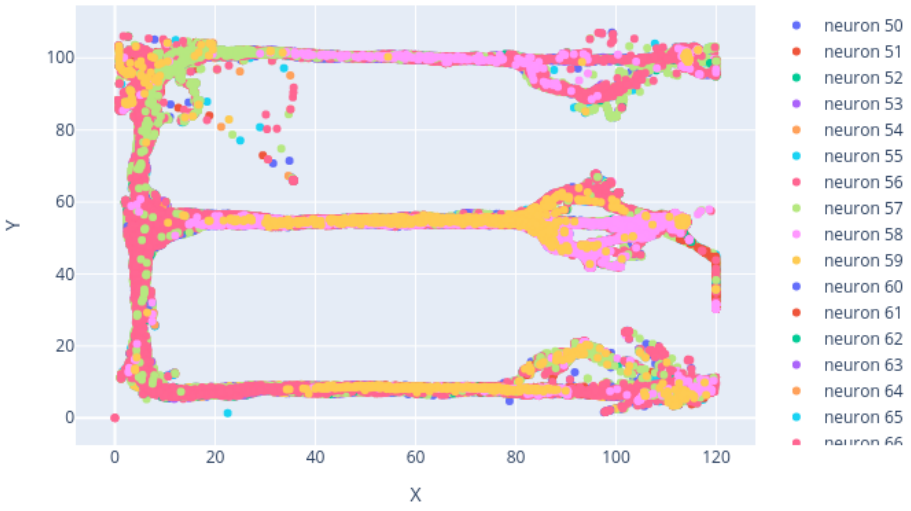

Figure 2: Spikes fired by 104 neurons. A colored dot indicates the position at which the colored-matched neuron fired a spike. Click on the figure to access its interactive version.

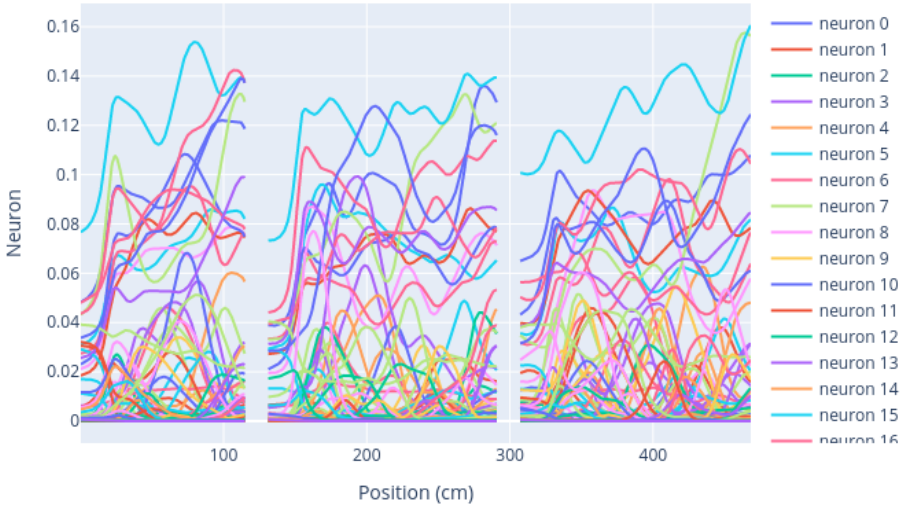

Figure 3: Place fields in linearized positions from 104 hippocampal neurons of the subject rat. Click on the figure to access its interactive version.

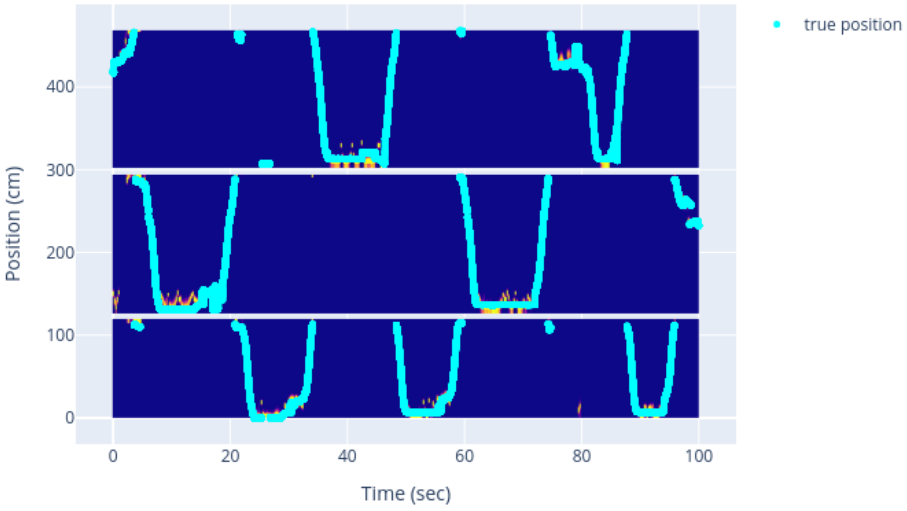

Figure 4: Decodings. Red-yellow traces indicate time and linearized positions bins with larger probability. The cyan curve shows the subject positons. Click on the figure to access its interactive version.