TORIC NEURAL IDEALS AND STIMULUS SPACE VISUALIZATION

ELIZABETH GROSS

ABSTRACT. A neural code $\mathcal{C}$ is a collection of binary vectors of a given length n that record the co-firing patterns of a set of neurons. Our focus is on neural codes arising from place cells, neurons that respond to geographic stimulus. In this setting, the stimulus space can be visualized as subset of $\mathbb{R}^2$ covered by a collection $\mathcal{U}$ of convex sets such that the arrangement $\mathcal{U}$ forms an Euler diagram for $\mathcal{C}$. There are some methods to determine whether such a convex realization $\mathcal{U}$ exists; however, these methods do not describe how to draw a realization. In this talk, we will look at the problem of algorithmically drawing Euler diagrams for neural codes using toric ideals. In particular, we will show how these objects are related to the theory of piercings in information visualization. This is joint work with Nida Kazi Obatake and Nora Youngs.