Learning to navigate turbulent environments

Thermal soaring and olfactory searches are two natural instances of navigation in the presence of complex orientation cues. Both problems are deeply rooted into physics and biology, with the prowess realized by birds and insects constituting a challenge for artificially intelligent robotic systems built for technological applications. I will first introduce the natural phenomenology, then review the physics that controls the complexity of the orientation cues, and finally show how machine learning methods are brought to bear on effective navigation strategies. Results are applied to robotics, and provide insight into the decision processes and the sensorimotor cues utilized by birds or insects.