Image Processing in Brains and Machines | SP Arun

Introduction

We recognize objects easily, but this is in fact a very challenging problem. Even the best computers do not match human performance today on the simplest of tasks, such as the distorted letters we see on websites. Object recognition is not easy for the brain either: a series of cortical areas, taking up ~40% of the brain, is dedicated to vision. But we know very little about the code in which the brain represents objects for perception, and about how the brain transforms what we see into what we perceive. How do we crack the code for objects? What are its features and what are its rules?

Approach

To investigate these questions, we perform three types of experiments: (1) In experiments using humans, we recruit participants to perform behavioral tasks such as visual search and explore the neural correlates using brain imaging or perturbation studies; (2) In experiments using monkeys, we record from single neurons in brain regions involved in processing visual information while monkeys perform complex cognitive tasks; (3) In experiments using computer vision, we compare state-of-the-art computer vision algorithms with biological vision to understand their flaws and improve their performance.

Typically, PhD students who join our lab are asked to identify a question they are curious about, identify experimental techniques to answer the question, and design many experiments to investigate the topic thoroughly. *Students from biology and engineering backgrounds have been extremely successful in this research. The only qualification required is curiosity and interest in the topic!*

For more information, visit the Vision Lab IISc at
https://sites.google.com/site/visionlabiisc/