3D Shape characterization using superquadrics

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Abstract: Geometric shapes are commonly used to simplify the shape of real or perceived objects. Among others, we can find a body of literature for fitting spheres, squares, cylinders or ellipsoids. There exists a simple equation can be adapted to many of these shapes, the superquadric. In this talk we will describe how assign geometric models to objects using superquadrics and some other superfigures. Superquadrics are a generalization of quadrics that can take a variety of shapes. Extensions to superquartics and skewed or deformed superquadrics allow creating different shape primitives at a low computational cost. This formulation has been used in robotics for grasping and obstacle avoidance, among other applications.

The seminar will cover the mathematical definition of the superobjects, the basic methods for sampling and geometry fitting, and their differential geometry. This knowledge will be applied to model objects by fitting one or several primitives to computer vision data, in order to define grasping strategies.