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Dissertation Proposal Title: Model-based active object recognition
using foveal vision
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Dissertation Proposal Abstract:

Model-based Active Object Recognition Using Foveal Vision
Summary

We proposed a prototype design of a model-based active object
recognition system using foveal vision sensor. The motivation of the
design tends to integrate the advantages of both the active object
recognition and the foveal vision sensor. The active object recognition
provides a framework for collecting information from different
selective views which moves the burden of recognition slightly away
form the process of interpreting a single view image to the processes
of integrating information from multiple views and of planning the
next-look action, while the foveal sensor provides a compromise among
high resolution where needed, a wider field of view, and smaller output
image size with respect to the space-invariant sensor.

To eventually develop a fully functional active object recognition
prototype system using the foveal vision sensor, a three-step strategy
is applied. The system is first tested in a 2-D environment where
instances of 2-D model objects from a database employing multi-
resolution feature sets need to be identified. Then the system will be
extended to the 3-D environment. A set of 3-D volumetric primitives
will be modeled by the superquadric scheme and form the database which
combines the object-centered modeling data and the view-centered
modeling data. In both 2-D and 3-D cases, gaze control unit needs to be
specially considered since the efficiency of which is decisive for the
overall performance of the system. In the 2-D case, the prediction-
correction algorithm is applied while the probability theory may serve
the key role in the 3-D case. Finally, the 3-D motion object pursuing
problem will be investigated. The goal of this stage is to capture and
smoothly pursuit the moving object using the foveal sensor. The entire
system will be built based on a virtual working environment and tested
using the synthetic and real images.