Title	Autonomous Learning of Motion Parallax for Active Depth Perception
Author(s)	Prucksakorn, Tanapol
Citation	
Issue Date	2015-09
Type	Thesis or Dissertation
Text version	author
URL	http://hdl.handle.net/10119/12921
Rights	
Description	Supervisor: Professor Nak Young Chong, School of Information Science, Master

Autonomous Learning of Motion Parallax for Active Depth Perception

Tanapol Prucksakorn (1310204)

School of Information Science,
Japan Advanced Institute of Science and Technology

August, 2015

Keywords: Autonomous Learning, Motion Parallax, Active Depth Perception, Self-Calibrating, Action-Perception Cycle.

Depth perception is a visual ability that allows humans and animals to be able to perceive the world and environments in three dimensions and distance of objects. It is one of the most fundamental task that artificial vision systems must solve. There are three different kind of depth perception which are stereo vision, motion parallax, and optic flow.

Estimating depth of an object by using vision system has been continuously researched for a long time. There are a lot of works that can estimate depth of objects by using binocular cue. However, there is little work on depth estimation by using monocular depth cue. Most of the researches focus on estimating depth from a single monocular image. Some of them require specific condition such as environment, some requires calibration. So, if there are some changes or interferences in environment or configuration of vision system, the solution seems to fail later. So, to contribute in monocular depth estimation, our goal is to propose an autonomous learning and self-calibrating motion parallax depth estimation system which is robust and able to adapt to environments.

In this thesis, we propose a model that combines knowledges of joint development of visual encoding and reinforcement learning together to find a depth of a single object with motion parallax. We use reinforcement learning to learn how to use encoded sensory data to explicitly control the movement of the eye. Perception and behavior will be developed simultaneously by minimizing the same cost function. We consider a real world experiment and a simulation. Experiment demonstrates that the framework can find estimate depths while it is an autonomous system and self-calibrating. Also, the experiment shows that an extension of active depth perception with another form of depth cue is possible.