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An automated tracking system for Y-maze behavioral test using kinect depth imaging

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[Zheyuan Wang](#) ; [Kevin Murnane](#) ; [Maysam Ghovanloo](#)[View All Authors](#)**Abstract**[Authors](#)[Figures](#)[References](#)[Citations](#)[Keywords](#)[Metrics](#)[Media](#)

Abstract:

This paper presents an image processing system for automated tracking and behavior analysis of the popular Y-maze test on freely behaving rats, using depth imaging provided by a Microsoft Kinect® 2D/3D imager. A contour-based segmentation algorithm was developed to identify the maze shape and extract its arm and center divisions. Using the extraction results, the system is capable of tracking the animal position and arm entry sequence for calculating spontaneous alternations and other measures that are used in analyzing the animal working memory and activity. The system was validated in vivo on seven freely behaving rats, and the results showed perfect agreement with human annotations, 100% accuracy in arm entry tracking and less than 0.1 s error in time stamps of “enter/leave” actions.

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I. Introduction

Among animal species, rodents such as rats and mice have been widely used in animal behavioral experiments because of being small, low cost, and easy to breed, with similarities in brain disease and genome sequences that are readily available, and can be modified in the case of mice [1]. Those experiments have been continuously contributing to the advancements in neuroscience, pharmacology, genetics, and psychology [2]. Tracking rodents accurately to analyze locomotion and behavior has been of great interest in those studies. Traditionally, rodent behavioral assessment is performed by human observers, which is labor-intensive, slow, boring, and subjective.

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