IWF

Institut für Werkzeugmaschinen und Fertigung
Institute of Machine Tools and Manufacturing

POMDP Model Extraction From Measurement Data

Keywords / Topics: Parallax Error, Interactive Screens, POMDP Modelling, Measurement Data

Abstract

Inthis thesis we develop a POMDP model extractor from measurement data. The resulting model is integrated into a Python controller, and the controller's belief is visualized using a common GUI system (Qt).

Introduction

The ICVR works in the field of interactive systems, providing a highly intuitive interaction with digital content on large displays. Interactive screens allow to directly manipulating digital content. Unfortunately, already a small offset between interaction and display plane causes a parallax error that impairs the interaction accuracy. Depending on the viewpoint, the user's interaction point differs for a given target.

Although, the parallax error could potentially been eliminated by directly tracking the user's viewpoint in front of the screen, we set up a controller that uses the previous interaction error on the touch plane, to estimate the viewpoint and deduce the parallax correction parameter.

We already ran a user study on a large interactive screen, and measured the viewpoint, interaction position and target position.

Content

The thesis analyzes the user study data and deduces a model for a POMDP parallax error correction controller. The POMDP controller consists of models of the system dynamics, which defines the users movement in front of the screen, a sensor model, which describes the coherence between interaction error and viewpoint and a reward model to enable optimization.

Work packages

- Analyze measurement data

- Develop a model builder in Python

- Analyze the coherence between interaction error and viewpoint

- Develop a script, that automatically deduces POMDP-Model (in Cassandra Format) from the measurements

- Integrate the Model in a POMDP-Controller (pyPOMDP)

- Visualize the viewpoint estimation on a interactive screen

- Document and present results
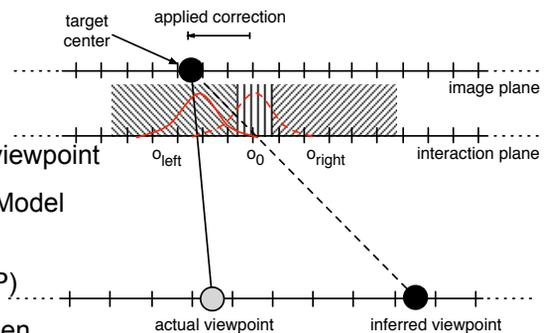
Sensor Model of Parallax Error Correction Controller

Requirements

We are looking for students, who would like to work at Human-Computer-Interaction projects in small research teams. Although skills in systems engineering and programming (C) are welcome, most important is the will to break into the given problem, develop solutions, and actively solve problems. Fulfilling the common academic processing is mandatory. You will document and present your results to the institutes' members in a 20 minutes mid-term and final session.

Information & Administration

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