

Title

Hand model for visual tracking (honours) / Diagnosis of discrete-event systems

Abstract

My honours thesis involved the creation of a computer model of a human hand with sufficient accuracy and flexibility for the tracking of a human hand. The model (named the NICTA hand) consists of an underlying skeleton and a skin surface. The skeleton is implemented as a hierarchical joint structure with 17 joints and 26 degrees of freedom. We define an extra imaginary joint at the palm to model the movement of the CMC joint of the thumb. A set of constraints is also defined on motion of the hand at its joints. This helps in reducing the search space during tracking as poses disallowed by those constraints do not have to be taken into account. This honours work is relevant to NICTA's Advanced Nonlinear Gradient Methods (ANGIE) research project. The hand model was tested and used with tracking algorithms developed by a PhD student, Mr. Desmond Chik. I will present and discuss the investigations carried out, the results obtained and their significance.

I will be working on the diagnosis of discrete-event systems (DES) for my MICT/PhD. Such systems (e.g. power distribution or telecommunication networks) are usually large and complex. We are interested in finding out what happened to the system (the sequence of states and events), i.e. the trajectories, using a sequence of observations we make on the system. The determined trajectories can then be used to identify and localize the possible faults occurring in the system. The main difficulty of this method lies in size of the model (large number of possible states and trajectories). A method that has been proposed to deal with this is the use of a decentralized approach. The main system is broken down into a set of sub-systems. The diagnoses from those sub-systems are combined to produce the overall diagnosis for the main system. [1], [2]

References

- [1] INRIA, Diagnosis of large scale discrete event systems, at <http://www.inria.fr/rapportsactivite/RA2005/dream/uid47.html>
- [2] Dr. Alban Grastien's homepage at <http://users.rsise.anu.edu.au/~agrastie/>

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