Journal updates for 2014.xx.xx

Biophysical Journal

(vol. 107, no. 4,5,6,7,8)
Nothing of interest

Proceedings of the National Academy of Sciences, USA

(vol 111, no. 33,34,35,36,37,38,39,40,41,42)

Nothing of interest.

Review of Scientific Instruments

(vol. 85, no. 8)

Nothing of interest

(vol. 85, no. 9)

Field programmable gate array-assigned complex-valued computation and its limits

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We discuss how leveraging Field Programmable Gate Array (FPGA) technology as part of a high performance computing platform reduces latency to meet the demanding real time constraints of a quantum optics simulation. Implementations of complex-valued operations using fixed point numeric on a Virtex-5 FPGA compare favorably to more conventional solutions on a central processing unit. Our investigation explores the performance of multiple fixed point options along with a traditional 64 bits floating point version. With this information, the lowest execution times can be estimated. Relative error is examined to ensure simulation accuracy is maintained.

Interesting because (1) have thought of doing FPGA based computation and (2) this was judged worthy of publication by community (which is not a negative but something to think about when considering what to publish).

High-speed imaging upgrade for a standard sample scanning atomic force microscope using small cantilevers

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We present an atomic force microscope (AFM) head for optical beam deflection on small cantilevers. Our AFM head is designed to be small in size, easily integrated into a commercialAFM system, and has a modular architecture facilitating exchange of the optical and electronic assemblies. We present two different designs for both the optical beam deflection and the electronic readout systems, and evaluate their performance. Using small cantilevers with our AFMhead on an otherwise unmodified commercial AFM system, we are able to take tapping mode images approximately 5–10 times faster compared to the same AFM system using large cantilevers. By using additional scanner turnaround resonance compensation and a controller designed for high-speed AFM imaging, we show tapping mode imaging of lipid bilayers at line scan rates of 100–500 Hz for scan areas of several micrometers in size.

High-speed AFM techniques remain point of interest to community.

IEEE Transactions on Automatic Control

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Nothing of interest

(vol 59, no. 10)

On Hybrid State Estimation for Stochastic Hybrid Systems

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This paper considers the state estimation problem for the general continuous-time Stochastic Hybrid System (SHS) which has various applications. Defined on the hybrid state space, the SHS has the interacting discrete dynamics and continuous dynamics subject to various uncertainties. The hybrid state estimation problem is to estimate both the continuous state and the discrete state of the SHS with the information given by a continuous-time observation process. In this paper, the hybrid state estimation problem is mathematically formulated and the corresponding filtering equations that are stochastic partial differential equations are derived to describe the evolution of the hybrid state estimates conditioned on the observation history. A numerical algorithm based on a finite-difference approach is proposed to solve the filtering equations. A Markov Chain (MC) is constructed on the descretized hybrid state space to approximate the infinitesimal generator of the SHS and then hybrid state estimation for the SHS is reduced to estimating the state of the MC. It is proved that the state estimation results of the MC converge to the solution to the filtering equations as the constructed MC converges to the SHS. An illustrative example of aircraft tracking is used to demonstrate the performance of the proposed algorithm.

Perhaps useful in multi-particle context if viewed as HS?

An Argument for the Bayesian Control of Partially Observable Markov Decision Processes

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This technical note concerns the control of partially observable Markov decision processes characterized by a prior distribution over the underlying hidden Markov model parameters. In such instances, the control problem is commonly simplified by first choosing a point estimate from the model prior, and then selecting the control policy that is optimal with respect to the point estimate. Our contribution is to demonstrate, through a tractable yet nontrivial example, that even the best control policies constructed in this manner can significantly underperform the Bayes optimal policy. While this is an operative assumption in the Bayes-adaptive Markov decision process literature, to our knowledge no such illustrative example has been formally proposed.

Since we constant deal with POMDPs.

On the Optimal Solutions of the Infinite-Horizon Linear Sensor Scheduling Problem

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This paper studies the infinite-horizon sensor scheduling problem for linear Gaussian processes with linear measurement functions. Several important properties of the optimal infinite-horizon schedules are derived. In particular, it is proved that under some mild conditions, both the optimal infinite-horizon average-per-stage cost and the corresponding optimal sensor schedules are independent of the covariance matrix of the initial state. It is also proved that the optimal estimation cost can be approximated arbitrarily closely by a periodic schedule with a finite period. Moreover, it is shown that the sequence of the average-per-stage costs of the optimal schedule must converge. These theoretical results provide valuable insights into the design and analysis of various infinite-horizon sensor scheduling algorithms.

Clearly related to what Xi is working on.

(vol 59, no. 11)

Selective ell_{1} Minimization for Sparse Recovery

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Motivated by recent approaches to switched linear system identification based on sparse optimization, the paper deals with the recovery of sparse solutions of underdetermined systems of linear equations. More precisely, we focus on the associated convex relaxation where the ell_{1}-norm of the vector of variables is minimized and propose a new iteratively reweighted scheme in order to improve the conditions under which this relaxation provides the sparsest solution. We prove the convergence of the new scheme and derive sufficient conditions for the convergence towards the sparsest solution. Experiments show that the new scheme significantly improves upon the previous approaches for compressive sensing. Then, these results are applied to switched system identification.

Clearly related to what Yufan is doing.

+ **one:**

NATURE CHEMICAL BIOLOGY

Tracking single molecules at work in living cells

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Methods for imaging and tracking single molecules conjugated with fluorescent probes, called single-molecule tracking (SMT), are now providing researchers with the unprecedented ability to directly observe molecular behaviors and interactions in living cells. Current SMT methods are achieving almost the ultimate spatial precision and time resolution for tracking single molecules, determined by the currently available dyes. In cells, various molecular interactions and reactions occur as stochastic and probabilistic processes. SMT provides an ideal way to directly track these processes by observing individual molecules at work in living cells, leading to totally new views of the biochemical and molecular processes used by cells whether in signal transduction, gene regulation or formation and disintegration of macromolecular complexes. Here we review SMT methods, summarize the recent results obtained by SMT, including related superresolution microscopy data, and describe the special concerns when SMT applications are shifted from the*in vitro* paradigms to living cells.

Need to keep up-do-date on what's going on.