

Title: Can reading half a bit help speed up your decision tree?
Renan Gross (Tel Aviv University)

Abstract: A randomized decision tree is an adaptive algorithm for determining the value of a function, given an unknown random n -bit input. At each step, the algorithm chooses an input bit and queries its value, stopping when it has enough information to guess the output.

I will present a generalization: "fractional" algorithms, that, when they query a bit, only gain a small amount of information on what the value of the bit is likely to be. Repeated fractional queries reveal more and more information, turning the bits into time-dependent stochastic processes. I will show how these algorithms connect two seemingly far-removed fields:

- 1) noise-sensitivity and analysis of Boolean functions, and
- 2) Brownian control and partial differential equations.