Applying Models of User Activity for Dynamic Power Management in Wireless Devices

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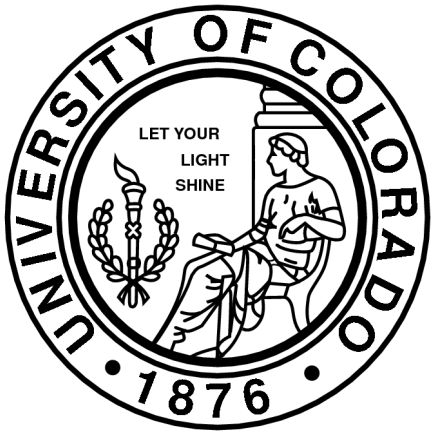

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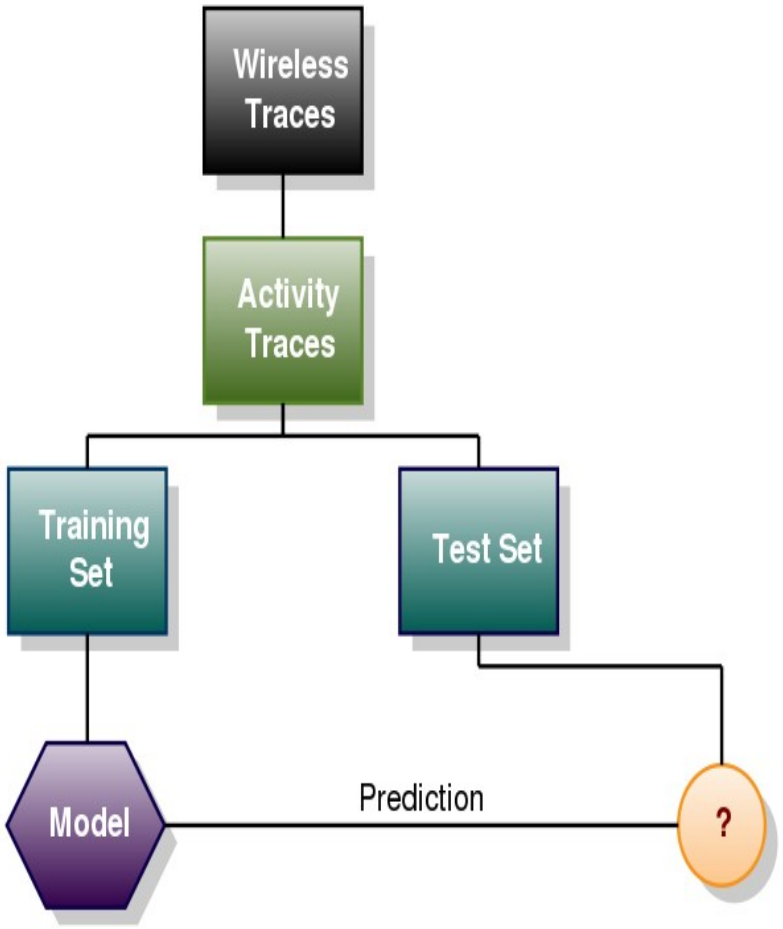
Overview

- Predictive powersaving for wireless devices
- Insights into user behavior
- Existing Literature offers no clear winner
- Plenty of data
- What we did: Implement many algorithms, both new and old, running them against the data



Data

- 236 unique user traces from 7 trace sets:
  - PDX/Vwave [Phillips'07]
  - UW/SigComm2004 [Rodrig'05]
  - Microsoft/OSDI2006 [Chandra'06]

- All traces are available on http://crawdad.org.

Problem Definition

- Assume that time is discretized into 1 second buckets
- Hardware can go to sleep and wake back up in 2 seconds
- One second is the minimum desirable sleep time
- At each time-slice, algorithm must decide to sleep or not, and for how long

Algorithms

- Implemented 9 Algorithms from the literature and 2 new algorithms based on our prior work

Markovian
M, MLL, MLC

Fitted
SR

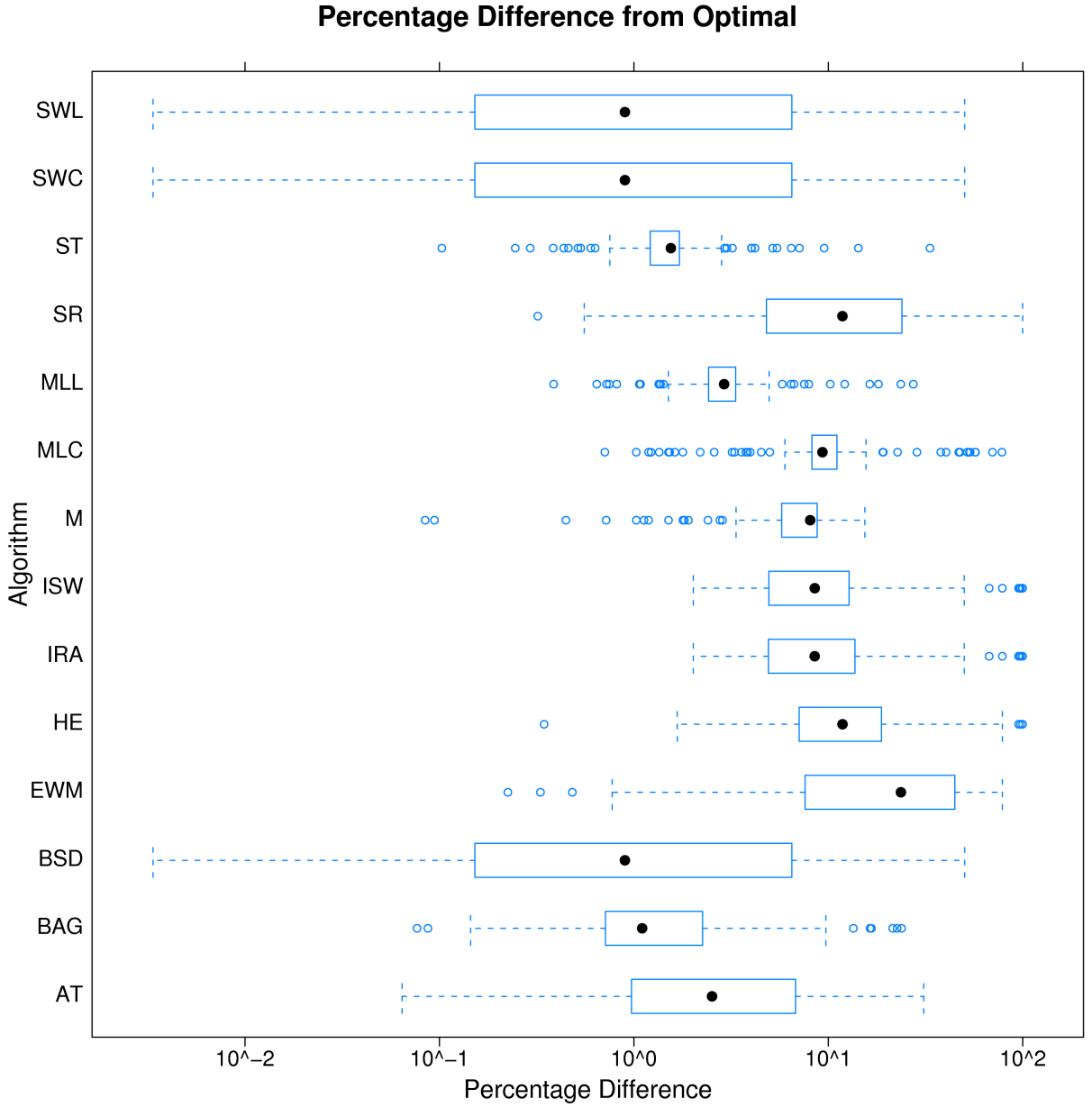
Timeout
ST, SWL,SWC

Probabilistic
EWM, HE, IRA, ISW

Complex
AT

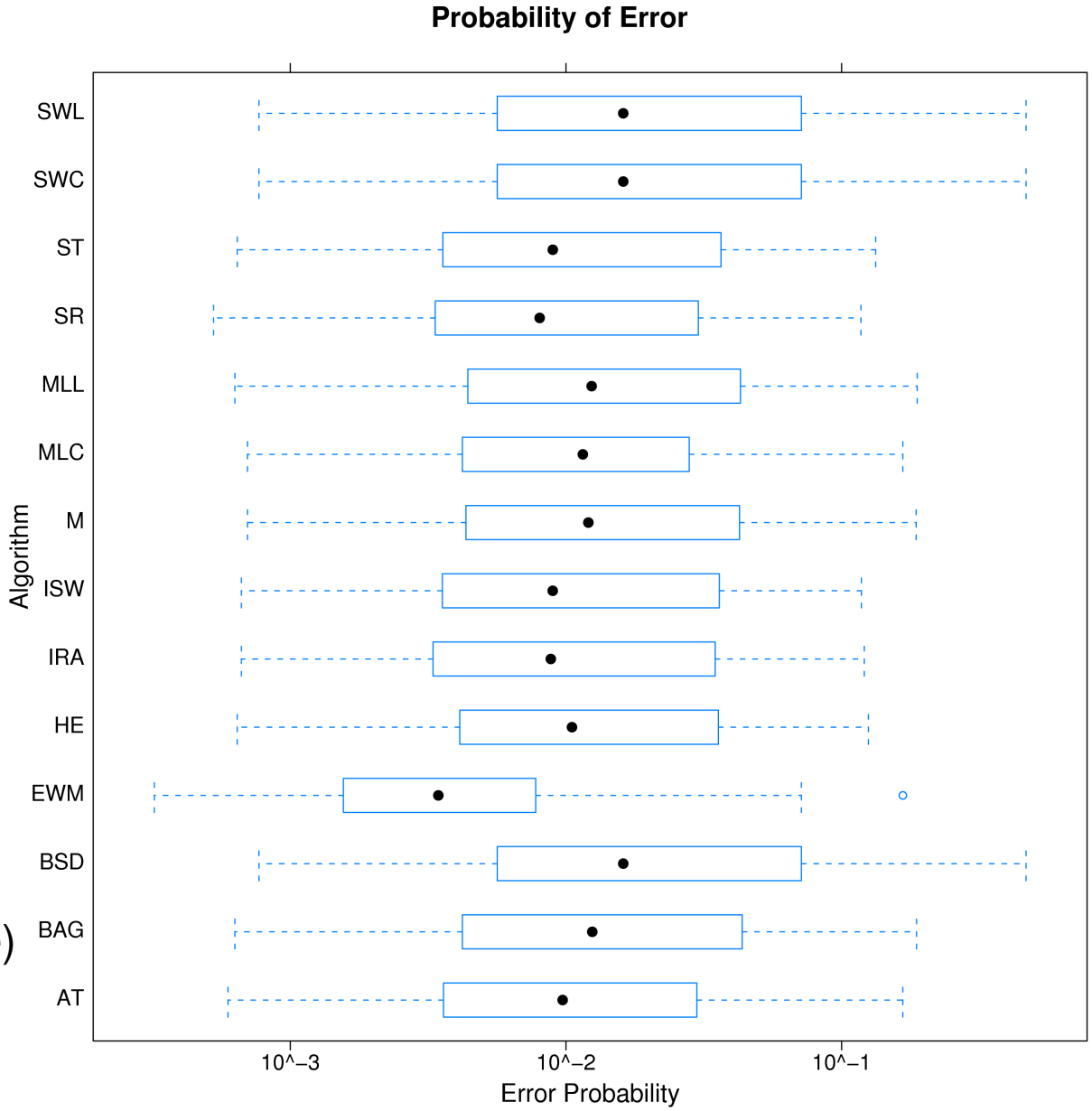
Backoff
BAG, BSD

Results: Performance Gap



Better (log scale)

Results: Error Probability



Better (log scale)

Conclusions

Best Performing	**Highest Fidelity**	**Simplicity**
ST, MLL, SWL/SWC, BAG, AT	**ST**, BAG, MLL, AT	**ST**, BAG, MLL

- Occam's Razor (**ST** & **BAG**)
- Real user traces provide a necessary means of validation and comparison (**MLL**)
- Offline questions/comments:
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