Predecessor lower bounds (in cell-probe model)

↳ static

6.897
L11.1
Mar. 10, 2005

- Ajtai – Combinatorica 1988:
  - first $\omega(1)$ bound, complicated
  - $\forall w\ \exists n$ s.t. $\Omega(\sqrt{\lg w})$ [accidental $\Omega(\lg w)$ claim]
- Miltersen – STOC 1994:
  - better understanding of "same" proof
  - connection to communication complexity
  - $\forall w\ \exists n$ s.t. $\Omega(\sqrt{\lg w})$ (again – slightly more general)
  - $\forall n\ \exists w$ s.t. $\Omega(\sqrt[3]{\lg n})$
- Miltersen, Nisan, Safra, Wigderson – STOC 1995 & JCSS 1998 (cites Beame & Fich as 1994 (!) & Xiao 1992 (!))
  - clean proofs of same bounds
  - round elimination idea & lemma
- Beame & Fich – STOC 1999 & JCSS 2002
  - $\forall w\ \exists n$ s.t. $\Omega\left(\frac{\lg w}{\lg\lg w}\right)$
  - $\forall n\ \exists w$ s.t. $\Omega\left(\sqrt{\frac{\lg n}{\lg\lg n}}\right)$
  - static DS with $O\left(\min\left\{\frac{\lg w}{\lg\lg w}, \sqrt{\frac{\lg n}{\lg\lg n}}\right\}\right)$
  - ⇒ best "pure" bounds in n & w
- Xiao 1992: – PhD thesis @ Stanford
  - same lower bounds!
  - ⇒ Beame & Fich LB was indep. discovery

(no round elimination)

TODAY ⟹
- Sen – CCC 2003 & arXiv:cs.CC/0309033 with Venkatesh
  - clean proofs of same bounds
  - uses round elimination & new lemma
- true trade-off between w & n: later & space