Theoretical Evidence: Analyzing Boosting Using Margins

- Theorem: large margins $\Rightarrow$ better bound on generalization error (independent of number of rounds)
  - proof idea: if all margins are large, then can approximate final classifier by a much smaller classifier (just as polls can predict not-too-close election)
- Theorem: boosting tends to increase margins of training examples (given weak learning assumption)
  - moreover, larger edges $\Rightarrow$ larger margins
  - proof idea: similar to training error proof
- so:
  although final classifier is getting larger,
  margins are likely to be increasing,
  so final classifier actually getting close to a simpler classifier,
  driving down the test error