Letter Recognition — Boosting

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Last week

- A bug in adaptive learning program fixed
- Tuned the program with `gprof`
  - most time-consuming parts: `tanh()`, feed-forward, back-propagation
  - replaced `tanh()` with two look-up tables
  - rewrote feed-forward and back-propagation: more pointer operations
  - decreased the precision of line-search (which decreases the # of feed-forward calls)

The training is now twice fast, while the performance (training/validation errors) remains.

- Tried bagging, simple boost, and AdaBoost.M1
  - Base model: 16-50-26, normalized data and $e^{(3)}$ (W3) error function, momentum, 700 epochs.
**Bagging**

**bootstrap aggregating**: resample with replacement, unweighted average
Simple boost

![Graph showing the classification error on train and test data as a function of the number of aggregated hypotheses. Blue line represents error on train data, green line represents error on test data.](image-url)

- **classification error (%)**
- **error on train data**
- **error on test data**

- # of aggregated hypotheses
AdaBoost.M1