

### 2.1 (due Feb. 12, 2009)

- Implement SVM with the SMO algorithm (see the pointer to the paper below). You can use either C or MATLAB. I encourage you to NOT follow the pseudo-code in the paper: try to come up with your own heuristic to pick the pair of  $\alpha$ 's to be updated.
- Now you will use your SVM on the data from [MNIST]. Pick 3 different kernel functions (one of which should be the identity kernel). For each kernel function you picked do the following:
  - For each pair of digits train your SVM using the training data. After the training is finished compute the classification error on the test data.
  - Output a  $10 \times 10$  (symmetric) table (with zero diagonal) with the classification error for each pair of digits.
  - Try to experiment with the value of  $C$  to make the entries in the table small.
- E-mail (by 11:59pm on **due Feb. 12, 2009**) to the TA and instructor: your code, few sentences on your choice of kernels, the heuristic to pick the pair of  $\alpha$ 's, the three  $10 \times 10$  tables (2 significant digits accuracy, not more), and your choice of  $C$ 's.

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[SMO] John C. Platt, <https://research.microsoft.com/en-us/um/people/jplatt/smotr.pdf>

[MNIST] <http://yann.lecun.com/exdb/mnist/>

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