

CS 180 MP 4: Artificial Neural Networks and Support Vector Machines

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Requirements:

- Python 3
- `numpy` python module
- `scikit-learn` python module
- `opencv` python module
- `bash` or your favorite shell
- `plotly` if you want to generate the graphs

Download http://www.cl.cam.ac.uk/Research/DTG/attarchive/pub/data/att_faces.zip.
Extract the `orl_faces` folder to the project directory. Remove `orl_faces/README`.

Just run `main.py train_list train_tags test_list test_tags` or `start_script.sh` to save on typing.

1. The MLP classifier with half the number of the input nodes in the hidden layer was 94.3750% accurate on the testing set.
2. Refer to Figure 1. In general, the MLP performs better with more nodes in the hidden layer. It achieves a maximum accuracy at around 8k nodes.
3. The MLP performed way worse (5% accuracy), but it trained faster.
4. The SVM trained really quickly, and had 95.6250% accuracy on the test set.
5. Refer to Figure 2. The performance of the SVM did not change and it completed training at around the same time.
6. Refer to Figure 3. The accuracy suffered rapidly as the gamma increased.
7. The SVM trained much, much faster than the MLP and seemed to require less memory. The MLP was able to achieve a higher accuracy than the SVM, by finding the optimal number of nodes in the hidden layer.

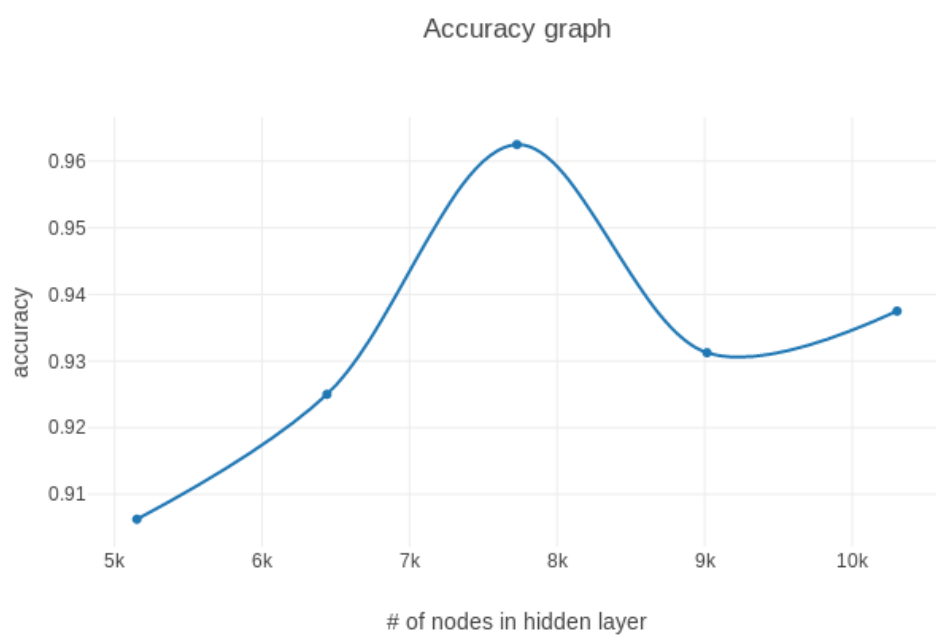


Figure 1: Plot of accuracy vs. number of hidden layer nodes.

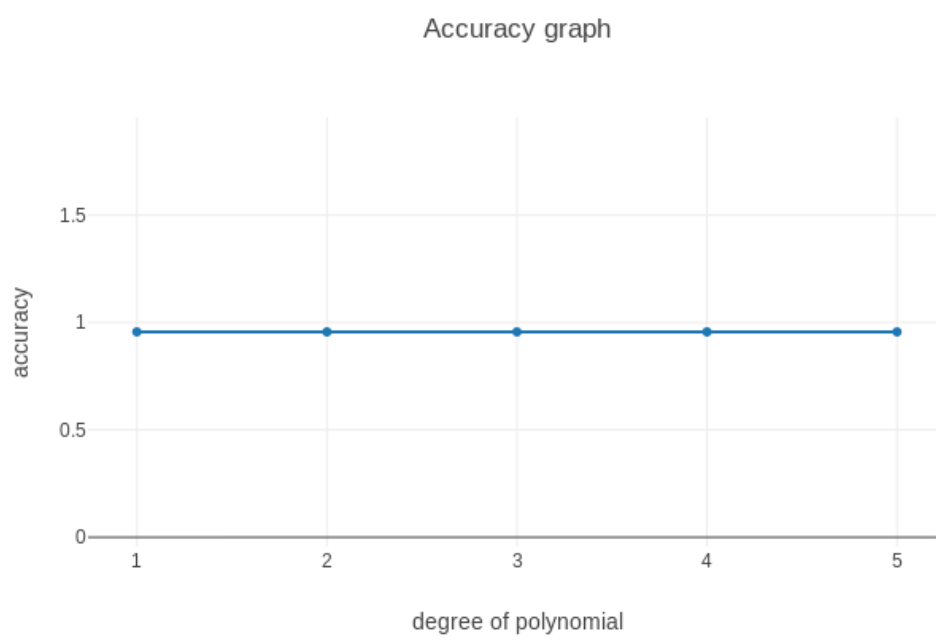


Figure 2: Plot of accuracy vs. polynomial degree. Accuracy stayed the same.

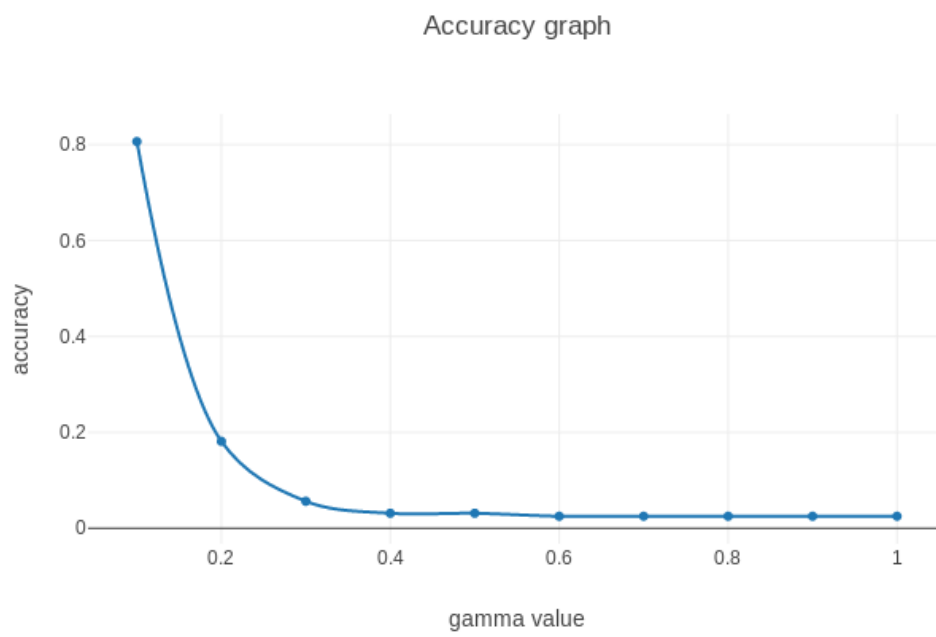


Figure 3: Plot of accuracy vs. gamma values. Accuracy decreases exponentially faster with higher gamma values.