

Machine Learning Class Projects

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General Info

- You must choose a project by next week!
- The project is due on December 9.
Submission via email:
 - 8 page write-up in NIPS format (see nips.cc)
 - Source code used (if any)

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Density Estimation Algorithm in Homework 4

- Implement
 - Sparse models
 - Alpha optimization
 - Extension to hundreds of thousands of training examples
- Test on Standard datasets and compare to published results

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Mobile Robot Path Following in Outdoor Environments: Project 1

- Apply many algorithms to more data of the type used in Homework 4.
- Use the WEKA toolkit and perhaps LIBSVM
- Report on
 - Which gives the best error rates
 - Which model is the fastest to evaluate
- Close the loop with the best model on the real robot (limited test – I just want you to take a model and put it into the loop).

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Mobile Robot Path Following in Outdoor Environments: Project 2

- Close the loop using the algorithm in homework 4 (here I expect more tests because you are using the algorithm you developed in homework 4).
- Experiment with various types of features extracted from the image
 - Grey scale?
 - Normalized color?
 - Other color representations (YUV)?
 - How big should the window be?
- Report on which features work best

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Mobile Robot Path Following in Outdoor Environments: Project 3

- Build a regression model that maps images to steering angles
 - Stick to one or two algorithms for learning the model (Maybe just the polynomial cascade algorithm)
- Use human examples (i.e. you teleoperating the robot) as training data
- Close the loop on the real robot
 - Report on at least a 2 different experiments
- Experiment with various types of features extracted from the image

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Your Own Project 1

- Pick a paper from a recent NIPS conference (nips.cc has all proceedings) and implement the algorithm
 - The algorithm should not have source code available
- Repeat experiments done in the paper (perhaps not all), and add at least one more
- Give me your opinion of the algorithm

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Your Own Project 2

- Start with novel data
- Apply at least 5 different learning algorithms to the dataset and determine which is best
- Use WEKA or other toolkits you can download from the web

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Reinforcement Learning for Mobile Robot Path Following in Outdoor Environments

- Learning the Q function starting from human examples

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