ML Project Assignment

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ML Project Assignment

- Define a project idea — *Use the forum!*
  - Three students per project
- Hand in a proposal — *Student portal*
  - April 14, 08:00
- Work hard (and use your supervisor)
  - ≈80 hours
  - Weekly meetings with your supervisor — *mandatory*
- Submit your report
  - June 1, 08:00 — *Student portal*
- Present your work at the seminars
  - June 2–3

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Supervision

- Project proposals are assigned to supervisors on April 14
- You supervisor will contact you to arrange a startup meeting
- Short weekly meetings
  - which week day depends on supervisor
  - mandatory (will affect grade U/3/4/5)

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Project ideas (general)

- Pattern recognition (pictures, sound, voice, ...)
- Other architectures/algorithms/methods
- Relations between fields (ANN, evolutionary computation, fuzzy logic, AI-learning, ...)
- Time series, Predictions (financial, weather, etc)
- Hardware issues
- Reinforcement learning (apply, investigate effects of variations, ...)
- Evolutionary computation (apply, compare, state-of-the-art, ...)
- Swarm Intelligence (pso, aco, ...)
- Deep Learning

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Proposal strategy

- You can list several several ideas, but if so, list them in priority order (most wanted first)
- Implementation projects are fun, but coding takes time
  - not productive from the course's viewpoint
- RL and EC projects often require implementation **and** take a long time to converge
  - make sure that you describe your idea well. Hopefully sufficient even without the experimental evidence
- Make sure you have data!

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Proposal strategy

- Experimental projects using existing tools and already available data, are safer
  - Most of the time can be spent designing solutions and analyzing results, and writing about them
- Survey/essay projects are also safer, from a time perspective
  - just make sure that you don't plagiarize!

- Tip: Kaggle.com has >13000 datasets on a wide range of topics!

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Examples of previous work

- User identification (typing/mouse use/voice)
- Motion tracking
- Deciding genre/instruments/harmonics in music
- Financial forecasting (time-series prediction)
- Feature extraction for fingerprints
- Image registration/segmentation
- Image style identification/transfer
- Variation of exploration rate in RL
- Various PSO extensions
- Traffic light control algorithms
- Classification of car license plates
- AIM-GP: Automatic induction of machine code
- Selective breeding of Redcode warriors
- Machine learning in network routing
- Recommendation systems

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Examples of previous work

- Machine learning (mostly RL) to play games
  - Backgammon, Checkers, Chess, Go, Ludo, Othello, Angry birds, Asteroids, Moon lander, racing games, Snake, Sokoban, Tetris, Mario, Starcraft, 2048, ...
- CMACs, SVMs, LSTMs, GANs, …
- Medical applications (e.g. ECG classification)
- Various extensions to the GridWorld lab
- Twitter bot/spam detection
- Classification of news articles
- NEAT Neuroevolution
- Augmenting data for CNNs
- A Look Through the Eyes of a CNN
- Classifiation of leaves
- Classifying Battlefield 1 Emblems
- Faking the greats
- Style transfer

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The report (June 1)

- English or Swedish
- Must convince us that you (all three) have worked approx. 2 full-time weeks (80 hours)
- Scientific report style
  - Format
  - Reproducibility
  - No claims without references or other evidence
  - Analysis of results
  - Suggest future work / extensions
- More important to clearly present your ideas on how things *should* be solved, than to actually have solved them!
  - A failed experiment is not a failed project!
- Excellent thesis writing practice!

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Seminars (June 2-3)

- Mandatory presence (to be decided how much)
- 15 minutes including questions
- Aim for the other students, not for us teachers
- In English
- All group members active
- You won't have time to say it all – focus on explaining ideas and general solutions. Details are not important (they are in the report!)
- **Don't bother explaining things that should already be known from the course!**