Machine Learning to the Rescue
Visser, A.; Nardin, Luis Gustavo; Castro, Sebastian

Citation for published version (APA):

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: http://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.
Workshop Goals

• Instruct how to use the MATLAB® Statistics and Machine Learning Toolbox™ through interactive applications to analyze and model disaster scenario data for developing more elaborated rescue decision-making algorithms.
• Demonstrate how to incorporate state-of-the-art machine learning algorithms into RoboCup Rescue competition code using the MATLAB® Engine API for Java.

Supervised Learning

Analysis of the disaster scenario could be used to learn associations between observable variables and hidden variables (part of a causal model of the world).
- Firefighters can optimize their decisions by estimating buildings’ danger of fire ignition (discrete state – classification).
- Ambulances can optimize their rescue operations by predicting more accurately the chance of potential victims to survive (continuous state – regression).

Pre-Compute

Before the actual run, an agent of each type can do map reconnaissance. In this phase, agents can precompute the paths and segment the map into sectors.
- Path Planning with MATLAB®:
  - Shortest-path algorithms based on breadth-first, Dijkstra or A* [1].
  - The agents receive the possible path sorted on distance.
  - During the competition each agent can modify the unobstructed distances in its own copy of the graph based on observed or cleared blockades.
- RoboCup teams may divide the work of the agents over different sectors of the map [2].

Results

In Statistics and Machine Learning Toolbox™, data can be preprocessed with dimensionality reduction methods like principal component analysis (PCA) or singular-value decomposition (SVD), followed by classification methods, or linear/non-linear regression methods.

By giving a workshop to the RoboCup teams on how to separate machine learning algorithms from the actual code to control the agents / robots, teams can concentrate on the learning aspect.

The algorithms implemented in the workshop are examples of common challenges in this competition, but the approach should extend to any algorithm available/developed in MATLAB®.

Conclusion

By giving a workshop to the RoboCup teams on how to separate machine learning algorithms from the actual code to control the agents / robots, teams can concentrate on the learning aspect.

The algorithms implemented in the workshop are examples of common challenges in this competition, but the approach should extend to any algorithm available/developed in MATLAB®.

References