

Research Summary

Marc Pickett

Autonomous Learning Laboratory
University of Massachusetts, Amherst MA 01002, USA
`pickett@cs.umass.edu`

Marc's research interests are in how abstractions can be created automatically by a machine learning agent. He is also interested in automatically creating representations, how knowledge can be grounded in sensory information, and methods for bridging the gap between statistical and symbolic computation. More generally, his interests include cognitive neuroscience, and applications of artificial intelligence to understanding complex systems.

Recently, Marc developed an algorithm that makes efficient use of a costly distance metric by using geometric reasoning. This algorithm approximates unknown distances among objects from a relatively small number of known distances. The approximate distances are then used to cluster objects. This technique has been successfully applied to indexing word images of handwritten text. This work has been in collaboration with David Jensen and R. Manmatha [1].

Another recent work has been on how a reinforcement learning agent can create abstract actions (options). His paper on this research presents a method called "PolicyBlocks" by which an agent can create useful options automatically. PolicyBlocks creates options by finding commonly occurring subpolicies from the solutions to a set of sample tasks, then subtracting these subpolicies from the solutions in a manner akin to Principal Components and Explanation Based Learning. Using these options, learning to do future related tasks is accelerated. This increase in performance was illustrated in a "rooms" grid-world, in which the options found by PolicyBlocks outperform even hand designed options, and in a hydroelectric reservoir control task. This work has been in collaboration with Andrew Barto [2].

References

- [2002] Pickett, M., Barto, A.: PolicyBlocks: An Algorithm for Creating Useful Macro-Actions in Reinforcement Learning. in proceedings of the International Conference on Machine Learning (2002)
- [2002] Pickett, M., Jensen D., Manmatha, R. Indexing Handwritten Text using Clustering Algorithms. Synthesis Project Report, University of Massachusetts (2002)