Imitation learning for structured prediction in natural language processing

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sheffieldnlp.github.io/ImitationLearningTutorialEACL2017/ (http://sheffieldnlp.github.io/ImitationLearningTutorialEACL2017/)

Your name sounds familiar

Imitation is an advanced behavior whereby an individual observes and replicates another's behavior. Imitation is also a form of social learning that leads to the development of traditions, and ultimately our culture.

(https://en.wikipedia.org/wiki/Imitation (https://en.wikipedia.org/wiki/Imitation))

Robotics

Legged locomotion
(Rattlif et al., 2006 (https://papers.nips.cc/paper/3154-boosting-structured-prediction-for-imitation-learning.pdf))

(http://www.bostondynamics.com/robot_littledog.html)

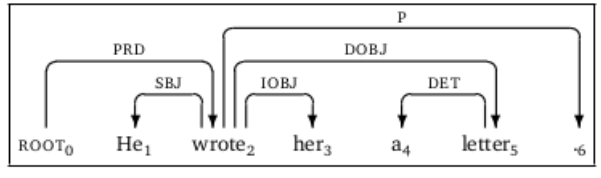
Autonomous helicopter flight
(Coates et al., 2008 (http://heli.stanford.edu/papers/coatesabbeelng_icml2008.pdf))

(http://www.theverge.com/2016/1/6/10721654/electric-self-flying-quadcopter-ehang-184-ces-2016)

And more: outdoor navigation (Silver et al., 2008 (http://www.roboticsproceedings.org/rss04/p34.pdf)), Super-Mario (Ross et al., 2011 (https://www.cs.cmu.edu/~sross1/publications/Ross-AIStats11-NoRegret.pdf)), autonomous driving (Zhang and Cho, 2017 (https://arxiv.org/abs/1605.06450)) ...

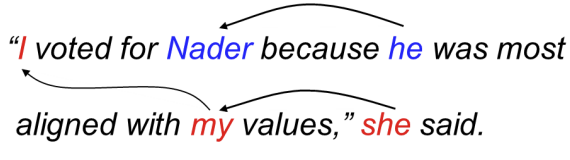
Your name sounds more(!) familiar

Dynamic oracles for parsing
(Goldberg and Nivre, 2012 (http://www.aclweb.org/anthology/C12-1059),
Ballesteros et al., 2016 (https://arxiv.org/pdf/1603.03793.pdf))

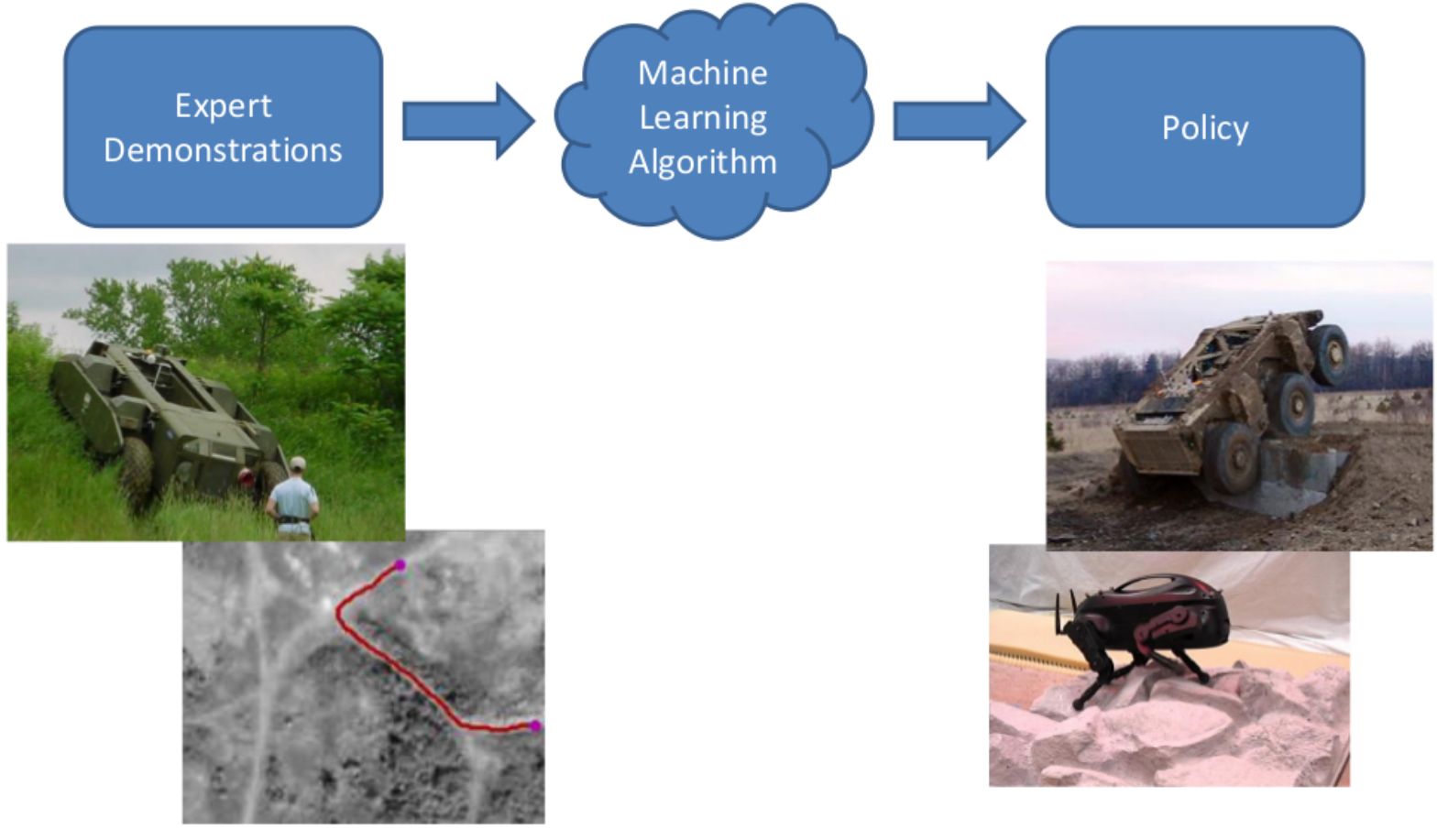


Incremental coreference resolution
(Clark and Manning, 2015 (http://cs.stanford.edu/people/kevclark/resources/clark-manning-acl15-entity.pdf))

(http://nlp.stanford.edu/projects/coref.shtml)



Imitation Learning in a nutshell



(http://www.cs.cmu.edu/~sross1/publications/Ross-AIStats11-Slides.pdf)

Meta-learning: better model (≈policy) by generating better training data from demonstrations.

Part 1: Imitation Learning for Structured Prediction

- Basics:
  - structured prediction
  - different types of supervision and loss functions
  - cost-sensitive classification
- Imitation learning algorithms:
  - Dataset Aggregation (DAgger)
  - Learning to Locally Optimal Learning to Search (LOLS)
- Interpretations and connections
  - Reinforcement Learning
  - Recurrent Neural Network training
  - Adversarial training

Part 2: NLP Applications and practical advice

- Applications:
  - Dependency parsing
  - Semantic parsing:
  - Natural language generation
- Practical advice
  - expert policy definition
  - accelerating cost estimation
  - trouble-shooting

Outcomes

- Understanding of how IL works via unified algorithmic presentations
- Clarification of the connections to other learning fr ameworks
- Familiarization with representativ e NLP applications
- Recognizing when and how to apply IL