Pyro and TF Probability

A case study of natural language understanding in PPLs

Armīns Bagrats Stepanjans (abs53)

Rational Speech Act

Probabilistic model of communication.

Each speaker reasons about the other (i.e. recursive theory of mind).

Practical evaluation setting for PPLs.

G. Scontras, M. H. Tessler, and M. Franke (2018). *Probabilistic language understanding: An introduction to the Rational Speech Act framework*. Retrieved 2020-11-26 from https://www.problang.org.

Frank, Michael C., and Noah D. Goodman. "Predicting pragmatic reasoning in language games." *Science* 336.6084 (2012): 998-998.

Contributions

Implementation of RSA in TF Probability.

Comparison of RSA implementations in WebPPL, Pyro, and TF Probability.

Analysis of RSA for NLP applications.

WebPPL The Benchmark Implementation

Problang.org demonstrates a textbook RSA implementation.

Uses recursive Bayesian inference.

Basis for the current Pyro RSA.

Pyro: an Existing Adaptation

How well does the current Pyro RSA take advantage of Pyro?

TF Probability: My Implementation

How well does TF Probability facilitate the implementation of RSA?

How does the implementation compare with Pyro?

How does the implementation compare with WebPPL?

Practical RSA

Does reasoning about the speaker's intentions make a difference in practice?

How does the inference time compare with other available tools in PyTorch and TF?

Please ask questions!

Thank you for time