

This note explains essential stuff to understand dual decomposition explained in [1]. See [2] for the full tutorial.

1 Important Terminologies

1. Subderivative (劣微分), subgradient (劣勾配)
2. Belief propagation (BP)
3. Lagrange Relaxation

2 Main Points

1. Typically simple and efficient [2].
2. Many decoding problems can be decomposed into two or more subproblems [2].
3. “Dual decomposition [...] is a special case of Lagrangian relaxation (LR).” [2]

$$\begin{array}{ll}\text{maximize} & f(z) + h(y) \\ \text{subject to} & y = z\end{array}$$

3 Dual Decomposition for Parsing

Cherry-picking important points from [2].

4 Why is dual composition/Lagrange relaxation important?

1. Able to include global features rather than local features (e.g., like what Viterbi algorithm does) during the decoding step [1].

References

- [1] Daisuke Okanohara. 双対分解による構造学習. <https://research.preferred.jp/2010/11/dual-decomposition/>. [Online; accessed 4-Jul-2016].
- [2] Alexander M. Rush and Michael Collins. A tutorial on dual decomposition and lagrangian relaxation for inference in natural language processing. 2012.