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]

\[
\begin{align*}
\text{maximize} & \quad f(z) + h(y) \\
\text{subject to} & \quad y = z
\end{align*}
\]

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
