

MAP vs Marginals

Marginals

- Less fragile
not a single righter
- Confidence in answers
How much trust between options
- Support decision making
Integration with uncertainty

MAP

- Coherent joint assignment
- More tractable model classes
- Some theoretical guarantees

Dual decomposition

Approximate inference

- Errors ARE often tolerated
 - Ability to gauge whether algorithm is working by looking at assignment

Algorithms for Marginals

- Exact inference
- Preferred option if it fits in memory
- Loopy message passing
- Sampling methods form a distribution

Algorithms for MAP

- Exact inference - low tree width (impossible)
- Optimization methods
 - exact or approximate (dual decomposition)
- Search-based methods (including sampling)
 - Hill-climbing
 - MCMC

Factors in approximate inference

Connectivity structure

- Densely connected bad for message passing
 - short cycles, low convergence, low accuracy

Sampling methods recommended

- Strength of influence
 - The stronger the harder
 - Strong coupling between variables

Opposing influences

Multiple peaks in the likelihood

Troubleshooting

1. Identify problem regions

2. Try to make inference in these regions more exact

- Larger clusters in cluster graph - Loopy BP
- Larger slave in dual decomposition - MAP problem
- Propose moves over multiple variables - Sampling