Uniqueness of Belief Propagation on Signed Graphs

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Main result: new condition for the uniqueness of the fixed point of BP algorithm

- **What is BP**
  - BP is for approximate inference on graphical models.
  - BP is a message passing algorithm on graphs.
- **Problem of BP**
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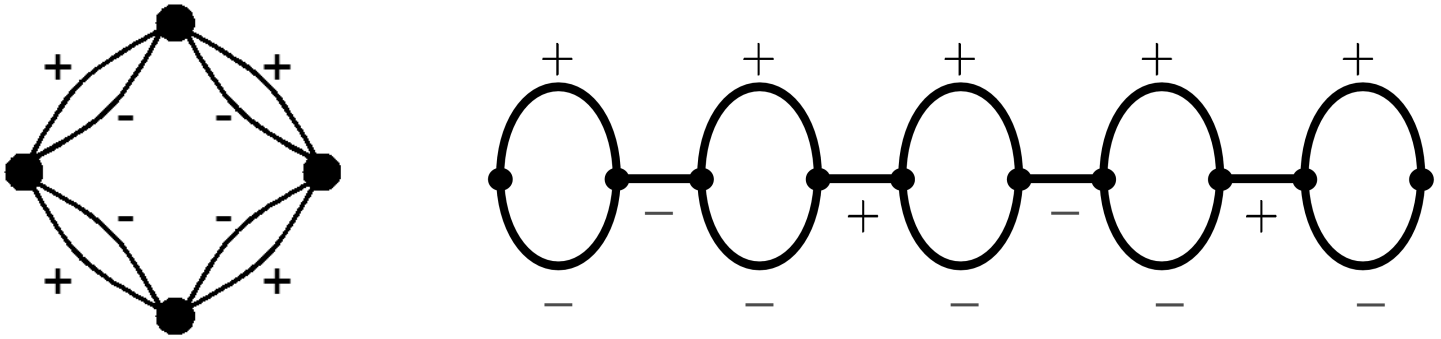
    - Matters for uniqueness
      1. Graph topology: cycles
      2. Interaction of variables: strength, **sign**

In previous researches, information of sign is never used!

- **Main result**
  - We explicitly give the class of signed graphs where the uniqueness of BP is *always* guaranteed.
  - Examples:



- **Technical novelty**
  - Extend graph zeta function techniques.

Y. Watanabe and K. Fukumizu, “Graph zeta function in the Bethe free energy and loopy belief propagation”, NIPS 2009.