Balancing Priors and Learning Biases to Improve Bayesian Neural Networks

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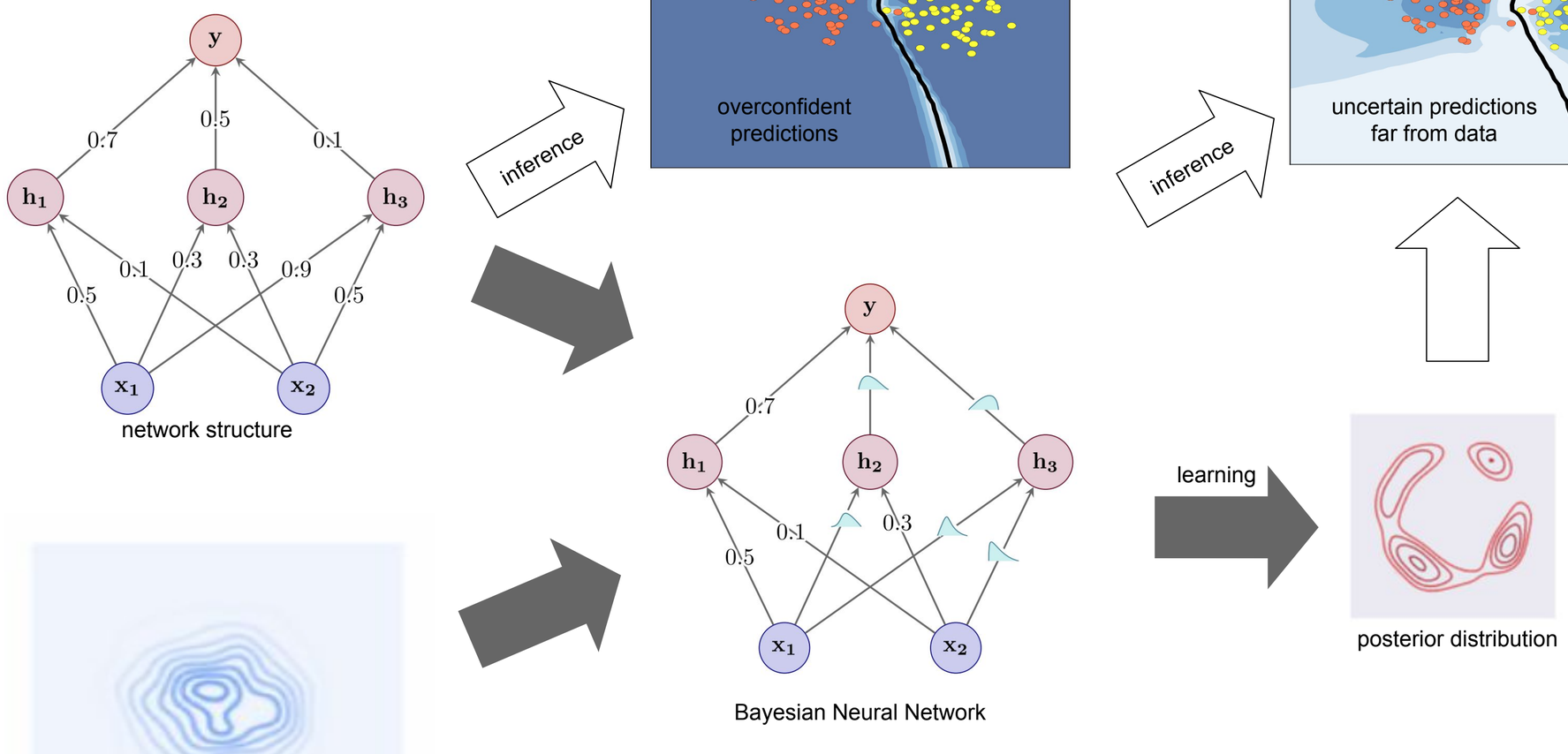

Main hypothesis

Priors, architecture and learning method decided together can lead to better performance

Research Questions

1. **RQ1:** How better priors can improve performance of BNNs?
2. **RQ2:** What architectures of priors and posteriors are optimal?
3. **RQ3:** How to select priors for BNNs?
4. **RQ4:** Shall models with advanced priors be handled in a more or less Bayesian way?

Motivation

- Overconfidence in predictions and miscalibration of modern neural networks.
- Computational difficulty and lack of intuition in specifying BNNs and their priors.
- The "cold posteriors" problem highlighting potential misspecification in BNNs.

Scientific Goals of the Project

- Address shortcomings of Deep Neural Networks in handling epistemic uncertainty and dependence on large data sets.
- Explore Bayesian Neural Networks as a means to incorporate uncertainty in a principled manner.
- Address critical gaps in understanding and applying BNNs.
- Investigate how integrating Bayesian approaches for deep learning can enhance AI applications.

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