**M.Sc. Topic**

Identifying a single-best model for a given case study is often challenging. Instead, it can be beneficial to combine several competing models into a weighted model average, such that the resulting model shows better predictive skill than the individual models. Here, we investigate a method that combines models such that their individual variances (width of prediction interval) and their weights are optimized toward maximum prediction skill in a validation period.

Previous works have shown that the method can improve predictive skill significantly, e.g. when combining two similar hydrological models. Performance is less clear in situations where a larger number of models is averaged. Open questions to be investigated are: (1) Can a stable optimum be found for a larger number of models in the set? (2) How similar do testing conditions have to be compared to training conditions, such that the method performs well? (3) Should the objective function be modified to improve predictive skill further?

The successful applicant will extend the existing implementation of the proposed optimization routine in MATLAB and will test the improved method on a hydrogeological case study of groundwater modelling. There is a good possibility of contributing to a paper if insightful conclusions can be obtained.

**Prospective Tasks**

- Literature review of Gaussian mixture modelling and EM algorithm
- Extending existing code in MATLAB
- Applying the improved method to a set of four hydrogeological models
- Visualization of results and discussion

**Advisors**

- Dr. Anneli Guthke (LS³)

**Desirable Skills**

- MATLAB
- Hydrology, Statistics

Apply now!
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