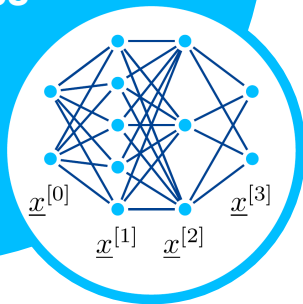


## Adaptive data-driven surrogates



In previous works we have successfully established interpolation schemes for data-driven surrogate models [1,2]. These methods are, in general, related to Radial Basis Function Networks (RBF-Networks). In this student research topic the Concentric Interpolation (CI) [2] will be extended to allow for a more general representation: Samples positions will be generalized without sacrificing too much accuracy in order to enable adaptive sampling to boost the overall efficiency with respect to the available data set size. The efficiency will be validated by comparison to naive feedforward artificial neural networks.

### References

- [1] F. Fritzen, O. Kunc. *Two-stage data-driven homogenization for nonlinear solids using a reduced order model*. *Europ. J. Mech. A/Solids* 69:201-220 (2018).
- [2] O. Kunc, F. Fritzen. *Generation of energy-minimizing point sets on spheres and their application in mesh-free interpolation and differentiation*. *Adv. Comp. Math.* 45:3021-3056 (2019).

### Tasks

- relax position of samples
- replace interpolation by regression
- provide an indicator for predicting the model uncertainty to enable adaptivity

### Technical requirements

- python or MATLAB programming skills
- some experience in numerical algorithms
- knowledge in machine learning desired

