

The **Vienna School of Mathematics (VSM)** is a joint graduate school of the mathematics faculties of the **University of Vienna** and the **TU Wien**. The VSM is devoted to top-level PhD education in all branches of mathematics. It fosters intra- and interdisciplinary scientific cooperation and networking among students and advisors and aims at increasing the international visibility of the Vienna area as a center for mathematics.

The VSM currently announces a PhD position in the area of

Computational Complexity of Neural Network Approximation (University of Vienna, Supervisor: P. Grohs)

Neural networks have been tremendously successful in representing complex functions/processes arising for example in text or image generation. However, in practice it is challenging to infer (or “learn”) a suitable neural network from a finite amount of sampled data. In a recent line of work (see for example [<https://link.springer.com/article/10.1007/s10208-023-09607-w>] or [<https://iclr.cc/virtual/2023/poster/11240>]) we provided a theoretical explanation for this difficulty by establishing fundamental lower bounds on the number of training samples needed to guarantee a given approximation accuracy. These results are however limited to specific activation functions and of a worst-case nature. In this project, they will first be generalized to arbitrary activation functions and the worst-case analysis will be replaced by an average-case analysis. In a second step, the gained understanding will be used to construct novel regularization methods that enable the stable and reliable training of neural networks from only few samples.

The advertised position is associated with the Faculty of Mathematics of the **University of Vienna**. The successful candidate will become a member of the Vienna School of Mathematics and is expected to actively contribute to its activities. The extent of employment is 30 hours per week. The position is planned to start on September 1, 2025.

Application Requirements and Procedure

The candidates must have a master degree (or equivalent) in Mathematics at the moment the PhD position starts. The application documents should contain a letter of motivation; the scientific CV with publications list; higher education certificates/diplomas; and letter(s) of recommendation. Applications have to be sent via the Job Portal of the University of Vienna at these links (pos. [4198](#) + [4199](#)). The deadline for application is **July 4, 2025**.