



**Seminar Hora Informaticae**

**Institute of Computer Science, Prague**

**Tuesday, March 21, 2023, 14.00 – 15.30 (2 - 3:30 PM) CET**

**Meeting room 318, Address: Pod Vodárenskou věží 2, Prague 8**

**ZOOM: <https://cesnet.zoom.us/j/95478234977?pwd=dXoyekFHbDJ0MkNrTjVVS3F2STZqUT09>**

**Meeting ID: 954 7823 4977 , Passcode: 712564**

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**Jan Vybíral, Department of Mathematics, FNSPE, CTU:**

**From ridge functions to neural networks II.**

The mathematics of the performance of neural networks in high-dimensional problems presents subtle challenges and many open problems. We discuss identification of a sum of the so-called ridge functions, which in turn corresponds to one layer of an artificial neural network. We show, that identification of such functions can be done by considering certain matrix decomposition as opposed to tensors of the third order used frequently in the literature. Finally, we present a construction of a multivariate Riesz basis of ReLU neural networks, which performs equally well independently on the dimension.

References:

C. Schneider and J. Vybíral, Multivariate Riesz basis of ReLU neural networks, in preparation

M. Fornasier, J. Vybíral and I. Daubechies, Robust and resource efficient identification of shallow neural networks by fewest samples *Information and Inference: a Journal of the IMA*, 10(2), June 2021, 625-695

S. Mayer, T. Ullrich, and J. Vybíral Entropy and sampling numbers of classes of ridge functions *Constructive Approximation* 42 (2) (2015), 231-264

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**Jan Vybíral** (<https://people.fjfi.cvut.cz/vybirja2/cv.pdf>) is affiliated with the Department of Mathematics, Faculty of Nuclear Sciences and Physical Engineering of the Czech Technical University in Prague. His main research interests are high-dimensional approximation theory, random matrix theory, information-based complexity, and computational mathematics.

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**HORA INFORMATICAЕ** (meaning: TIME FOR INFORMATICS) is a broad-spectrum scientific seminar devoted to all core areas of computer science and its interdisciplinary interfaces with other sciences and applied domains. Original contributions addressing classical and emerging topics are welcome. Founded by Jiří Wiedermann, the seminar is running since 1994 at the Institute of Computer Science of the Czech Academy of Sciences in Prague.

<https://www.cs.cas.cz/horainf>