Associate Professorship of Coding and Cryptography
TUM Department of Electrical and Computer Engineering
Technical University of Munich

Seminar

Recent applications of Levenshtein's reconstruction problem

Levenshtein presented in 2001 his reconstruction problem: given multiple noisy observations of the same information, can the original be deduced, and how? It is a problem applicable to many data storage and transmission scenarios, where multiple transmissions and/or reads are inherently available or else cheaper to obtain than the cost of added redundancy required for tranditional error-correction.

This framework has since seen many adaptations and applications in various contexts, for various channels. It is especially applicable to some novel storage technologies such as cloud storage, racetrack memories and DNA storage.

The student's taks is to research Levenshtein's seminal paper in addition to any recent application of their choosing (some suggestions herein), and present (an introduction to / a summary of) the underlying principles to their peers.

References:

[1] V. I. Levenshtein, “Efficient reconstruction of sequences,” IEEE Trans. on Inform. Theory, vol. 47, no. 1, pp. 2–22, Jan. 2001.

[2] Y. Cassuto and M. Blaum, “Codes for symbol-pair read channels,” IEEE Trans. on Inform. Theory, vol. 57, no. 12, pp. 8011–8020, Dec. 2011.

[3] Y. M. Chee, H. M. Kiah, A. Vardy, V. K. Vu, and E. Yaakobi, “Coding for racetrack memories,” IEEE Trans. on Inform. Theory, vol. 64, no. 11, pp. 7094–7112, Nov. 2018.

[4] E. Yaakobi and J. Bruck, “On the uncertainty of information retrieval in associative memories,” IEEE Trans. on Inform. Theory, vol. 65, no. 4, pp. 2155–2165, Apr. 2019.

[5] Y. Yehezkeally and M. Schwartz, “Uncertainty of Reconstruction with List-Decoding from Uniform-Tandem-Duplication Noise,” IEEE Trans. on Inform. Theory, accepted for publication, Feb. 2021.

Prerequisites

Basic knowledge of error-correcting codes and their applications. Control of basic mathematic notions (linear and abstract algebra) is assumed.

Contact

yonatan.yehezkeally@tum.de

Advisors

Yonatan Yehezkeally