

Critical Summary

Select a paper for a critical summary from the following list and let me know of your choice as soon as possible as *no paper can be chosen by more than one student*. Unpublished papers can be copied from me. Submit your critical summary by **July 25th, 2004**, and then set with me an appointment for the oral discussion on the paper.

General requirements:

The critical summary should be no more than 10 pages long. First, it should include a concise description of the main results in the paper along with explanations. One is not expected to copy proofs or analytical developments, but *is* expected to explain the essence of the techniques used therein. Secondly, and this is the critical part, the summary should include, as much as possible, personal observations of the student: intuitive insights, relationships (if exist) with the material of the lectures, comments on the degree of innovation with respect to previous work, technical rigor and correctness, suggestions for improvement, simplification, or generalization of the analysis, and so on.

For the oral discussion, the student should be knowledgeable not only with regard to the paper itself, and its detailed technical aspects, but also on closely related work like the references cited in the paper. Thus, short papers should not necessary be considered more attractive than long ones.

List of Papers

- (1) O. Barak, D. Burshtein and M. Feder, "Bounds on achievable rates of LDPC codes used over the binary erasure channel," submitted to *IEEE Trans. on Information Theory*. A preprint can be provided by me.
- (2) D. Burshtein and G. Miller, "Asymptotic enumeration methods for analyzing LDPC codes," *IEEE Trans. on Information Theory*, vol. 50, no. 6, pp. 1115–1131, June 2004.
- (3) D. Burshtein and G. Miller, "Expander graph arguments for message-passing algorithms," *IEEE Trans. on Information Theory*, vol. 47, no. 2, pp. 782–790, February 2001.
- (4) D. Burshtein, M. Krivelevich, S. Litsyn and G. Miller, "Upper bounds on the rate of LDPC codes," *IEEE Trans. on Information Theory*, vol. 48, no. 9, pp. 2347–2449, September 2002.
- (5) S. Y. Chung, T. J. Richardson and R. L. Urbanke, "Analysis of sum-product decoding of low-density parity-check codes using a Gaussian approximation," *IEEE Trans. on Information Theory*, vol. 47, no. 2, pp. 657–670, February 2001.
- (6) T. Etzion, A. Trachtenberg and A. Vardy, "Which codes have cycle-free Tanner graphs?," *IEEE Trans. on Information Theory*, vol. 45, no. 6, pp. 2173–2181, September 1999.

- (7) H. Jin and R. J. McEliece, "Coding theorems for turbo code ensembles," *IEEE Trans. on Information Theory*, vol. 48, no. 7, pp. 1451–1461, June 2002.
- (8) A. Kavcic, X. Ma, and M. Mitzenmacher, "Binary intersymbol interference channels," *IEEE Trans. on Information Theory*, vol. 49, pp. 1636–1652, July 2003.
- (9) F. R. Kschischang, Brendan J. Frey, Hans-Andrea Loeliger, "Factor Graphs and the Sum-Product Algorithm," *IEEE Transactions on Information Theory*, vol. 47, pp. 498–519, February 2001.
- (10) F. R. Kschischang and A. W. Eckford, "Low-Density Parity-Check Codes for the Gilbert-Elliott Channel," *Proceedings 41st Annual Allerton Conference on Communication, Control, and Computing*, pp. 1307–1316, Monticello, Illinois, USA, 2003. The paper can be provided by me.
- (11) B. M. Kurkoski, P. H. Siegel and J. K. Wolf, "Joint message-passing decoding of LDPC codes and partial-response channels," *IEEE Trans. on Information Theory*, vol. 48, no. 6, pp. 1410–1422, June 2002. See correction in *IEEE Trans. on Information Theory*, vol. 49, no. 8, p. 2076, August 2003.
- (12) F. Lehmann and G. M. Maggio, "Analysis of the iterative decoding of LDPC codes and product codes using the Gaussian approximation," *IEEE Trans. on Information Theory*, vol. 49, pp. 2993–3000, November 2003.
- (13) J. Li, K. R. Narayanan and C. N. Georghiadis, "Product accumulate codes: a class of codes with near-capacity performance and low decoding complexity," *IEEE Trans. on Information Theory*, vol. 50, pp. 31–46, January 2004.
- (14) M. G. Luby, M. Mitzenmacher, A. Shokrollahi and D. Spielman, "Efficient erasure correcting codes," *IEEE Trans. on Information Theory*, vol. 47, pp. 569–583, February 2001.
- (15) H. P. Nik and F. Fekri, "On decoding of low-density parity-check codes over the binary erasure channel," *IEEE Trans. on Information Theory*, vol. 50, pp. 439–454, March 2004.
- (16) P. Oswald and A. Shokrollahi, "Capacity-achieving sequences for the erasure channel," *IEEE Trans. on Information Theory*, vol. 48, no. 12, pp. 3017–3028, December 2002.
- (17) L. Ping, W. K. Leung and K. Y. Wu, "Low-rate turbo-Hadamard codes," *IEEE Trans. on Information Theory*, vol. 49, pp. 3213–3224, December 2003.
- (18) The following two papers:
 - T. J. Richardson and R. Urbanke, "The capacity of low-density parity-check codes under message-passing decoding," *IEEE Trans. on Information Theory*, vol. 47, no. 2, pp. 599–618, February 2001.
 - T. J. Richardson, M. A. Shokrollahi and R. Urbanke, "Design of capacity-approaching irregular low-density parity-check codes," *IEEE Trans. on Information Theory*, vol. 47, no. 2, pp. 619–637, February 2001.
- (19) T. J. Richardson and R. Urbanke, "Efficient encoding of low-density parity-check codes," *IEEE Trans. on Information Theory*, vol. 47, no. 2, pp. 638–656, February 2001.
- (20) I. Sason and R. Urbanke, "Parity-check density versus performance of binary linear codes over memoryless symmetric channels," *IEEE Trans. on Information Theory*, vol. 49, no. 7, pp. 1611–1635, July 2003.

- (21) I. Sason and R. Urbanke, "Complexity versus performance of capacity-achieving irregular repeat-accumulate codes on the erasure channel," *IEEE Trans. on Information Theory*, vol. 50, no. 6, pp. 1247–1256, June 2004.
- (22) I. Sason, E. Telatar and R. Urbanke, "Asymptotic input-output weight distributions and thresholds of convolutional and turbo-like codes," *IEEE Trans. on Information Theory*, vol. 48, no. 12, pp. 3052 - 3061, December 2002.
- (23) H. M. Tullberg and P. H. Siegel, "Serial concatenated TCM with an inner accumulate code: Density evolution analysis," accepted to *IEEE Trans. on Communications*. A preprint can be provided by me.
- (24) C. C. Wang, S. R. Kulkarni and H. Vincent Poor, "Density evolution for asymmetric channels," submitted to *IEEE Trans. on Information Theory*, September 2003. [Online]. Available: <http://www.princeton.edu/~chihw/IT03DensAsym.pdf>