

Ενδεικτικά Θέματα Εργασιών (projects)

Σημείωση: Τα παρακάτω αποτελούν ενδεικτικά θέματα εργασιών. Κάτω από κάθε θέμα παρατίθεται ενδεικτική βιβλιογραφία. Μπορείτε να επιλέξετε και άλλα θέματα, αρκεί να έχει ενημερωθεί και να έχει συμφωνήσει ο διδάσκων. Περισσότερες οδηγίες και διευκρινίσεις για τις εργασίες δίνονται στο Φυλλάδιο 7.

* Network Coding

- R. Ahlswede, N. Cai, S.-Y. R. Li, and R. W. Yeung, "Network information flow," *IEEE Trans. Info. Theory*, vol. 46, pp. 1204–1216, 2000.
- C. Fragouli et al, Network Coding: An Instant Primer, ACM SIGCOMM 2006, <http://infoscience.epfl.ch/getfile.py?mode=best&recid=58339>.
- R. Yeung, S.-Y. R. Li, N. Cai and Z. Zhang, *Network Coding Theory*, Now publishers, 2006
- S.-Y. R. Li, R. W. Yeung, and N. Cai, "Linear network coding," *IEEE Trans. Info. Theory*, Feb. 2003.
- R. Koetter and M. Medard, "An algebraic approach to network coding," *IEEE/ACM Trans. Networking*, Oct. 2003.
- R. Dougherty, C. Freiling, and K. Zeger, "Unachievability of network coding capacity," *IEEE Trans. Info. Theory*, vol. 52, no. 6, pp. 2365–2372, June 2006.
- <http://www.networkcoding.info/>

* Channel capacity when the channel is unknown or partially known

- A. Lapidoth and P. Narayan, "Reliable communication under channel uncertainty," *IEEE Trans. Info. Theory*, vol. 44, no. 6, Oct 1998.
- A. Lapidoth, and I. E. Telatar, "The compound channel capacity of a class of finite-state channels," *IEEE Trans. Info. Theory*, vol.44, no. 3, pp. 973-983, May 1998
- M. Medard, "The Effect upon Channel Capacity in Wireless Communications of Perfect and Imperfect Knowledge of the Channel," *IEEE Trans. Info. Theory*, vol. 46, no. 3, May 2000

* Capacity of fading channels

- A. J. Goldsmith, and P. P. Varaiya, "Capacity of Fading Channels with Channel Side Information," *IEEE Trans. Info. Theory*, vol. 43, no. 6, Nov 1997
- R. Berry and R. Gallager, Communication Over Fading Channels With Delay Constraints (2002)
- M.-S. Alouini and A. J. Goldsmith, "Capacity of Rayleigh Fading Channels under Different Adaptive Transmission and Diversity-Combining Techniques," *IEEE Trans. Info. Theory*, vol. 48, no. 4, July 1999.

* Capacity of discrete channels with memory

- Βιβλίο Gallager κεφ. 4
- Βιβλίο Ash κεφ. 7

* Relay channel

- T. M. Cover and A. A. El Gamal, "Capacity theorems for the relay channel," *IEEE Trans. Info. Theory*, vol. 25, no. 5, pp. 572-584, Sep. 1979.

* Relay Networks

- S. Avestimehr, S. N. Diggavi, and D. N. C. Tse, "Wireless network information flow," *Proceedings of Allerton Conference*, Sept. 2007, <http://www.eecs.berkeley.edu/~dtse/pub.html>.
- S. Avestimehr, S. N. Diggavi, and D. N. C. Tse, "A deterministic approach to wireless relay networks," *Proceedings of Allerton Conference*, Sept 2007.
- N. Ratnakar and G. Kramer, "The multicast capacity of deterministic relay networks with no interference," *IEEE Trans. Info. Theory*, vol. 52, no. 6, pp. 2425–2432, June 2006.
- G. Kramer, M. Gastpar, and P. Gupta, "Cooperative strategies and capacity theorems for relay networks," *IEEE Trans. Info. Theory*, Feb. 2004.
- G. Kramer, M. Gastpar, and P. Gupta, "Cooperative strategies and capacity theorems for relay networks", *IEEE Trans. Info. Theory*, vol. 51, no. 9, pp. 3037-3063, Sep. 2005.

* Cognitive radio

- J. Mitola, III and G. Q. Maguire, Jr., "Cognitive radio: Making software radios more personal," *IEEE Personal Comm.*, vol. 6, pp. 13–18, Aug. 1999.
- N. Devroye, P. Mitran, and V. Tarokh, "Achievable rates in cognitive radio channels," *IEEE Trans. Info. Theory*, vol. 52, pp. 1813–1827, May 2006.
- N. Devroye, M. Vu and V. Tarokh, "Cognitive Radio Networks," *IEEE Signal Processing Magazine*, vol. 25, no. 6, pp. 12-23, November 2008.
- A. Jovicic and P. Viswanath, "Cognitive radio: An information-theoretic perspective," *IEEE Trans. Info. Theory*, vol. 55, no. 9, pp. 3945 – 3958, Sep 2009.

* Capacity of wireless ad-hoc networks

- P. Gupta and P.R. Kumar, "The Capacity of Wireless Networks," *IEEE Trans. Info. Theory*, vol. 46, no. 2, pp. 388–404, March 2000
- L.-L. Xie and P. R. Kumar, "A network information theory for wireless communication: Scaling laws and optimal operation," *IEEE Trans Info. Theory*, vol. 50, no. 5, pp. 748-767, February 2004.
- O. Leveque and I. E. Telatar, "Information-theoretic upper bounds on the capacity of large extended ad hoc wireless networks," *IEEE Trans. Info. Theory*, vol. 51, no. 3, pp. 858-865, March 2005.
- M. Grossglauser and D. Tse, "Mobility Increases the Capacity of Wireless Adhoc Networks," Infocom 2001.
- M. Franceschetti, O. Dousse, D. Tse, P. Thiran, "Closing the gap in the capacity of

wireless networks via percolation theory," *IEEE Trans. Info. Theory*, vol. 53, no. 3, pp. 1009-1018, March 2007.

http://pages.cs.aueb.gr/~toumpis/courses/ad_hoc/adhoc.html

* MIMO Capacity

- Emre Telatar, "Capacity of Multi-antenna Gaussian Channels," *European Transactions on Telecommunications*, vol. 10, no. 6, pp. 585-595, Nov/Dec 1999.
- G. J. Foschini & M. J. Gans, "On Limits of Wireless Communication in a Fading Environment when Using Multiple Antennas," *Wireless Personal Communication*, vol. 6, no. 3, pp. 311-335, March 1998.
- T. Marzetta and B. M. Hochwald, "Capacity of mobile multiple antenna communication link in rayleigh flat fading," *IEEE Trans. Info. Theory*, vol. 45, no. 1, pp. 139--157, January 1999.
- S. Venkatesan, S. H. Simon, and R. A. Valenzuela, "Capacity of a Gaussian MIMO Channel with Nonzero Mean," in *Proc. IEEE Vehicular Tech. Conf. 2003*, p.1767-1771
- A. J. Goldsmith, S. Jafar, N. Jindal, and S. Vishwanath, "Fundamental Capacity of MIMO Channels," *IEEE Journ. Select. Areas Commun., Special Issue on MIMO systems*, 2003.

* Capacity Calculation for Discrete Memoryless Channels

- S. Arimoto, "An algorithm for calculating the capacity of an arbitrary discrete memoryless channel," *IEEE Trans. Info. Theory*, vol.18, pp. 14-20, 1972
- Βιβλίο Gallager κεφ. 4.5

* Duality between MAC and BC

- N. Jindal, S. Vishwanath, and A. J. Goldsmith, "On the duality of Gaussian multiple-access and broadcast channels", *IEEE Trans. Info. Theory*, vol. 50, no. 5, pp. 768 – 783, May 2004.
- S. Vishwanath, N. Jindal and A. J. Goldsmith, "Duality achievable rates and sum-rate capacity of Gaussian MIMO broadcast channels," *IEEE Trans. Info. Theory*, vol. 49, no. 10, pp. 2658-2668, Oct. 2003.
- P. Viswanath, and D. N. C. Tse, "Sum capacity of the vector Gaussian broadcast channel and uplink-downlink duality", *IEEE Trans. Info. Theory*, vol. 49, no. 8, pp. 1912 – 1921, Aug. 2003

* Channel Capacity per unit cost

- S. Verdú, "On Channel Capacity per unit cost," *IEEE Trans. Info. Theory*, vol. 36, no. 5, Sep 1990.

* Asynchronous MAC

- T. Cover, R. McEliece, and E. Posner, "Asynchronous multiple-access channel capacity," *IEEE Trans. Info. Theory*, vol. 27, no. 4, Jul 1981
- J. Hui, and P.A. Humblet, "The Capacity Region of the Totally Asynchronous Multiple-Access Channel," *IEEE Trans. Info. Theory*, vol. 31, no. 2, pp. 207-216, March 1985.

* Transmission of correlated sources over the MAC

- D. Slepian, and J. K. Wolf, "Noiseless coding of correlated information sources," *IEEE Trans. Info. Theory*, pp. 471-480, July 1973.
- T. M. Cover, A. El Gamal, and M. Salehi, "Multiple access channels with arbitrarily correlated sources," *IEEE Trans. Info. Theory*, vol. 26, no. 6, pp. 648-657, Nov. 1980.
- G. Dueck, "A Note on the Multiple Access Channel with Correlated Sources," *IEEE Trans. Info. Theory*, vol. 27, March 1981.

* Capacity of the MAC with feedback

- T. M. Cover and C. S. K. Leung, "An achievable rate region for the multiple-access channel with feedback," *IEEE Trans. Info. Theory*, vol. 27, no. 3, pp. 292-298, 1981.
- L. H. Ozarow, "The capacity of the white Gaussian multiple access channel with feedback," *IEEE Trans. Info. Theory*, vol. 30, no. 4, pp. 623-628, 1984.
- F. M. J. Willems, "The feedback capacity region of a class of discrete memoryless multiple access channels," *IEEE Trans. Inf. Theory*, vol. 28, no. 1, pp. 93-95, 1982.

* Quantum Information Theory

* Kolmogorov complexity and Algorithmic Information Theory

- Cover 2nd Ed., Ch. 14
- G. J. Chaitin, *Information Randomness & Incompleteness*, World Scientific Publishing, 1987.
- Li and Vitányi, *An Introduction to Kolmogorov Complexity and its Applications*, Springer, 1993.

* Rate-distortion theory

- Cover 2nd Ed., Ch. 10.
- Gallager, Ch 9

* Dirty Paper Coding and its use in transmission over the SISO and MIMO BC

- M. H. M. Costa, "Writing on Dirty Paper," *IEEE Trans. Info. Theory*, vol. 29, no. 3, pp. 439-441, May 1983.
- S. Vishwanath, N. Jindal and A. Goldsmith, "Duality achievable rates and sum-rate capacity of Gaussian MIMO broadcast channels," *IEEE Trans. Info. Theory*, vol. 49, no. 10, pp. 2658-2668, Oct. 2003.
- W. Yu and J. M. Cioffi, "Trellis precoding for the broadcast channel," in *Proc. Globecom*, San Antonio, TX, Nov. 2001, pp. 1344-1348.
- G. Caire and S. Shamai (Shitz), "On the achievable throughput of a multi-antenna Gaussian broadcast channel," *IEEE Trans. Info. Theory*, vol. 49, no. 7, pp. 1691-1706, Jul. 2003.

* Gaussian MAC with Inter-Symbol Interference (frequency-selective)

- R. S. Cheng and S. Verdu, "Gaussian multiaccess channels with ISI: capacity region and multiuser water-filling," *IEEE Trans. Info. Theory*, vol. 39, no. 3, pp. 773-785, May 1993.
- D. N. C. Tse, and S. V Hanly, "Multiaccess fading channels. I. Polymatroid structure, optimal resource allocation and throughput capacities," *Trans. Info. Theory*, vol. 44, no. 7, pp. 2796-2815, 1998.

* Universal source coding

- Cover 2nd ed, Ch. 13

* Gambling and Portfolio Theory

- Cover 2nd ed, Ch. 6, 16.

* 2-user interference channel

- T. Han, and K. Kobayashi, "A new achievable rate region for the interference channel," *IEEE Trans. Inf. Theory*, vol. 27, no. 1, pp. 49-60, Jan. 1981
- A. Carleial, "Interference channels," *IEEE Trans. Inf. Theory*, vol. 24, no. 1, pp. 60-70, Jan. 1978
- A. B. Carleial, "A case where interference does not reduce capacity (Corresp.)," *IEEE Trans. Info. Theory*, vol. IT-21, pp. 569 - 570, Sep. 1975.
- H. Sato, "On the capacity region of a discrete two-user channel for strong interference (Corresp.)," *IEEE Trans. Info. Theory*, vol. IT-24, pp. 377 - 379, May 1978.
- A. A. El Gamal, and M. H. M. Costa, "The capacity region of a class of deterministic interference channels (Corresp.)," *IEEE Trans. Info. Theory*, vol. IT-28, pp. 343 - 346, March 1982.
- R. H. Etkin, D. N. C. Tse, and H. Wang, "Gaussian Interference Channel Capacity to Within One Bit," *IEEE Trans. Info. Theory*, vol. 54, no. 12, pp. 5534 – 5562, Dec. 2008.
- V. S. Annapureddy, and V. V. Veeravalli, "Gaussian Interference Networks: Sum Capacity in the Low-Interference Regime and New Outer Bounds on the Capacity Region," *IEEE Trans. Info. Theory*, vol. 55, no. 7., pp. 3032-3050, July 2009.
- Y.-H. Kim, and A. El Gamal, *Lecture Notes on Network Information Theory*.

* K-user interference channel and interference alignment

- V. R. Cadambe, and S. A. Jafar, "Interference Alignment and Degrees of Freedom of the K-User Interference Channel," *IEEE Trans. Info. Theory*, vol. 54, no. 8, pp. 3425 – 3441, Aug 2008
- V. R. Cadambe, S. A. Jafar, and S. Shamai, "Interference Alignment on the Deterministic Channel and Application to Fully Connected Gaussian Interference Networks," *IEEE Trans. Info. Theory*, vol. 55, no. 1, pp. 269 - 274, Jan 2009
- V. R. Cadambe, and S. A. Jafar, "Parallel Gaussian Interference Channels Are Not Always Separable," *IEEE Trans. Info. Theory*, vol. 55, no. 9, pp. 3983 – 3990, Sep 2009

* Secrecy capacity

- A. D. Wyner, "The wiretap channel," *Bell Syst Tech. J.*, vol. 54, pp. 1355-1387, Oct. 1975.
- S. K. Leung-Yan-Cheong and M. E. Hellman, "The Gaussian wire-tap channel," *IEEE Trans. Info. Theory*, vol. 24, pp. 451-456, July 1978.
- I. Csiszar and J. Korner, "Broadcast channels with confidential messages," *IEEE Trans. Info. Theory*, vol. 24, pp. 339-348, May 1978.

* Αντιστοιχία Θεωρίας Shannon και Θεωρίας Μέτρου

- R. W. Yeung, *A First Course in Information Theory*, Κεφ. 6.