EE564: Prof. Chugg,

This is a list of references for EE564 for further reading.

- The **Viterbi Algorithm** is originally presented in [Vi67]. Omura recognized that this algorithm is the optimal decoder (MAP sequence decoder) in [Om69]. In [Fo73], Forney coined the name “Viterbi Algorithm” and demonstrated its widespread applicability.

- Trellis Coded Modulation (TCM) was introduced by Ungerboeck in [Un82]. Pragmatic TCM is described in [ViWoZePa89].

- The **Forward-Backward Algorithm** was developed independently by several authors. Chang and Hancock considered it for an intersymbol interference (ISI) channel in 1966 [ChHa66]. The most widely referenced paper is that of Bahl, et. al. [BaCoJeRa74] wherein the FBA was described for convolutional codes – i.e., this gives rise to the term “Bahl algorithm” or “BCJR Algorithm”. Around the same time, this was developed by Welch and colleagues [McWeWe72] and, in fact, the FBA is a component of the Baum-Welch algorithm which was developed much earlier. For a tutorial on the Baum-Welch algorithm, see [Ra89]. The FBA is also described in the appendix of [Fo73]. A nice hardware architecture for a “min-lag/max-lag” implementation of the FBA is described in [Vi98] and a detailed implementation of this approach is discussed in [MaPiRoZa99].

- The emergence of modern **Turbo-Like Codes (TLCs)** in the mid-1990s is due to Berrou, et.al [BeGlTh93], which was a seminal conference paper in 1993 introducing “turbo” codes or parallel concatenated convolutional codes (PCCCs). This work later appeared in [BeGl96]. The notion of *uniform interleaver analysis* was introduced, as applied to PCCCs, in [BeMo96, BeMo96b]. Similar analysis for serially concatenated codes is presented in [BeDiMoPo98b]. The spectral thinning interpretation is given in [PeSeCo96]. Low Density Parity Check (LDPC) codes were first described by Gallager [Ga62, Ga63], but not appreciated until after the discovery of PCCCs when they were rediscovered in [MaNe96, Ma99b].

  Threshold prediction was developed by several researchers at roughly the same time. Richardson and Urbanke [RiUr01] introduced the idea of density evolution for LDPC codes and used this to design *irregular LDPC codes* with optimized threshold. The Gaussian approximation for simplification was suggested in [ChRiUr01]. Using the Gaussian approximation and SNR-in/SNR-out analysis was developed by several authors [ElHa01, DiDoPo01]. Stephan tenBrink introduced the similar notion of extrinsic information transfer (EXIT) charts early [Te99] and applied these to PCCCs in [Te01].

  An important constrained class of LDPC codes is the generalized repeat accumulate (GRA) code which allow for simple encoding. This construction has appeared many places in the literature independently. In particular, see Ping’s letter [PiHuPh99b], parallel concatenated Zig-Zag codes [PiHuPh99] and similar concatenated tree codes [PiWu99] papers. The same GRA construction can be found in [NaAlNa03, Ma03, JiKhMc00].

- The understanding of the turbo decoding algorithm as probability propagation on graphs with cycles, and the subsequent view of a standard *iterative message passing algorithm (iMPA)*, is largely due to Wiberg [Wi96, WiLoKo95]. Following this, this there was a great deal of interest in connecting this algorithm and the graphical models to those from the computer science literature. Among these essentially equivalent treatments are Belief Propagation (BP) and Belief Networks [McMaCh98, Pe88], the Generalized Distributive Law (GDL) and junction trees or graphs [AjMc00, JeJe94], factor graphs [KsFrLo01], and normal graphs [Fo01]. An equivalent view based on implict index models (i.e., block diagrams), which went largely unappreciated in the coding community, is presented in [BeMoDiPo98] and is expanded upon in [ChAnCh01].

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