

Tutorial 1

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Tutorial Title: "Iterative ('turbo') algorithms on factor graphs: Theory and applications"

Subject Area: Coding Theory

Duration: Half-Day

Tutorial Abstract

Originally developed for decoding turbo codes, normal factor graphs are a natural setting for the description of iterative techniques for detecting coded signals transmitted on a variety of channels. In addition, they provide a unified framework allowing one to understand the connections among seemingly different detection problems. This tutorial describes the application of normal factor graphs to a number of these problems, such as equalization of coded signals, multiuser detection, decoding of multilevel coded modulation, and reception of space--time coded signals.

Potential audience:

1. Soft Decoding. Factor graphs and the Sum--Product algorithm.
2. Decoding codes described by factor graphs. The turbo algorithm.
3. Low-density parity-check codes. Turbo codes.
4. Analysis of turbo algorithms: EXIT charts.
5. Turbo algorithms for multiuser detection.
6. Turbo algorithms for space--time decoding in MIMO systems.