Kritsada Mamat 2010: Low Search Complexity Signature Quantization Schemes for CDMA. Master of Engineering (Electrical Engineering), Major Field: Electrical Engineering, Departmant of Electrical Engineering. Thesis Advisor: Assistant Professor Wiroonsak Santipach, Ph.D. 75 pages.

This work considers a reverse-link code division multiple access (CDMA) where mobile is a transmitter and base station is a receiver. In CDMA, mobiles or user use different signature code to communicate with base station. To increase system or user performance, user need to adapt its signature to a time-varying channel. With channel information, a receiver can compute the optimal signature for a desired user. To relay the signature code from base station to the user, the signature need to be quantized due to limited-rate feedback channel.

We propose three signature quantization schemes with low complexity, namely, a treestructured random vector quantization, PAM (Pulse Amplitude Modulation) and k-dimensional (kd) tree. The proposed schemes are compared with a RVQ scheme, which use exhaustive search to locate optimal signature. We first consider single-user signature quantization and then extend to multi-user one. From numerical results shown, kd-tree among the proposed schemes give the best performance with less complexity. The search complexity of all 3 schemes increases linearly with number of feedback bits for both single-user and multi-user cases. At 1 feedback bit per processing gain, kd-tree perform almost the same as RVQ does. In the example shown number of inner product computations used in kd-tree scheme is 3 order of magnitude less than that used in RVQ.

Student's signature

Thesis Advisor's signature

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