MULTIPLE DESCRIPTION LATTICE VECTOR QUANTIZATION FOR IMAGE AND VIDEO CODING BASED ON COINCIDING SIMILAR SUBLATTICES OF A_n

ABSTRACT

Nowadays applications of multimedia communication are found everywhere. Digital communication systems deal with representation of digital data for either storage or transmission. The size of the digital data is a crucial factor for storage and error resiliency of the data is a crucial factor for transmission systems. Thus, it is required to have more efficient encoding algorithms in terms of compression and error resiliency. Multiple-description (MD) coding has been a popular choice for robust data transmission over unreliable network channels. This technique avoids having data retransmission or the automatic repeat-request (ARQ) in a communication system network. Lattice vector quantization (LVQ) provides lower computation for efficient data compression. In this thesis multiple-description lattice vector quantization for image and video coding based on coinciding similar sublattices of A_n (MDCLVQ-A_n) has been targeted. The design of the MDCLVQ is based on the coinciding similar sublattices of A_2 and A_4. The coinciding sublattices are geometrically similar sublattices with the same index, but generated by different generator matrices. A novel labeling algorithm based on the coinciding sublattices is also developed. The proposed MD coding schemes, MDCLVQ-A_2 and MDCLVQ-A_4 are applied to image coding. In addition, in this research the MDCLVQ-A_2 has been employed to H.264/AVC and Motion JPEG2000 video coding standards to form MD video

coding schemes, MDCLVQ-H.264/AVC and MDCLVQ-Motion JPEG2000. The MD coding schemes are used in order to increase the robustness of transmission over error-prone communication channels. The proposed MD coding schemes have been applied to two standard test images and five videos. The experimental results of application of the MD coders show improvements in terms of encoding performance and transmission robustness.