(1)

Utilizing Repeated Adjacencies of Vector Quantization Indices in Image Compression

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Abstract:

Image compression using vector quantization (VQ) results in highly correlated indices. The correlation between these indices is used to reduce the bits needed to represent them. This is done by many index compression algorithms such as the Hu and Chang, search order coding (SOC), and switching tree coding (STC). A new algorithm for VQ index compression is introduced and it utilizes the local statistics of each image and the repeating pattern of its adjacent indices. The proposed algorithm improves the index compression performance of the basic VQ, with a relatively slight increase of complexity.

Keywords:

VQ Index Compression, Lossless Coding, Image Compression, Vector Quantization.

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(2)

Utilizing Index Usage Map for VQ Index Compression

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Abstract:

In practical vector quantization (VQ) of images, the used pixel block dimensions are kept small to reduce the cost of computations. This in turn results in highly correlated blocks and the corresponding VQ indices will inherit this high correlation. The compression of the basic VQ can be increased through utilising this high correlation of indices by inserting a lossless index compression stage after the VQ stage. A new index compression algorithm is introduced. In this algorithm the 2 dimensional index map is divided into nonoverlapping square blocks. Index usage in each of these blocks is employed to remap (renumber) the reduced number of actually used indices in this block, thus resulting in reduced bit rate expressed in bits/pixel The proposed algorithm reduces the average bit rate by a value depending on the codebook size, namely a reduction of about 32% for codebook size of 64, and down to about 23% for codebook size of 1024. Moreover this algorithm lends itself to being cascaded by other index compression algorithms resulting in increased compression.

Keywords:

VQ Index Compression, Lossless Coding, Image Compression, Vector Quantization.

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(3)

Design and Implementation of Building Energy Monitoring and Management System based on Wireless Sensor Networks

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Abstract:

Wireless sensor networks (WSNs) play a key role in extending the smart grid implementation towards residential premises and energy management applications. Efficient supply and demand balance, and consequently reducing the electricity expenses and carbon emissions, is an immediate benefit of implementing smart grids. In this paper, design and implementation of an energy management system (EMS) for efficient load management are proposed. The EMS reduces the consumption of the consumers at the peak load hours and thus reduces the carbon emissions of the household. The proposed system consists of two main parts. The first part is an Energy Management Unit (EMU) which has a graphical user interface for runtime monitoring and control. The second part is sensor nodes which measure the power consumption of the different loads and transfer it to the EMU via multi-hop network. The EMU is implemented using NI LABVIEW software and XBee-PRO ZigBee module to communicate with sensor nodes. Hardware model is implemented using Arduino Uno microcontroller, XBee-PRO ZigBee module and the ACS712 current sensor. The EMS is applied to building of Electrical Engineering Department at Assiut University as a case study

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