Deep Learning Network and Compression Framework over Limited Bandwidth Network Links

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ABSTRACT

Researchers at the University of California, Davis have developed a technology that enables the quantization of discrete wavelet transformed coefficients to reduce bandwidth for cloud-based storage applications.

FULL DESCRIPTION

The performance of cloud-based image classification is heavily dependent on its allocated bandwidth. In cloud-based environments, reducing bandwidth for a given classification accuracy requires "quantization." Traditionally, this quantization is achieved via the development of manually prepared tables with step sizes for each layer or coefficient. However, these tables are typically not optimized for different purposes – such as image classification or segmentation. Thus, traditional methods can negatively affect classification accuracy under limited bandwidth.

Researchers at UC Davis have developed a technique that more effectively manages both bandwidth consumption and image accuracy in cloud-based environments. This technique minimizes traditional classification loss and quantization loss which quantifies the bandwidth. The technology can be applied to any compression framework in order to learn how to quantize most effectively for any given process – such as classification, segmentation or other applications.

This technology is important because it has the ability to achieve significant accuracy improvement for a given channel bandwidth. Similarly, significant bandwidth can be saved to achieve a desired accuracy for cloud-based image classification.

APPLICATIONS

- Preserves high classification accuracy for band limited transmission of images
- Optimizes the quantization of multiple sub-bands/channels
- Increases the efficiency of machine learning frameworks that facilitate image compression for activities such as classification and visualization under given bandwidth requirement.

FEATURES/BENEFITS

- Optimizes overall bandwidth demand
- Significantly improves accuracy for a given channel bandwidth
- Learns the quantization table for each task - optimizing both bandwidth and image accuracy
- Can customize and enforce differing limits on bandwidth in each, case-specific, application

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OTHER INFORMATION

KEYWORDS

Quantization, Deep Learning, Compression, Bandwidth Management, Cloud storage

CATEGORIZED AS

- **Communications**
  - Other
- **Computer**
  - Other
- **Engineering**
  - Other

RELATED CASES

2020-015-0

- Adopting the technology is straightforward – as it is applicable to any, existing, deep neural, networks
- Can be directly used with various commercial compression codecs without complication

PATENT STATUS

Patent Pending

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Cross-Layer Robust Header Compression (ROHC) Compressor Design
- Wireless Data Transmission with Efficient Radio Resource Usage

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