**Video Transmission using Human Perceptual Model**

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**Project background and goals**

The ultimate object of a video/image compression and transmission system is to minimize the average number of bits used to represent the digital video/image signal while maintaining subjective video/image quality as good as possible.

In this project we explored the utilization of a human perceptual model in video compression, channel coding, error concealment and subjective image quality measurement.

A perceptual distortion model just-noticeable-distortion (JND) is investigated.

**Methodology/Procedure**

- 3D wavelet decomposition
- Human perceptual model Just-noticeable-distortion (JND)
- Arithmetic coding
- Slicing and error concealment
- Rate compatible punctured convolutional (RCPC) code

**Project Results**

- A new perceptual distortion index based on JND is proposed and compared with PSNR
- A video codec implemented in C/C++ with consideration of some practical problems (motion detection for JND model update, slicing for error concealment, etc.)
- Unequal error protection scheme using RCPC
- Simulations in noisy channels with different SNR and different RCPC coding rates

**Significance**

- The novel perceptual distortion index is better than traditional image quality metric PSNR to indicate the subjective quality
- The HVS based video codec system realizes subjective quality control without feedback
- The slicing technique based on JND constrains the error propagation effectively
- The RCPC coding rate selection based on JND assigns bit-rate according to the importance of data

**Future Work**

- Joint source-channel coding based on JND profiles
- Application of JND profile in medical imaging
- Application of JND profiles in classification for subband coding