Project proposal for EE 5359 Multimedia processing, summer 2008, 
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Project Topic:  
**Error Concealment Techniques in H.264/AVC Standard for wireless video transmission**

Motivation:  
Nowadays audio-visual and multi media services are seen as important sources of the traffic within mobile networks. An important characteristic of such networks is that they can not provide a guaranteed quality of service QoS due to issues like interfering traffic, signal to noise ratio fluctuations etc.

Problem Statement:  
One of the limitations within the mobile networks is the low transmission bit rate which demands the reduction of the video resolution and a high efficient video compression technique such as H.264 / AVC video compression standard. This codec is the newest standard, which provides a high compression gain. The video compression is based on the elimination of the spatial and temporal redundancies within the video sequence. This makes the video stream more vulnerable against bit stream errors. These errors can have the effect of degrading the quality of the received video.

Quality Metrics:  
Another important performance parameter is the computational complexity, crucial especially for the wireless video due to the size and power limited mobile terminals and also due to the real-time requirements of services. At present there is no 'standard' criteria used to compare the complexity of the error concealment methods. To evaluate the quality of reconstruction, typically Peak Signal to Noise Ratio (PSNR), Mean Square Error (MSE) and Structural Similarity Index Metric (SSIM) are used.

Error Concealment Techniques:  
In this work we present some techniques that allow the concealment of the visual effect of bit stream error, since the retransmission of erroneous data packets is limited by the defined maximum channel delay. Due to the nature of video image there exists significant statistical correlation between adjacent frame pixels in spatial domain and between the adjacent video frames in the temporal domain. This property has been exploited in the design of the error concealment methods. The error concealment can be performed in the spatial domain by interpolating the pixels of the defected part of the video image from the pixels within the surrounding area. The interpolating process can be configured to fit the character of image. For this purpose we integrate some algorithms which can detect the smoothness and the directional structure within the processed area. On the other hand the error concealment can be performed in the temporal domain where the pixels of the missing part of the image can be copied from the previously decoded neighboring frames. The copying process can be adjusted to fit the dynamic...
character of the video sequence by applying the motion compensation to the copied image parts. For this purpose we use different algorithms, which can estimate the amount of motion within the processed part of video sequence. Finally this work investigates the performance of each method in terms of the computational complexity and the resulting image quality.

Literature Review:
Error Concealment scheme for entire frame loss [2], Motion Vector Estimation[3,4,5], Temporal error concealment and spatial error concealment [1,3,6,8], Error propagation [5,9,16].

References:


