EE368B - Image and Video Compression

Course Information

3 units, Autumn 2000-2001, MWF 9:00-9:50, 60-61G

Introduction

Visual information plays an important role in almost all areas of our life. Due to the vast amount of data associated with images, compression is a key technology for their digital transmission and storage. For video, the problem is even more severe; a feature-length movie in today’s television resolution would need more than hundred GByte, when stored in uncompressed form. Fortunately, advanced compression schemes are known today that enable applications unthinkable only a few years ago, such as video streaming over the Internet or mobile videophones.

The new course "Image and Video Compression" presents a comprehensive overview of the principles and algorithms employed in modern source coding schemes for still and moving images. It targets students interested in this rapidly evolving area, as well as researchers, engineers and technical managers involved in projects on transmission or storage of visual information. A particular course objective is an in-depth understanding of the rationale behind the current and emerging ISO and ITU-T standards, such as MPEG.

Prerequisites

EE261 - The Fourier Transform and Its Applications
EE278 - Introduction to Statistical Signal Processing

Topics

- Introduction
- Some fundamental results of information theory
- Scalar quantization and vector quantization
- Human visual perception
- Predictive coding
- Transform coding
- Resolution pyramids and subband coding
- Interframe coding
- Motion estimation
- Motion compensated coding
- Coding standard (JPEG, H.261, H.263, and MPEG)
Personnel

Instructor: Bernd Girod  
Course Assistant: Kelly Yilmaz

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General TA: Markus Flierl

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ISE Lab TA: Sung-Won Yoon

Grading

The course grade will be based on homeworks (25%), a mid-term (25%), and a term project (50%). Homeworks (3-4 problem sets which require computer and Matlab) should be done individually, but discussions among students are encouraged. The term project will be done individually or in groups and should take about 40-50 hours in total per person. A project approval is required. The approval deadline is Oct. 31. Web submission of the project report is due to Dec. 1. Please be aware that for the web submission no extensions are granted. Class-room presentations of the projects are scheduled for Dec. 1-8.

Emanation of Course Information

The class home page http://www.stanford.edu/class/ee368b contains all the course information, including lecture slides, assignments, and latest announcements. If you have any questions, you might find the answers in the home page. Otherwise, please direct generic questions about the course to the TAs or Kelly. Contact Prof. Girod or the TAs if you have questions about homeworks and projects.

The class email list is ee368b@lists.stanford.edu. Please make sure that you subscribe to the list, otherwise you might miss important announcements. You can subscribe by sending email to majordomo@lists.stanford.edu with the one line message "subscribe ee368b". To unsubscribe, do the same but replace "subscribe" with "unsubscribe". If you need any help,
send an email to majordomo@lists.stanford.edu with the one line message "help".

The class newsgroup is su.class.ee368b. This is intended to be a platform for students to freely exchange information. We will NOT be checking the newsgroup regularly, so please make sure that you send your questions to the course personnel if you expect an answer from us.

**Handouts**

The lecture notes and the problem sets and occasionally other material will be made available in Adobe Portable Document Format (pdf) form. These can be read on virtually any platform using the free Adobe Acrobat Reader software.

**Computing**

We recommend that you use the Image Systems Engineering (ISE) Lab to do all your work in this class, although you can choose to stay with the Leland account or your own machine, with the only requirement that a copy of all your project files should be on ISE at the time of submission. We will create an ISE account for you in the first few weeks of class. Please watch out for our announcements regarding this issue. See the web page Computing Resources for a description of the ISE Lab.

*Sep 26, 2000*