

IEE7745: Source Coding 訊源編碼 (Sept. 2011)

Time: Monday (1:30pm –3:20pm)-ED301; Thursday (4:40pm-5:30pm)-ED101

Instructor: 杭學鳴 Hsueh-Ming Hang, ED609, x31861

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Objectives: This course introduces the basic theory and various techniques used in multimedia compression. It covers both lossless and lossy coding but with a higher percentage on the latter. We emphasize on the fundamental principles of the compression techniques used for different types of data such as speech, audio, image and video. Also covered briefly are popular compression standards such as JPEG and MPEG.

This course may be taught in English. (本課程可能用英語教學。)

Classnotes: 杭學鳴 <http://cwww.ee.nctu.edu.tw>

Textbook: Class notes;

K. Sayood, *Intro. to Data Compression*, 3rd Ed., Morgan Kaufman, 2006.

Recommended Readings:

1. J.-R. Ohm, *Multimedia Communication Technology*, Springer, 2004.
2. Y. Q. Shi and H. Sun, *Image and Video Compression for Multimedia Engineering*, 2nd ed, CRC Press, 2008
3. D. Salomon, *Data Compression: The Complete Reference*, Springer, 2007

Grading: Homework: 35 % (~3-4 HW Sets (10%) + 2 Computer (25%))

Final Examine: 30% (2 hours, closed book, two pages of (one-sided) A4 notes)

Term Project: 35% (one computer assignment + one paper study -- from a given list; 15 or 20 mins each person; two persons as a group select a topic)

Background: Signals and Systems, Commu. Systems, Digital Image Proc.

Contents:

- (1) Introduction
- (2) Lossless Coding (Huffman, arithmetic, and dictionary)
- (3) Scalar/Vector Quantization
- (4) Predictive/Differential Coding (Speech Coding)
- (5) Transform Coding (JPEG)
- (6) Subband Coding (MPEG Audio)
- (7) Wavelet Coding (JPEG2000)
- (8) Motion estimation; (9) Video Coding (MPEG/ITU Video)
- (10) 3D Video (MPEG)

Schedule: Source Coding (Sept. 2011)

Hsueh-Ming Hang, Sept. 2011

Week	Month(s)	Days		Remarks
1	Sept.	<u>15</u>		Conference
2	Sept.	19, 22	(1) Introduction; (2) Lossless Coding	
3	Sept.	26, 29	(2) Lossless Coding	
4	Oct.	3, 6	(3) Scalar/Vector Quantization	
5	Oct.	10, 13	(3) Scalar/Vector Quantization; (4) Predictive/Differential Coding	
6	Oct.	<u>17</u> , <u>20</u>	(4) Predictive/Differential Coding	Conference
7	Oct.	24, 27	(5) Transform Coding	
8	Oct./Nov.	31/ 3	(5) Transform Coding	
9	Nov.	7, 10	(6) Subband Coding	
10	Nov.	14, 17	(6) Subband Coding	
11	Nov.	21, 24	(7) Wavelet Coding	
12	Nov./Dec	<u>28/ 1</u>	(8) Motion Estimation	(MPEG meeting?)
13	Dec.	5, 8	Final (1--7)	
14	Dec.	12, 15	(8) Motion Estimation; (9) Video Coding	
15	Dec.	19, 22	(9) Video Coding	
16	Dec.	26, 29	(9) Video Coding;	
17	Jan.	2, 5	(10) 3D Video	
18	Jan.	9, 12	Presentation	

Final Examine: Dec. 5; (1-- 7); 2 hours; closed book, 2-page notes

Term Project: Jan. 9 – 12, 2012