

COURSE	Name : Multimedia Signal Processing
	Code : EE185331
	Credit(s) : 2
	Semester : III

Description of Course

This course discusses the basic principles of image and video coding in the context of the generating and distributing of multimedia content through communication systems and networks. The topics discussed are: representation, acquisition and display of color and video images; sampling images and videos on spatial domains and time and their relation to the frequency domain; the working principle of the human vision system and its relation to light and color theory; application of information theory for coding without loss and with losses; predictive coding and coding transformation; image coding principle; the principle of video coding based on motion compensation and the use of optimization techniques in the coder design; and examples of standard video coding techniques and their development.

Learning Outcomes

Knowledge

(P01) Mastering the concepts and principles of science in a comprehensive manner, and to develop procedures and strategies needed for the analysis and design of systems related to the field of power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics as a preparation for further education or professional career.

Specific Skill

(KK01) Being able to formulate engineering problems with new ideas for the development of technology in power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics.

General Skill

(KU11) Being able to implement information and communication technology in the context of execution of his/her work.

Attitude

(S09) Demonstrating attitude of responsibility on work in his/her field of expertise independently.

Course Learning Outcomes

Knowledge

Mastering the concepts and principles of representation, acquisition and coding of images and videos related to color theory and the application of information theory to design image and video coding.

Specific Skill

Able to design colored image and video acquisition and coding systems with information theory principles and analyze their performance.

General Skill

Able to use software and tools to implement image and video coding with Matlab and VcDemo.

Attitude

Demonstrating attitude of being responsible for the work in his/her area of expertise independently.

Main Subjects

1. Introduction to encoding multimedia signals
2. Formation of images in human vision systems and cameras
3. Human visual system and color theory
4. Representation, acquisition and display of images and videos
5. Source coding without losses
6. R-D theory and quantization
7. Predictive coding and transformation coding
8. Image coding
9. Video coding
10. Standard video coding techniques and their development

Reference(s)

- [1] Jens-Rainer Ohm, "Multimedia Signal Coding and Transmission," Springer-Verlag, 2015.
- [2] John W. Woods, "Multidimensional Signal, Image, and Video Processing and Coding," 2nd ed., Academic Press, 2012.
- [3] William A. Pearlman & Amir Said, "Digital Signal Compression: Principles and Practice," Cambridge University Press, 2011.

Prerequisite(s)

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