

Course number			
Year	Time of starting a course	Day period	Faculty
2016	Fall	Thu.4	Engineering and Science
Lecture code	Subject name[English]	Number of credits	
R0045500	Signal Processing Theory	2	
Charge teacher name[Roman alphabet mark]			
アシャリフモハマッド			

Course content and methods

In this lecture, we shall concentrate about 2-D signal processing, which is digital image processing. First, we shall study the necessary mathematics for 2-D processing. Then, the fundamental of digital image are aimed for study. Image transformations, which are used in this topic, will be reviewed. Image enhancement is one of the main point in image processing to be studied. Then after, we should know about image restoration, where many techniques are going to be said there. One big aim in digital image processing is the image compression algorithms. Here, again we need our concentration on these topics. Image segmentation, representation & description are the remainder topics to make one becomes with full fundamental knowledge about these topics, which could be studied for further readings.

There are many applications for digital image processing, medical imaging, remote sensing, communications, image recognition & so on are few to be mentioned here.

Goals and objectives

To understand mathematics of 2-D signal processing.

To understand human visual perception, robot vision & 3-D stereoscope, image sampling & pixel relations, film, camera.

To understand image transformation.

To understand different algorithm in image enhancement.

To understand different algorithm in image restoration.

Image coding algorithm & segmentation & description

Evaluation criteria and evaluation methods

Present at class 10%

Simulation home work 30%

Report 30%

Persentation 30%

Course conditions

Basic DSP, Communications

Contents of Class

第1回目

Introduction: 2-D system, related theorems

第2回目

Mathematical characteristics of image

第3回目

Digital Image fundamental: Elements of visual perceptions, image model, sampling and quantization

第4回目

Basic relationship between pixels

第5回目

Image geometry, photography film

第6回目

Image transforms: 2-D Fourier transform, FFT, WT, HT, DCT

第7回目

Haar transform, Slant transform

第8回目

The Hotelling transform

第9回目

Image enhancement: Enhancement by point processing

第10回目

Histogram processing, Subtraction, Averaging

第11回目

Spatial filtering, frequency domain, Homomorphic filtering

第12回目

Color image processing

第13回目

Image restoration: Model, algebraic approach, inverse filtering, LMS (wiener) filter

第14回目

Constraint LS restoration, interactive restoration, geometric transformation

第15回目

Image compression

第16回目

Fundamentals, models, error-free compression, lossy compression, standards

■ ■ Prior learning

Student should have basic knowledge about DSP and study some papers and books related. Also prior to each class, students should digest the past lecture and understand it.

■ ■ Post learning

After learning, students should make a presentation of their study and present in the class. This can be their original work or the an study many papers about a subject and make a paper survey for presentation.

■ ■ Textbook

Text book	Title	Digital Image Processing, by Rafael G. Gonzalez, Richard E. Woods			ISBN	9780131687288	Note
	Author						
	Publishing company		Publishing year		NCID	BA83355630	

■ ■ Textbook Remarks

All related Books and papers. Especially Digital Image Processing, by Rafael G. Gonzalez, Richard E. Woods

■ ■ References

■ ■ Reference book Remarks

Also related books and papers.

■ ■ Language

English

Message

ニュースグループ
ura.ie.classes.signal

Office Hours

Tuesday 3 : 0 0 ~ 5 : 0 0、 Friday 3 : 0 0 ~ 5 : 0 0

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