

การประมวลผลภาพ

Digital IMAGE PROCESSING and
COMPUTER VISION

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Purposes of the course

After finish this course, students should be able to:

- explain digital image processing concept and apply in research process.
- In addition, should be able to:
 - display gray/colour images,
 - image enhancement,
 - geometrical transformation,
 - analyse image data using basic statistical methods.
- They should be able to apply in research problems.

Course Description

- Concepts of image processing;
- image processing categories;
- digital characteristics and formats;
- histogram techniques;
- algebraic and geometric operations;
- random technique; filtering design;
- transformation; storage and compression;
- software for image processing and its applications

Evaluation Plan

- Mid Term 30%
- Final 30%
- In the classroom 40%
 - Laboratory
 - Seminar

Introduction

- **Image processing and computer vision** is a burgeoning field that is the need for image analysis tools is ever increasing.
- Along with this is also the need to be able to efficiently and explicitly describe processes used in analyzing images.
- The purpose of this subject is to provide a unified **mathematical language** that coincides and matches well with modern scripting of a computer **program**.

IMAGE NOTATION

- An image is usually conceived as a two-dimensional array of pixel values. However, the number of dimensions increases with the inclusion of color, motion, or more spatial dimensions.
- Thus, the definition of an image begins with the declaration that the space in which the image exists is X and a vector \mathbf{x} spans this space. The pixels (or voxels) locations are defined by this scanning vector $\mathbf{x} \in X$.
- An image is therefore represented in bold as, $\mathbf{a}[\mathbf{x}]$. This represents any type of image from a grayscale image to a hyperspectral image.

operator categories

- **Creation operators.** These create an image or sets of images.
- **Channel operators.** These extract information from specific channels or combine multiple channels into one.
- **Information operators.** These extract information from images but do not alter the images.
- **Intensity operators.** These modify the intensity of the pixels in an image without changing the shapes (or content) within the image.
- **Geometric operators.** These move content within the image but do not change the intensity of the content.
- **Transformation operators** move the information into a completely different coordinate system or representation.
- **Expansion operators.** These convert the image information into an expanded space.