**TUGAS 3 - Resume**

**MK Pengolahan Citra Digital**

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Resume Video

1. Structure of Human Eye - <https://www.youtube.com/watch?v=UdE_jTphTN8>

Elements of Visual Perception

* Digital image processing is built from mathematical and probabilistic formulations.
* The choice of technique are based on subjective and visual judgment from human intuition

Topic:

* Mechanic of the human visual system
* Image formation in the eye
* Brightness adaptation and discrimination

Human Visual System:

* Eye and the brain are the two primary components of human visual system connected by the optic nerve.
* An eye actually a detector to electromagnetic radiation (EMR) emitted by object with a wavelength between 400 to 700 nm.
* Color is related to the wavelenght of the light
* Brightness is related to the intensity of the radiation.
* It also can discriminate figure, detect movement, and detect color.

Visible Spectrume Bands:

* Blue (400 – 500 nm)
* Green (500 – 600 nm)
* Red (600 – 700 nm)
* The sensor or cone cell are distributed across retina

Structure of the Human Eye:

* Have a shape of a spehre with diamter approx 20 nm.
* There are 3 membrane: Cornea-Sclera, Choroid, and Retina.
* Cornea = Tough and transparent tissue
* Sclear = Opaque membrane that encloses the remainder of the eye
* Choroid = Network of blood vessels
* Choroid = Heavily pigmented and reduce the amount of light entering the eye
* Iris = Contracts and expand to control the amount of light enters the eye
* Pupil = Central opening of the iris with diameter varies from 2 to 8 mm.
* Lens = Absorbs approx 8% of visible light spectrum
* Retina = The place of cell receptors.
* Fovea = Central portion of the retina with highly sensitive color receptors (cone cell)
* Cone cell = 6-7 Million cells, Photopic or bright-light vision, Concentrated in fovea
* Rods Cell = 75-150 Million celss, scotopic or dim-light vision, Distributed across retina.

1. Digital Image Processing: p005- Human Visual System - <https://www.youtube.com/watch?v=Zxx026N7TpY>

Human have a huge varies of intensity of brightness. But we can not see very bright and very dark spot in a room at the same time. At example if you go into a tunnel that have no light on it. We are going to be blind until our eyes are adapt and able to see a little of light. Same phenomenon also occurs when you go out from the tunnel.

An actual intensity of a mach band are constant, but human perception will perceived that between two intensity looks the other one darker and the other one brigther. More example with 3 rectangle with same level of gray, but the background are different with 3 level of dark. And it became contrast with different background. The first one will perceived brighter than the other two, it a visual illusion.

Optical Illusion works because the brain need to quickly interpreting or guess what we see. It designed specifically to make use of the flaws in the interpretation of what we sees.

1. Types of Image || Digital Image Processing (AKTU) - <https://www.youtube.com/watch?v=kyGGBgfKF4w>

Types of Images can be determined from the:

* Attributes
* Colour
* Dimensions
* Data types

Based on Attributes:

* Raster images 🡪 Pixel based
* Vector Graphics 🡪 Basic geometric calculated real time in a computer.

Based on Color:

* Binary Images 🡪 Have a value 0 or 1.
* Grey Scale Images 🡪 Have a 8 bit level or a total of 256 grey scale.
* True Color Images 🡪 Full range of available colors. Mostly use 24 bits with a total 2563 point.
* Pseudo Color Images 🡪 False color images to artifically based on interpretation data.

Based on Dimension:

* 2D rectangular array of pixel
* 3D Shapes with added depth or characteristic of 3D shapes.

Based on Data Type:

* Binary image 🡪 1 bit
* Grey Scale Images 🡪 8 bit or 2 byte images
* Color Images 🡪 24 bits or 32 bits to represetn color
* Negative number 🡪 Signed and unsigne integer types
* Floating Point 🡪 Scientific notation

Based on Domain Specific:

* Range images 🡪 Pixel value to denote the distance between the object and camera
* Multispectral Images 🡪 Remote sensing

1. Image Representation - <https://www.youtube.com/watch?v=wtxD9apCtH0>

Image is a grid of pixel with brightness and color information. The most common method are represent with RGB colors from tristimulus theory or substractive color.

1 pixel are represented by 3 bytes or 24 bits of information.

Color depth are measured in bits per pixel.

Size on disk = width x height x color depth (bytes)

So 1280 x 720 with color depth of 24bpp are 2,76 MB is only a single frame, if a video with 30 fps, that’s mean 2,76 x 30 = 82,86 MB per second. A 60 second video will make 4,96 GB file size.

Indexed color are a method to compress bit without make the image destroyed or distorted.

Lossless Compression 🡪 No mather information we have it will make an ouput of the same input.

Lossy Compression 🡪 Will make a slightly different output