Vietnam National University Ho Chi Minh City

Ho Chi Minh City University of Technology

Faculty of Mechanical Engineering
Mechatronics Department

Project Report

Topic

REAL-TIME OBJECTS TRACKING THROUGH CAMERA

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Introduction

1. Image

An image may be defined as a two-dimensional function, $f(x, y)$, where x and y are spatial (plane) coordinates, and the amplitude of f at any pair of coordinates (x, y) is called the *intensity* or *gray level* of the image at that point. When x, y, and the intensity values of f are all finite, discrete quantities, we call the image a *digital image*.

Fig 1.1. lena.jpeg - the first JPEG format image

2-D Fourier Transform:

$$H(\omega_x, \omega_y) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} h(x, y) e^{-j(\omega_x x + \omega_y y)} dx dy \tag{1.1}$$

Schrondinger equation in Spherical Coordinates:

$$-\frac{\hbar^2}{2m}\left(\frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2\frac{\partial\psi}{\partial r}\right) + \frac{1}{r^2\sin\theta}\frac{\partial}{\partial\theta}\left(\sin\theta\frac{\partial\psi}{\partial\theta}\right) + \frac{1}{r^2\sin^2\theta}\frac{\partial^2\psi}{\partial\phi^2}\right) + U(r)\psi = E\psi \tag{1.2}$$

Conclusion

Bibliography

[1] Lê Đức Hạnh (2024), *Computer Vision lecture slide*, Ho Chi Minh City University of Technology.

[2] Lê Đức Hạnh (2023), *Thị giác máy tính và ứng dụng trong Robotics*, VNUHCM Press.