DIGITAL IMAGE PROCESSING

Image Enhancement in Frequency Domain: Session 1

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Today's Lecture

- **Image Enhancement in Frequency Domain**
  - **Fourier Transform**

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Introduction

- Fourier Series

  Any periodic function can be expressed as the sum of sines and /or cosines of different frequencies, each multiplied by a different coefficients

- Fourier Transform

  Any function that is not periodic can be expressed as the integral of sines and /or cosines multiplied by a weighing function

Jean Baptiste Joseph Fourier, French mathematician and physicist (03/21/1768-05/16/1830)

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Example of Fourier Series

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Preliminary Concepts

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Fourier Series

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1-D Fourier Transform: **Continuous Variable**

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1-D Fourier Transform: **Continuous Variable**

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1-D Discrete Fourier Transform

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2-D Fourier Transform: **Continuous Variable**

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2-D Discrete Fourier Transform and Its Inverse

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Properties of 2-D DFT: **Relationships between Samples in the Frequency and Spatial Domains**

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Properties of 2-D DFT: **Translation and Rotation**

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Properties of 2-D DFT: **Periodicity**

Properties of 2-D DFT: **Symmetry**

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Properties of 2-D DFT: **Fourier Spectrum and Phase Angle**

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Phase Angle: **Example**

Phase Angle and The Reconstructed: **Example**

Next Class

- **Image Enhancement in Frequency Domain**
  - **Filtering in Frequency Domain**

Thank you:
Question?