DIGITAL IMAGE PROCESSING

Image Restoration : Session 3

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Image Restoration

- It minimizes local variances of the restored estimated

Procedure for restoration tasks in multiple periodic interference

Isolate the principal contributions of the interference pattern

Subtract a variable, weighted portion of the pattern from the corrupted image

Image Restoration

Optimum Notch Filtering

Extract the principal frequency components of the interference pattern

Place a notch pass filter at the location of each spike.

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Optimum Notch Filtering

Image Restoration

Optimum Notch Filtering

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Assume that w(x,y) remains essentially constant over the neighborhood gives the approximation
w(x+s, y+t) = w(x,y)

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Optimum Notch Filtering

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Optimum Notch Filtering: Example

Image Restoration

Optimum Notch Filtering: Example

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Optimum Notch Filtering: Example

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Linear, Position-Invariant Degradations

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Linear, Position-Invariant Degradations

Image Restoration

Linear, Position-Invariant Degradations: Continuous Impulse Function

Homogeneity

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Linear, Position-Invariant Degradations

Convolution integral in 2-D

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Linear, Position-Invariant Degradations

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Since degradations are modeled as being the result of convolution, image deconvolution is used frequently to signify linear image restoration.

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Estimating the Degradation Function

Three principal ways to estimate the degradation function

1. Observation
2. Experimentation
3. Mathematical Modeling

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Estimating the Degradation Function: Mathematical Modeling (Method1)

- Environmental conditions cause degradation
  - A model about atmospheric turbulence

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Estimating the Degradation Function: Mathematical Modeling (Method2)

- Derive a mathematical model from basic principles

  E.g., An image blurred by uniform linear motion between the image and the sensor during image acquisition

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Estimating the Degradation Function: Mathematical Modeling (Method2)

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Estimating the Degradation Function: Mathematical Modeling (Method2)

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Estimating the Degradation Function: Mathematical Modeling (Method2)

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Estimating the Degradation Function: Mathematical Modeling (Example)

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Inverse Filtering

Image Restoration

Inverse Filtering

Image Restoration

Inverse Filtering

Image Restoration

Inverse Filtering

Next Class

- **Image Restoration**
  - **More Filters**

Thank you:
Question?